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RESEARCH ON TOBACCO IN INDIA (INCLUDING BETEL QUID AND ARECA NUT)

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RESEARCH ON TOBACCO IN INDIA

(INCLUDING BETEL QUID AND ARECA NUT)

An annotated bibliography of research on

use, health effects, economics, and control efforts

Cecily Stewart Ray

with Prakash Gupta and Joy de Beyer

August 2003

Health, Nutrition and Population (HNP) Discussion Paper

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Health, Nutrition and Population (HNP) Discussion Paper

ECONOMICS OF TOBACCO CONTROL PAPER NO. 9

RESEARCH ON TOBACCO IN INDIA
(INCLUDING BETEL QUID AND ARECA NUT)

An annotated bibliography of research on
use, health effects, economics, and control efforts

Cecily Stewart Ray[a] with Prakash Gupta[b] and Joy de Beyer[c]

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Paper prepared for the World Bank for the meeting on Tobacco Control Research in India, held in New Delhi, India on April 10-11, 2002.

The on-line version of this annotated bibliography will be updated periodically. Readers are encouraged to send additional references and abstracts to the authors.

Abstract: This report is a compilation of references and abstracts of all research on tobacco in India from 1985 to 2003. Studies are organised by subject matter, and within each sub-topic, are arranged by year of publication with most recent studies listed first, and for studies published in the same year, alphabetically by author's last name. The studies include tobacco use surveys, studies on tobacco-related mortality, tobacco-related diseases both cancerous and non-cancerous, according to body system and site, and other health problems associated with tobacco use and environmental tobacco smoke. Other topics include the toxicity of tobacco products, educational interventions and the psychology of tobacco use, tobacco control measures and policies, reports on tobacco advertising and sponsorship and research into the tobacco health hazards faced by tobacco workers. It also includes studies on tobacco employment, tobacco growing and technology, and the economics of tobacco. The following databases were searched: Pub Med, Medline, and J-Gate (a new Indian database). The keywords used for the searches were '(Tobacco OR smoking) AND India', as well as names of diseases known from international research findings to be associated with tobacco, 'AND India'. In some cases, reports were excluded if they were duplicative, or the methodology or findings were unclear.

The report is also available on-line, at to http://www.actindia.org/databases.html or www.actindia.org -- click on "databases", or through www.worldbank.org/tobacco. In future, all the abstracts will be available also on the WHO 'Health Internetwork' (HIN) website, that is under development. The electronic file is available upon request, from the authors.

Keywords: tobacco, nicotine, bidi, tendu, gutkha, paan masala, smoking, areca nut, betel-quid, chewing tobacco, smokeless tobacco, reverse smoking, chutta, environmental smoke, passive smoking, second-hand smoke, sidestream smoke, India, cancer, tuberculosis, pulmonary disease, CVD, coronary vascular disease, respiratory disease, stroke, peripheral vascular disease, adverse pregnancy outcomes, nutritional status, tobacco control, tobacco policy, economics of tobacco

Disclaimer: The findings, interpretations and conclusions expressed in the paper are entirely those of the authors, and do not represent the views of the World Bank or the World Health Organization, their Executive Directors, or the countries they represent.

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The electronic file for this document (word.doc file) is available upon request from Cecily Ray or Joy de Beyer, for readers who wish to be able to search or sort the file for personal use. The file can be sent by email, or on CD or diskette.

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PREFACE

In 1999, the World Bank published "Curbing the Epidemic: governments and the economics of tobacco control", which summarizes trends in global tobacco use and the resulting immense and growing burden of disease and premature death. In 2000, there were nearly 5 million deaths from tobacco each year, and this huge number is projected to grow to 10 million per year by 2030, given present consumption trends. Already about half of these deaths are in high-income countries, but recent and continued increases in tobacco use in the developing world is causing the tobacco-related burden to shift increasingly to low- and middle-income countries. By 2030, seven of every ten tobacco-attributable deaths will be in developing countries.

"Curbing the Epidemic" also summarizes the evidence on the set of policies and interventions that have proved to be effective and cost-effective in reducing tobacco use, in countries around the world. Tax increases that raise the price of tobacco products are the most powerful policy tool to reduce tobacco use, and the single most cost-effective intervention. They are also the most effective intervention to persuade young people to quit or not to start smoking. This is because young people, like others with low incomes, tend to be highly sensitive to price increases.

Why are these proven cost effective tobacco control measures –especially tax increases– not adopted or implemented more strongly by governments? Many governments hesitate to act decisively to reduce tobacco use, because they fear that tax increases and other tobacco control measures might harm the economy, by reducing the economic benefits their country gains from growing, processing, manufacturing, exporting and taxing tobacco. The argument that "tobacco contributes revenues, jobs and incomes" is a formidable barrier to tobacco control in many countries. Are these fears supported by the facts?

In fact, these fears turn out to be largely unfounded, when the data and evidence on the economics of tobacco and tobacco control are examined. The team of about 30 internationally recognized experts in economics, epidemiology and other relevant disciplines who contributed to the analysis presented in "Curbing the Epidemic" reviewed a large body of existing evidence, and concluded strongly that in most countries, tobacco control would not lead to a net loss of jobs and could, in many circumstances actually generate new jobs. Tax increases would increase (not decrease) total tax revenues, even if cigarette smuggling increased to some extent. Furthermore, the evidence shows that cigarette smuggling is caused at least as much by general corruption as by high tobacco product tax and price differentials, and the team recommended strongly that governments not forego the benefits of tobacco tax increases because they feared the possible impact on smuggling, but rather act to deter, detect and punish smuggling.

Much of the evidence presented and summarized in "Curbing the Epidemic" was from high income countries. But the main battleground against tobacco use is now in low- and middle-incomes countries. If needless disease and millions of premature deaths are to be prevented, then it is crucial that developing counties raise tobacco taxes, introduce comprehensive bans on all advertising and promotion of tobacco products, ban smoking in public places, inform their citizens well about the harm that tobacco causes and the benefits of quitting, and provide advice and support to help people who smoke and chew tobacco, to quit.

In talking to policy-makers in developing countries, it became clear that there was a great need for country-specific analytic work, to provide a basis for policy making, within a sound economic framework. So the World Bank and the Tobacco Free Initiative of the World Health Organization (as well as some of the WHO regional offices and several other organizations, acting in partnership or

independently) began to commission and support analysis of the economics of tobacco and tobacco control in many countries around the world.

Most of the other papers in this Discussion Paper series report results of new, previously unpublished analyses of tobacco economics and tobacco control issues. Clearly, this annotated bibliography is different, being a compilation of references and abstracts of research which has been published elsewhere, often in refereed journals.

Our hope is that the information compiled in this report will be a useful reference for researchers and others who are looking for information on tobacco use and its impact in India, or on tobacco control in India.

Joy de Beyer

Tobacco Control Coordinator
Health, Nutrition and Population
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The authors are grateful to the librarians at the World Bank who conducted the initial literature searches, to Dr. Gurmeet Hans, Tata Institute of Social Sciences, for sharing her database on youth and tobacco, and to Dr. Mira Aghi and Mr Sat Pal Malhotra for additional items, and to Dr.Ketan Gandhi for helping prepare some of the abstracts. Thanks also go to Victoriano Arias for xeroxing and mailing hundreds of articles, Megha Nalavade for helping prepare the manuscript for publication, Gisele Biyoo for helping with the cover, and to Sandra Sousa, Malini Rego, Geetanjali Chopra, Nira Singh and Janet Nader for helping to arrange the printing and distribution.

The internet version was designed and created by Vishal Bal. It is available at www.actindia.org -- click on “databases”, or go directly to http://www.actindia.org/databases.html.

This analysis was carried out with the aid of grants provided by the World Bank and the Office on Smoking and Health at the US Centers for Disease Control.

The authors are also grateful to the World Bank for publishing the report as an HNP Discussion Paper.

INTRODUCTORY NOTE

This bibliography is an attempt to compile a list of 'all' tobacco and areca nut related research conducted in India since 1985, providing references and abstracts. Most of the abstracts were originally prepared by the authors. The purpose of creating this database is to form a pool of information, which can be drawn upon by tobacco control researchers, advocates for tobacco control and those specializing in public health policy.

This compilation contains abstracts on reports of tobacco use surveys, tobacco related mortality, tobacco related diseases both cancerous and non-cancerous, according to body system and site, and other health problems associated with tobacco use and environmental tobacco smoke. Other topics include the toxicity of tobacco products, educational interventions and the psychology of tobacco use, tobacco control measures and policies, reports on tobacco advertising and sponsorship and research into the tobacco health hazards faced by tobacco workers. Also included are tobacco employment studies, tobacco agriculture and technology, and the economics of tobacco. There are many more studies on the health problems caused by tobacco use than on other topics, reflecting the seriousness of the health impact of tobacco use.

The following **databases were searched**: Pub Med, Medline, and J-Gate (a new Indian database). The keywords used for the searches were 'Tobacco AND India', Smoking AND India, as well as names of diseases known from international research findings to be associated with tobacco, 'AND India'. Proceedings of other meetings on research related to tobacco provided additional sources. We are grateful to the librarians who helped with the literature searches, and to those who contributed articles and other publications from their own collections.

Some judgment was used in **selecting material** for this database, both according to its quality and to the usefulness of the information for framing tobacco control policies or interventions. We decided to include only publications from 1985 onwards. Some papers were excluded because they duplicated another paper by the same author/s, or because the methodology or statistics were unclear. In addition to research studies, some editorials, letters and news articles containing fresh viewpoints, interesting ideas, useful summaries or information were also included. The compilers of this bibliography are not responsible for any errors made by the authors of articles whose abstracts appear in the document. Readers should read the original papers carefully before using information contained in the abstracts.

A **table of contents** is included for quick location of abstracts and references, in which articles are categorised by topic area. Within each topic, articles are listed in reverse chronological order, but ascending alphabetical order of authors last names within the same year. Codes have been given for each article, designating the topic category, the year of publication (or of preparation), and the first three letters of the first author's last name. The table of contents shows the topic codes. Some articles are listed more than once, if they fall into more than one of the categories. Both codes are given with each listing. At the end of this document, there is a **full alphabetical listing** by last name of the first author, to make it easy to search for particular articles, and then locate them in the bibliography according to

the classification code used. The electronic word file is available from the authors upon request (by email, or we can send a CD ROM or diskette), so that users can search and sort the articles electronically. The files are also available on-line at the ACT-India website www.actindia.org and through the World Bank website: www.worldbank.org/tobacco.

The following **types of reports** are included: analytical reports, case series studies and case reports, case-control studies, cohort studies, comparative studies, cross-sectional studies and cross-sectional follow-up studies, detection camp reports, descriptive reports, incidence studies, intervention studies, histological studies, news reports, overviews of research results, predictive reports, proceedings, reviews of studies, recommendations, and tobacco use surveys. There are also a few clinical, biophysical and biochemical studies.

Abstracts and most references to biological research have not been included in this compilation due to the highly technical and specialized nature of this area of research. Tobacco or areca nut research involving animal subjects was omitted also.

A tremendous amount of biological research on the effects of tobacco on the cells of the oral mucosa has been done in India. Researchers in cancer cytogenetics have mostly studied changes in the oral mucosa leading to cancer and the related abnormalities in the DNA structure of oral mucosal cells. Broadly, the main findings are that tobacco acts on cells as a mutagen, disrupting the inherited regulation mechanisms for repair and reproduction, putting them on the road to cancer. Individuals who have inherited defective DNA repair genes are more likely than people with normal DNA to develop cancer within their lifetime, but even persons with normal cell DNA from birth can develop cancer. The main message from cytogenetic research is that tobacco in all forms is carcinogenic and poses health risks to everyone exposed to it. Similarly, experiments with extracts of areca nut (sometimes erroneously referred to as betel nut), have demonstrated that substances it contains interact with and damage DNA, eventually making cells unhealthy and potentially cancerous.

Several health problems, which have been found through various studies conducted in the West to occur more frequently in smokers, have either not been studied in India, or not after 1985. These topics include periodontal disease (studied prior to 1985 in India), peptic ulcer and oesophageal reflux, impotence, osteoporosis, and cervical and breast cancers. Tobacco as a risk factor for these conditions might be worth investigating in India. It should be noted that results on the association of diabetes with tobacco use are also found with the studies on circulatory diseases, since diabetes is a risk factor for circulatory diseases.

This annotated bibliography on tobacco is perhaps the first attempt of its kind. There may be shortcomings and unintended omissions. We shall be most grateful to readers for pointing those out and contributing new as well as missed papers. We urge those working in any fields under-represented here to contribute further articles. This would improve this database and make future versions more useful and comprehensive. The database will be expanded and updated periodically.

Cecily Stewart Ray, Prakash C. Gupta and Joy de Beyer

1. Tobacco Use Surveys and Reports

Tobacco use surveys have been conducted in different areas of India to gather data on the use of tobacco by the population, awareness of the health effects of tobacco and attitudes toward tobacco use and efforts to discourage its use (usually called "tobacco control"). The purpose of these surveys is usually for planning awareness programmes. Other articles summarized here are reports of distilled knowledge on tobacco use patterns or of events that changed tobacco use in an area. This section is divided into subsections, by the type of population reported on.

1.1 Youth in general

Two articles are summarized here: the first on tobacco use in youth in the Southeast Asian Region, pointing out similarities among youth of the different countries in the region and particularities of tobacco use by Indian youth, and the second on reasons why Indian youth use tobacco and the forms it takes. With the second article, we are making an exception to the cut-off point of 1985.

TUS India (2002) Gup: Review
Gupta, PC and Ray, C. **Tobacco and youth in the south east Asian region.** *Ind J Cancer*, 39 (1), 2002, 5-35.

Tobacco use among youth in South-East Asian countries was reviewed using available literature. Youth who are out-of-school, earning, less educated and live in rural areas are more likely to use tobacco and start during the preteen years. Better educated youth may know the health effects of smoking but the dangers of passive smoking are generally unknown. Youth are fairly unconcerned about the present or future effects of tobacco use on health but do favour tobacco control measures. Children and youth are more responsive than adults to tobacco education. In India, a manufactured smokeless tobacco product, gutkha, has been targeted toward youth and has become extremely popular. An evolving epidemic of oral submucous fibrosis attributed to gutkha use has been documented among youth, with a resultant increase in oral cancer in lower age groups. Children in India are often illegally employed in bidi manufacturing. This review points out the need for specific actions.

TUS India (1982) Agh: Descriptive report
Aghi, M. B. **Patterns of smoking among children in India.** Contribution to UICC Manual on Smoking and Children, Geneva, 1982.

While peer pressure and parental example are important all over India in determining the use of tobacco by children, the dynamics of smoking behaviour are different in urban and rural areas. In **urban areas** the young often smoke because their peers smoke. However

peer pressure is not to the same degree among all the economic classes. Traditional values do not favour smoking among the young and never among females. The real problem in urban areas is located among urban poor. Boys under the age of 10 years and sometimes even 5 to 6 years smoke. Their most common reason is not peer pressure but their film hero who smokes. In the **rural areas** many people believe in multi-magical properties of tobacco and are unaware of the hazards of smoking. Tobacco is believed to be able to cure toothache. Advertisements for cigarettes are not to be found in villages, nor are health warnings against tobacco use. A bundle of bidis does not have any warning. Illiteracy, however would be an impediment to a warning's effectiveness. Gujarati village boys start smoking from the ages of 9 and 10 onwards, seeing their parents smoke. Young rural men often take to smoking to appear modern, open minded, tough and smart and often to show that they are educated. Many villagers in Gujarat believe smoking facilitates bowel movement in the morning. People generally believe that tobacco gives relief from gas, stomach acidity, headache and indigestion, hence when their sons complain of such problems, they give them bidi or hookli to smoke. Young boys who work in agriculture begin smoking because others are smoking and local employers in shops give bidis to young boys to attract them to work in their shops. Gossip groups, commonly seen in rural areas, are conducive to smoking. In rural Andhra Pradesh the following observations have been made: A young boy who is not smoking gets coaxed into it by his friends. Many young boys believe that smoking while watching a play or movie adds to the fun of watching it. Young boys going to work are told by their counterparts that to relax one must smoke. The majority of young girls smoke on advice of elder folks for things like fulfilment of a wish or longing during pregnancy, as a cure for anaemia, asthma and for getting relief from toothaches. A few young boys and girls take up smoking to show that they are grown up. A belief exists that one should not see a non-smoker's face in the morning as this could bring ill luck. Conclusion: It should be brought to the attention of policy makers that no awareness exists in rural India on the ill effects of tobacco. There is room for improvement in awareness in urban areas also. The responsibility for generating such awareness rests on the policy makers, whose policies and budgets impact the country.

1.2 School children

This section on tobacco use in school children is divided into two subsections. The first subsection summarizes results of surveys conducted at different times by different researchers using their own methodologies, while the second one contains surveys in various states in India conducted within a short time span (2001-2002) using identical methodology, as part of the Global Youth Tobacco Survey.

1.2.1 Independent surveys of school children

The articles in this section report on surveys of tobacco use and awareness among school children in areas of Punjab, Gujarat, Goa (2), Tamil Nadu, Karnataka, Haryana, and Maharashtra. The definition of a tobacco user is not clearly spelled out and may not be comparable across all the studies, but it is clear from each of them that tobacco use is

practiced among Indian school children. In areas of low adult use, like Goa and Punjab, tobacco is making inroads among the youth.

TUS India (2002) Kau: Tobacco use survey
Kaur S and Singh S. **Cause for concern in Punjab villages. High levels of Gutkha intake among students**. *Lifeline*, Volume 7 January 2002, 3-4.
(Department of Agricultural journalism, Punjab Agricultural University – Ludhiana)

A random survey among rural school children in five villages around Mullanpur, Punjab State, covering 100 students from 5 schools, was conducted with the objective of finding out the extent of gutkha use (a form of chewing tobacco) among village students, their level of awareness about hazards of tobacco and to suggest remedial measures. The results showed that 66 of the students regularly used gutkha, a matter of concern for parents, teachers and administrators. Of the 66 students found using gutkha, it was seen that 19 consumed it every day while 31 took it almost every day, and 16 said they took gutkha 2 to 3 times a week. Most of the users began in 7^{th} or 8^{th} standard. As many as 97 % of the students were aware of gutkha. Nearly 60% came to know of tobacco from school, and one third through advertisements on TV, magazines and ads painted on public buses. The authors observed that gutkha was available at roadside stands, tea stalls, cigarette shops and grocery stores and even bookshops. Above all it is conveniently priced at Re. 1, within easy reach of school children. In conclusion, the concern is that if gutkha consumption is so high among students in Punjab, the situation could be much worse in other states where religion does not play a deterrent role against tobacco use.

TUS India (1998) Pat: Tobacco use survey
Patel S, Shah R, Pati H, Gandhi P, Bhatt S, Venkur GK. **Awareness and use of substances among high school students.** Abstracts of scientific papers presented at the Golden Jubilee Annual National conference of the Indian Psychiatric Society, 1998. *The Indian Journal of Psychiatry* Vol. 40 Supplement, April, 1998.

Immediately after a 45 minute drug awareness programme, knowledge about tobacco and alcohol was assessed in 964 students studying in grades 9 to 12 in high secondary school of Baroda. It was assessed using a 20 item questionnaire administered in a classroom. A majority of the students had adequate knowledge. Incorrect responses were common regarding the following items: alcohol dependence is a disease, alcohol ensures good sleep and quitting smoking is impossible. Substance use was reported by 38 out of 964 students (3.9%) and it was limited to smoking, smokeless tobacco, alcohol and cannabis.

TUS India (1997) Kri: Tobacco use survey
Krishnamurthy S, Ramaswamy R, Trivedi U, Zachariah V. **Tobacco use in Rural Indian Children.** *Indian Pediatrics*, Vol. 34-october 1997.

(Department of Preventive Oncology, S.S.B. Cancer Hospital And Research Center, Kasturba Medical College and Hospital)

Background: Tobacco-related disease kills an estimated half million people a year in India and most adult users start young. Objective: To assess the degree, nature and pattern of tobacco use by children in rural areas. Subjects and Methods: A Tamil, Gujarati or Kannada translation of an internationally developed English questionnaire was administered to 335 children, both school going and non students, in rural southern Tamil Nadu, rural Gujarat, and slum semiurban areas in Bangalore, Karnataka. The Chi square test for linear trend in proportions was used to test the relationship between 1) The child's awareness of the health hazards of his or her tobacco habits, and 2) the significant persons who use tobacco in the child's environment. Odds ratios of each form of tobacco use were calculated for each score of awareness.
Results: The harmfulness of smoking was better known to children (68% boys, 94% girls) than that of chewing/applying (44% boys, 63% girls) or using snuff (51% boys, 64% girls). Ignorance of harmful effects was significantly associated with smoking and snuff use. Ever smoking was associated with an increased number of adult users in the child's world. Regarding the possibility of future use of tobacco, 83% of 94 girls and 49% of 241 boys said "No" while 11% girls and 47% boys were ambivalent. Only 1 boy said "yes". Conclusion: (i) Nearly 50% of rural children, boys more than girls, experiment with tobacco, mostly as snuff (nashyna, chhinkni) even by 10 years of age; (ii) Snuff use decreases, while smoking and chewing increase with age; (iii) Smoking is better known as a health hazard than chewing or snuff use; (iv) Tobacco use by elders influences children; (v) A larger study with objectively validated answers from 6 to 20 years olds, in and out of school is needed.

TUS India (1995) Kap: Tobacco use survey
Kapoor SK, Anand K and Kumar G. **Prevalence of Tobacco Use Among School and College going Adolescents of Haryana.** *The Indian Journal of Paediatry* 1995, 62: pp 461-466.

The study is about the prevalence of tobacco use among the school- and college-going adolescents of Haryana State in northern India. 1130 male and 256 female students were given a self administered questionnaire regarding tobacco use. Ballabgarh town of Haryana and the village around Ballabgarh were studied. Children from Class VIII to XII and college students in the Arts and Commerce discipline were the subjects of this study. A total of 166 (12%) students had ever smoked. About 6% of the children in the age group 13-14 years had ever smoked which increased to around 15% among those of age 18 years or more. The prevalence in males was 14.2% compared to 2.3% in females. The prevalence of current smokers was 7.1% Smokeless tobacco use was nonexistent. Similarly there were no rural-urban differences. Majority of smokers had started the habit at 10-15 years of age, though 36% had smoked at least once before the age of 10 years. Almost 80% said that their family members disapproved of smoking. Both the smokers and nonsmokers were well aware of the adverse effects of smoking.

TUS India (1992) Vai: Tobacco use survey
Vaidya SG, Vaidya NS, and Naik UD. **Epidemiology of tobacco habits in Goa, India.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 315-320.
(Goa Cancer Society, Dona Paula, Goa, India)
Note: this article is cited in Traquet-Chollat C. Evaluating Tobacco Control Activities-Experiences and guiding principles, WHO, Geneva, 1996, pp 151-152, as an example of an evaluation of school interventions.

Children have been a particular target of tobacco advertising in Goa, India. Use of tobacco in different forms is very common and starts at a young age. Sweets and candies that look like cigarettes are sold in packages similar to cigarette packets. A tobacco product in paste form has been sold in toothpaste-like tubes. Called a "creamy snuff", this product is initially used as toothpaste. Because of this problem, the Goa Cancer Society conducted several epidemiological studies to determine the prevalence of tobacco habits among school-children and adults, to educate school children through a specially designed curriculum on tobacco habits and interventions, and to assess the feasibility of using schoolchildren to encourage their parents and the community in general to stop using tobacco.
Surveys The first survey was carried out from 1986 to 1987. Thirty-one schools were randomly selected from 73 villages, and self-administered questionnaires distributed to 6271 children. Information was elicited on socio demographic data, the nature of tobacco habits, the age of starting to use tobacco, and the possible influence of parents and family members. About 13.4% of boys and 9.5% of girls used tobacco, mostly of the smokeless variety. They began use as early as five years of age and most were introduced to tobacco use by family members and friends. The second survey was carried out the following year on persons aged 15 and over. A house-to- house survey was carried out on a 40% systematic sample from the 73 villages in the first survey. Information on age, sex and tobacco use was collected on 29,713 individuals. The results showed that 33% of men and 20% of women used tobacco.
Interventions Following these two surveys, education about tobacco habits and interventions was given to students in 46 selected villages. Class teachers were given a three-hour training course. A sample of 448 boys and 338 girls from the intervention areas were interviewed again and were compared with a sample of a similar number of boys and girls from the non-intervention areas. At the same time as the school-based intervention, information on tobacco was also distributed to the community by multipurpose health workers and Anganwadi (child welfare) workers. The main measures used were assessment of cognitive and attitudinal changes towards tobacco use following the school health intervention, and the cessation rate among adults who were influenced by the children in the community. (The study did not, however, make clear which were the results of the school health education and which were attributable to the community-based intervention of the Anganwadi). Children who received health education on tobacco and intervention methods were instrumental in achieving a stoppage rate of 9.7% among adults. Moreover, there was a significant difference in

attitude among children who had been given the programme, compared with the control group. The former group developed a negative attitude towards tobacco. The investigation focused on the importance of including health education material on tobacco in school curricula. It highlights the findings that such material is useful in shaping children's attitudes towards tobacco and in conveying the intervention messages to their parents.

TUS India (1991) Jay: Tobacco use survey
Jayant K, Notani PN, Gulati SS, Gadre VV. **Tobacco usage in school children in Bombay, India. A study of knowledge, attitude and practise.** *Indian J Cancer* 1991 Sep;28(3):139-47.
(Cancer Research Institute, Parel, Bombay, India)

A study of knowledge, attitudes and practice with regard to tobacco usage was conducted among 1278 boys and 353 girls studying in the final year in various schools in Bombay. The proportion of boys using some form of tobacco (including experimenters/triers) was significantly higher in private English medium schools (22.5%) than in private Indian language schools (6.9%) or municipal Indian language schools (13.8%). There was also a significant difference between the two types of Indian schools. The only girls in the study were from Indian language schools and the proportion of tobacco users was very low (1.1%). Most (86%) boys who used tobacco were smokers. Hence the detailed analysis is restricted to smokers. Several probable factors influencing smoking behaviour were studied. It was found that a significantly higher proportion of boys smoked if their father or best friend smoked. Generally boys were more sensitive to best friend's or elder brother's disapproval than to parental. They were well informed about harmfulness of smoking but knowledge about specific health hazards was limited. Most of them had a positive attitude towards nonsmoking and smoking control programmes. Tobacco use has been proven to be a major health hazard. Although its use in adults in India is common, prevalence in adolescents in urban schools is not yet high. Before the situation changes we need to mount anti-tobacco educational programmes and work towards a non-tobacco generation to contain the harmful consequences of tobacco usage.

TUS India (1989) Vai: Tobacco use survey
Vaidya SG and Naik UD. **Study of Tobacco Habits in School Children in Goa.** In: Sanghvi LD and Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 169-173.

Children notice everything that happens around them, very often without knowing the significance, but which has profound influence on their behaviour later, when they group up. There is hardly a child who does not know the smoking and chewing habits of their parents and teachers and there is hardly any parent or teacher who knows the tobacco or for that matter probably any other habits of their children or wards. A survey conducted in nine schools in villages of Goa, India covering 1668 children by self-administered

structured questionnaire revealed that 18% were tobacco habitués. The prevalence of tobacco habits was higher in boys (22%) than in girls (13%). The common habits were the use of “mishri” or “masheri” (i.e. roasted and powdered tobacco rubbed over the gums with the index finger) and “creamy snuff” toothpaste. While 84% (256) of the habitués had a single habit, 12% and 4% had double and triple habits respectively. The mean age of acquiring the habit was 11.9 years. Almost 75% of the habitués stated family influence as the most common influencing factor.

TUS India (1987) Moh: Tobacco and other drug use survey
Mohan D et. al. **A multicentred study of drug abuse among students** (sponsored by the Ministry of Welfare, Government of India). Preliminary Report, AIIMS, New Delhi 1987.

This study found that among males, the most commonly abused psychoactive drug was alcohol (58.5%), followed by tobacco (19.3%) and opium (6.3%). Tobacco and alcohol are two major sources of revenue for the government and are actively promoted by companies that process or produce them.

1.2.2 Global Youth Tobacco Surveys in India

WHO and CDC developed the Global Youth Tobacco Survey (GYTS) to track tobacco use among youth across countries using a common methodology and core questionnaire, allowing comparability across surveys. The GYTS surveillance system is intended to enhance the capacity of countries to design, implement, and evaluate tobacco control and prevention programs. Funding for the GYTS has been provided by the Centers for Disease Control and Prevention, Canadian Public Health Agency, National Cancer Institute, UNICEF, and the World Health Organization-Tobacco Free Initiative. The Tobacco Free Initiative (TFI) of the WHO and the CDC also provide technical assistance to the GYTS.

"Fact sheets" are available for India, summarising major findings of the surveys completed so far in 19 states/cities. Prevalence of tobacco use ranges from 4 percent to 63 percent among the full student samples; from 6 percent to 69 percent among boys, and from 2 percent to 56 percent among girls. Prevalence rates, and the percent of students who smoke but said they wanted to stop, are summarized below. The website for the factsheets: http://www.cdc.gov/tobacco/global/GYTS.htm

State/city	% students who use tobacco (all forms)	% girls	% boys	% smokers who would like to stop
Arunachal Pradesh	50	54	44	60
Assam	36	45	25	67
Bihar	59	61	51	67
Central Bihar	11	10	3	67
Culcutta	18	19	15	48
Delhi	5	6	3	No data
Goa	5	6	3	No data
Maharashtra	13	13	11	No date
Manipur	62	74	47	22
Meghalay	44	58	32	59
Mizoram	54	58	49	85
Mumbai	4	6	2	81
Nagaland	63	69	56	81
Navoday	11	13	8	92
Rajastan	18	22	10	71
Sikkim	55	68	38	27
Tamil Nadu	7	8	5	73
Tripuna	44	50	37	33
West Bengal	15	17	8	76

Source: GYTS surveys, accessed on-line http://www.cdc.gov/tobacco/global/GYTS.htm

About the GYTS Survey:

Methodology

- School-based survey of students aged 13-15 years
- Can include public and private schools
- Multistage sample design with schools selected proportional to enrolment size
- Classrooms chosen randomly within selected schools
- All students in selected classes eligible for participation
- Anonymous and confidential self-administered questionnaire
- Computer-scannable answer sheets
- Requires only 30 - 40 minutes to administer
- Fieldwork conducted in 6 - 8 weeks
- Country-level data with regional level stratification possible
- Core questionnaire
- Country may add questions to the questionnaire

The GYTS Questionnaire is composed of "core" country-approved questions designed to gather data on seven topics:

Prevalence of cigarette smoking and other tobacco use among young people

- How many young people have experimented with smoking cigarettes or use other forms of tobacco products

- The age at which young people begin cigarette smoking
- What brand of cigarettes young people smoke
- Where young people usually smoke

Knowledge and attitudes of young people towards cigarette smoking

- The strength of intention to remain nonsmokers among young people who never smoked (index of susceptibility)
- What young people perceive to be the social benefits and the health risks of smoking cigarettes
- The extent of peer pressure on young people to begin cigarette smoking

Role of the media and advertising on young people's use of cigarettes

- How receptive young people are to cigarette advertising and other activities that promote cigarette use
- Awareness and exposure of young people to antismoking messages

Access to cigarettes

- Where young people usually get their cigarettes
- Whether sellers refuse to sell young people cigarettes because of their age
- How much money young people spend on cigarettes

Tobacco-related school curriculum

- What young people were taught in school about tobacco
- Young people's perceptions of their school's programs to prevent cigarette use

Environmental tobacco smoke (ETS)

- The extent of young people's exposure to smoking at home and in other places
- Young people's perceptions about the harmful effects of ETS

Cessation of cigarette smoking

- The short- and long-term likelihood that young cigarette smokers will quit.
- For surveys in India, the core questionnaire was expanded to include bidi smoking and smokeless tobacco use.

TUS India (2003) Sin: GYTS surveys

Sinha DN[1], Gupta PC[2], Pednekar MS.[2] **Tobacco use among students in Eight North-eastern states of India.** *Indian Journal of Cancer* 2002; 3:1-45.

([1] School of Preventive Oncology, Patna, India; [2] Tata Institute of Fundamental Research, Mumbai, India)

Objectives: To obtain baseline information about prevalence of tobacco use among school children in eight states in North-eastern part of India. Methods: A two-stage probability sample of students in grade 8-10 corresponding to 13-15 years of age was selected in each of the states and surveyed through anonymous, self-administered questionnaire. Results: Among the sampled schools, the school response rate was 100% in all states except Tripura (92%) and Meghalaya (96%). Over 80% of the eligible students participated in the survey. Among the respondents, the proportion of boys ranged between 50%-55%. The range of ever tobacco use was from 75.3% (Mizoram) to 40.1% (Assam). Over 65% users reporting initiation at 10 years of age or earlier in all states except Mizoram (23.1%). The range of current tobacco use (any product) ranged

from 63% in Nagaland to 36.1% in Assam. Current smokeless tobacco use ranged from 49.9% in Nagaland to 25.3% in Assam. Among the North-eastern states, Mizoram reported the highest smoking (mainly cigarette) prevalence (34.5%) and Assam reported the lowest smoking (mainly cigarette) prevalence (19.7%). Smoking among girls (8.3%-28.2%) was found to be high in North-eastern India. Cigarette smoking (8.6%-23.1%) was the most preferred form of smoking among students in all North-eastern India. Over half of cigarette smokers (53.2%-96.3%) and a high proportion of smokeless tobacco users (38.5%-80.8%) reported feeling like having tobacco first thing in the morning. Conclusions: Tobacco use including smoking was very high, even among girls, in all eight states in the North-eastern part of India. Signs of tobacco dependency were already visible in these students, more among those who smoked.

TUS India (2001) Ose: Review
Osei MR and Karki YB. **The Tobacco Smokescreen Victims: Women and Children.** *Lifeline*, October 2001: 6: 1-5. WHO SEARO, New Delhi, India.

This short report summarizes prevalence data for India and other countries in the region, and summarizes the results of Global Youth Tobacco Survey from 7 states in India and compares the data with the GYTS from Sri Lanka and Indonesia.

1.3 College students

Four studies are summarized here, one is an unpublished thesis on college students' tobacco use in Karnataka, the next two were done to form the basis for a tobacco control programme in colleges of Maharashtra and Andhra Pradesh respectively, with the former mainly looking at smokeless tobacco and the latter looking only at smoking.

TUS India (2003) Ano: News articles report on tobacco use survey
Anon. All smoke and no hope in sight. Times of India, May 29, 2003
http://timesofindia.indiatimes.com/cms.dll/html/uncomp/articleshow?xml=0&artid=47806294

The articles refers to a study of trends of tobacco consumption by 800 young collegians, conducted by the Consumer Education and Research Center (CERC). It cites the S Yellore, Director, Torch division of CERC as saying that the study finds two main reasons for students becoming addicted to tobacco – peer pressure and the influence of movies and television, and that "most believe "it wont happen to me".

TUS India (1999) Nic: Tobacco use survey
Nichter SM, Nichter M, Sickle DV. **Tobacco use among male college students in Karnataka**. (unpublished) Submitted to Social Science and Medicine as: Prevalence and Patterns of tobacco use among college students in South India.
(University of Arizona, Department of Anthropology, Tucson, Arizona)

The objective of this research was to study the use of tobacco, smoking and gutkha among college students in Karnataka. A sample of 1,606 male students whose mean age was 20 years was interviewed. Various aspects of tobacco use like prevalence of smoking and gutkha usage, age of initiation, use across religious groups, types of tobacco products, reasons for tobacco use, perceived benefits of smoking cigarettes, social and family influences and perceptions of addiction and advertising were studied.
Some of the major findings of this research were that 36% had ever tried smoking and 18% had ever tried chewing gutkha. A quarter of those who had ever tried cigarettes were daily smokers and another quarter were occasional smokers. The rest had either quit or only experimented a few times. Among youth who smoked 5-6 cigarettes per day, about half of these cigarettes were smoked alone. The mean age of initiation for smoking cigarettes and chewing gutkha among college students was about 17 years. Over 80% believed that cigarette smoking was increasing among boys. Students thought that smoking could relieve tension and boredom and give a kick.

TUS India (1998) Han: Tobacco/pan masala use survey
Hans G. **Prevention of Cancer in Youth with Particular Reference to Intake of Paan Masala and Gutkha.** NSS Unit, TISS, Mumbai, India, 1998.

This is a report of inputs provided by the Tata Institute of Social Sciences to sensitize National Service Scheme (NSS) officials and peer educators about the hazards of paan masala and gutkha addiction, as to motivate and enable them to initiate prevention campaigns through NSS. It also has a section to help readers understand the problem. The document includes a report of the study conducted by the author, on paan masala and gutkha addiction amongst students in Maharashtra state. The study is exploratory in nature covering 20 Principals and 1200 students from junior and degree colleges. Colleges communicate clear disapproval of smoking, but not of paan masala or gutkha use. The study identifies misinformation about the effects of these products amongst the Principals, and notes the need to inform them better about these threats to young people's health. Amongst students, addiction to the following forms of tobacco intake was: Cigarettes (smoking): 10.6%, Tobacco Chewing- 6.7 %, paan masala- 9.9 %, and gutkha- 9.6%. Of those who took these products, very few were addicted to a single product - 15 % of those who smoked, 2 % of those who ate paan masala, 13 % of those who ate gutkha and 14 % of those who chewed tobacco in other forms, were addicted to a single product, while the remaining used other forms of tobacco, alcohol and beer. While paan masala/gutkha addiction is found in both rural and urban areas, it appeared to be greatest in small towns followed by villages. Male students spent more on these products than females. The study also confirmed that male students got more pocket money, thus giving them more opportunity to buy these products if they wanted to. The study recommends a peer approach to counter peer pressure. Eighty per cent of students were not addicted to any substance, and three fourth of students who did use various substances said that they did so for fun or enjoyment. These finding hold much potential for a peer-based strategy.

TUS India (1991) Gav: Tobacco use survey
Gavarasana S, Doddi VP, Prasad GV, Allam A, Murthy BS. **A smoking survey of college students in India: implications for designing an antismoking policy.** *Jpn J Cancer Res* 1991 Feb;82(2):142-5.
(Lions Cancer Treatment & Research Centre, Visakhapatnam, India)

A survey of 599 college students was conducted in Andhra Pradesh, India, to help formulate an anti-smoking policy for youth. There were 64.6% boys and 35.4% girls between 15 and 22 years, and 8.2% of students (n = 49, 48M + 1F) who were smokers. It is taboo for girls to smoke. There is no current anti-smoking policy and one is proposed based on the smoking survey results. The policy includes parental pressure to curb smoking, and a ban on (1) advertising of tobacco products, (2) smoking in public places and (3) teachers smoking in school. A majority of the students expressed approval for an increase in the price of cigarettes. The survey revealed a gap in the knowledge of students about the ill effects of smoking, which can be rectified by health education programs.

1.4 Health professionals (including medical and dental students)

Of these seven studies, four examined medical students and one, dental students, one surveyed medical school students, faculty and practitioners, and one focused on physicians at a conference. Three of the studies were conducted in Patna; and one each in Surat, Kanpur and Chandigarh, and the other had a national sample. Tobacco use in Patna students was particularly high (around half) and was reported to have increased over the years. Smoking was mainly confined to males. Two studies linked tobacco smoking to emotional problems. The different definitions of tobacco use – occasional and regular – make comparisons difficult.

TUS / Circ India (2001) Gup: Survey
Gupta A, Gupta R, Lal B, Singh AK, Kothari K. **Prevalence of coronary risk factors among Indian physicians**. *J Assoc Physicians India.* 2001 Dec;49:1148-52.
(Government ESI Hospital, Jaipur.)

Of 1,000 physicians attending a national conference, 256 agreed to participate in a survey to determine risk factors. Smoking or tobacco use was seen in only 5 participants, all males (2.3%).
(For full abstract, see Circ / TUS India (2001) Gup: Survey)

TUS India (2001) Sin: Tobacco use survey
Sinha DN, Gupta PC. **Tobacco and areca nut use in male medical students of Patna.** *Natl Med J India* 2001 May-Jun;14(3):176-8.

Assessment of the use of tobacco and areca nut products among medical students is important because of the impact of the example they will set for their patients as future

care givers. A tobacco use survey was conducted during July to October 1998 among male medical students of the Patna Medical College and Hospital. Of the 509 male students, 400 (93.2% - Editor's comment: must be a typo in either number or %) responded to the questionnaire (mean age: 20.4 years). Questions on tobacco use included the age and school class level at initiation, the type of products used, frequency of use and knowledge of their harmful effects. Questionnaires were distributed in the classrooms and absent students were interviewed in their hostels. Responses on habits were confirmed by third persons. Only 18.8% were non-users, 43% were regular users and 0.7 % were regular areca nut users. In addition, 9.2% were occasional tobacco users and 27.5% were occasional areca nut users. Awareness of product-specific ill effects of use were known to less than 13% of first, second and third year students. In the fifth year this rose to 67 %. Awareness of the ill effects of smokeless tobacco and areca nut products was much lower than knowledge about smoking. Year of initiation peaked at class ten. No student reported initiation during the fifth year of medical school, but some had started during the fourth year. Compared to an earlier survey conducted in 1970, the proportion of regular tobacco users had remained constant around 43%, but chewing habits had increased while smoking had decreased. There was also an additional 36% of occasional users (mostly of areca nut containing products). The increase in regular and occasional use of chewing products was due to a high use of manufactured smokeless tobacco (gutkha, which contains both tobacco and areca nut) and areca nut products (pan masala). Interventions at school and college level designed to prevent medical students from using tobacco and areca nut will impact the future of the health system and the nation's health.

TUS India (2001) Sin: Tobacco use survey
Sinha DN, Gupta PC, Pednekar MS, Singh JP. **Tobacco use among students of Patna Dental College – Bihar.** *Lifeline.* Vol. 6 – October 2001,11-12.
(School of Preventive Oncology, Patna, India, & Patna Dental College, Patna, India)

A study was conducted to ascertain the extent of tobacco use among students of the Dental College in Patna. During the academic year 2000-01, amongst the total of 88 students, 67 responded to a self-administered, structured questionnaire anonymously. Among the 41 male respondents, 65.9% reported current tobacco use and 26.8% past use. Among the 26 females, 38.5% reported current use and 11.5% past use. Current use was higher amongst senior students and higher age groups compared to junior students. Smokeless tobacco is almost as popular among girl students as among boys, while the higher level of tobacco use among boys is mainly due to cigarette smoking. Dentists from Patna Dental College, with its high prevalence of tobacco use, would be unlikely to counsel their patients against using tobacco, a major determinant of oral health status. There is a need for an in-depth study of tobacco use among students, and a review of the content and quality of the dental curriculum to highlight the hazards of tobacco and enhance the knowledge of the teachers and students on this topic. Also, specific interventions that will help prevent tobacco use among dental students are urgently required.

TUS India (1998) Sin: Tobacco use survey with psychological analysis
Singh RK**. To study the relation between tobacco smoking and adjustment among MBBS male students**, in *The Asian Journal of Psychology and Education,* 1998 June;31(3-4): pp 30-32.

The aim of the study was to explore psychological factors related to adjustment of M.B.B.S. male students of Patna and Gaya medical colleges. One hundred fifty students were selected randomly, of whom seventy-five were tobacco smokers and seventy-five were non -smokers. The results showed that smokers had poor adjustment in the area of home, physical health, social and emotional health and they also differed from nonsmokers in personal life.

TUS India (1994) Zul: Tobacco use survey
Zulfikar AR, Vankar GK. **Psychoactive substance use among medical students**, in *The Indian Journal of Psychiatry* 1994;36(3):pp 138-140.

Using a standard epidemiological survey instrument for psychoactive drug use, 215 medical students in three classes from Medical College, Surat were studied. One third of all students reported non-medical drug use. The substances ever used were: betel nut 13%, smokeless tobacco 3%, cigarettes 12%, alcohol 13.5%, cannabis 0.9% and benzodiazepines 3.7%. Use during the last month was reported for four substances and daily use was reported for cigarettes only (3.2%). Cigarette and benzodiazepine use mostly began after entry to medical college. Men and final year students had higher prevalence of drug use.

TUS India (1990) Sar: Tobacco use, knowledge and attitude survey
Sarkar D, Dhand R, Malhotra A, Malhotra S, Sharma BK. **Perceptions and attitude towards tobacco smoking among doctors in Chandigarh.** *Indian J Chest Dis Allied Sci* 1990 Jan-Mar;32(1):1-9.
(Department of Internal Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh)

Two hundred and eighteen randomly selected doctors drawn from among the faculty and students of Postgraduate Institute of Medical Education and Research; Interns and staff at the General Hospital; and General practitioners of the Chandigarh city, were administered a structured questionnaire. Among them 31.6% were current smokers whereas 23.3% had stopped smoking (ex-smokers). All but one of the smokers were men who smoked cigarettes. Spirit of experimentation and peer influence were important initiating factors whereas the habit was continued mainly to concentrate on work/study. Doctors were uniformly aware of the detrimental effects of smoking, particularly its association with lung cancer, chronic bronchitis and coronary artery disease, and this was the major reason for their abstaining or wanting to quit the habit. The relation of smoking with oral cancer, laryngeal cancer, emphysema and peripheral vascular disease was not well appreciated. Counselling patients about hazards of smoking was practised significantly

less often by smoking doctors and surgeons. The options favoured by doctors for preventing smoking included a ban on tobacco advertising, specific health warning on cigarette/bidi packs, and restriction of smoking in public places, particularly hospitals and clinics.

TUS India (1990) Tan: Tobacco use survey
Tandon AK, Singh SK, Chandra S. **Psychosocial study of Cigarette Smoking.** *Indian Journal of Psychiatry* 1990;32(2):pp 159-161.

The study was carried out to assess the smoking habit among medical students and its relationship to demographic, social and psychological characteristics. The study was carried out on the students of G.S.V.M. Medical College, Kanpur. A questionnaire was given to all 1293 students; 854 (733 male and 121 females) responded adequately. There were 263 (30.79%) smokers (6 females), and 591 non-smokers (115 females). Socio economic factors did not differentiate the two groups. The two groups were similar except that the married group had more male smokers (44.3%) than the unmarried group (29.1%). Thirty-nine students (16.15%) of 1st year, 63 students (26.59%) of 2nd year and 69 students (43.1%) of final year were smokers, as well as 12 interns (46.1%) and 80 post-graduates (42.8%). Among smokers 116 (77.3%) had a family history of smoking whereas in 147 (20.9%) there was no family history of smoking. The percentage of mild smokers (using fewer than 5 sticks per day) was 63.5% whereas heavy smokers (more than 10 sticks per day) was 16.3% and the rest were moderate smokers (6-10 sticks per day). The highest mean duration of smoking was found among the P.G. students, followed by interns. As many as 34.3% said they smoked because of failed relationships with a friend and only 8.5% associated it with failure in examination. Alertness was felt after smoking by 33.2% of smokers and increase in concentration power was felt in 28.3% of cases. The percentage of mild smokers was highest in first year students and minimum in senior students. The highest percentage ascribed smoking to being unhappy without any justified cause (30.89%) in moderate smokers, and (13.17%) in the mild smokers. No consistent pattern of psychological state could be obtained in smokers.

1.5 Education personnel and other professional groups

These articles include one on personnel in schools and two on university personnel, and one on media professionals. Tobacco use is high among adults who have daily contact with students, and among people who influence public opinion.

TUS India (2002) Sin: Tobacco use survey
Sinha DN, Gupta PC, Pednekar MS, Jones JT, Warren CV. **Tobacco use among school personnel in Bihar, India.** *Tobacco Control* 2002;11:82-85
(School of Preventive Oncology, Patna)

The article (published as a letter) describes the Global School Personnel Survey (GSPS) conducted in Sept-Oct 2000 in Bihar. The objectives of this cross sectional survey were 1) to obtain baseline information on tobacco use, 2) to evaluate the existence, implementation and enforcement of tobacco control policies in schools, 3) to understand knowledge and attitudes towards tobacco control policies, 4) to assess training and material requirements for implementing tobacco prevention and control interventions and 5) to verify some information obtained from the Global Youth Tobacco Survey. Out of 697 eligible school personnel, 637 participated. Prevalence of smoking among women was 31% and 47.4% among men. Almost all school personnel (91%) agreed that tobacco was addictive and 83% said that it had serious health consequences. Everyone replied, except two, that there was no policy on tobacco use either for students or personnel. Also a large proportion (90.4%) wanted a policy prohibiting tobacco use by students and surprisingly even more wanted a policy prohibiting tobacco use among school personnel (93.9%). Another striking finding was that 80% wanted tobacco companies not to sponsor sports events and 95% wanted a complete ban on tobacco advertisements. Surprising, even though a majority were tobacco users, 78.4% agreed with the need to increase prices of tobacco products, with no difference between users and non users. The findings dispel the myth that Indian women do not smoke. They show encouraging support for measures to reduce tobacco use, even among smokers.

TUS India (2000) Sin: Prevalence survey
Sinha DN, Gupta PC. **Tobacco Use Among Media Personnel In Patna.** *Lifeline*, May 2000, 8: 5-6. WHO SEARO, New Delhi, India.

This pilot study looks at tobacco use among media personnel, hypothesizing that it may influence their coverage of tobacco and its control. The study site is the largest of the 6 or 7 major printing establishments in Patna, the Aryavarta Press. Employees were trained to help conduct a survey, using a self-administered survey questionnaire. The response rate was 81% (300/370 employees; most non-respondents were on leave). Information was checked with a pan and tobacco shopkeeper at the entrance to the organization, and by asing staff about tobacco use by their colleagues. 89% of respondents used tobacco: 30 smokers (10%), 156 (52%) chewers and 81 (27%) smoked and chewed. Nearly 58% of respondents knew that tobacco was not good for health; 35% knew it caused cancer. But 7% were completely unaware of the health consequences of tobacco use. Most (56%) spent less than Rs. 1,000 per year on tobacco products, 21% spent more than Rs. 5,000. Work continues to examine the relationship between use and reporting on tobacco.

TUS India (1997) Kum: Tobacco use survey with sociodemographic analysis
Kumar A, Mohan U, Jain VC. **Influence of some socio-demographic factors on smoking status of academicians.** *Indian J Chest Dis Allied Sci* 1997 Jan-Mar;39(1):5-12.
(Upgraded Dept of Social and Preventive Medicine, KG Medical College, Lucknow.)

Among many habits of life style, smoking is one which is acquired by children during their years at school, and teachers may exert an influence on their students' attitudes and behaviour. To monitor smoking habits of teachers, 573 teachers of Lucknow University were surveyed with the help of a questionnaire based on WHO guidelines. Overall, 21.4% and 12.3% of male teachers reported themselves as current and ex-smokers respectively. None of the female teachers admitted to being a smoker. Significantly higher prevalence of smoking was observed among teachers of sixth decade, Muslims and unmarried. Engineering faculty had the highest proportion (30.2%) of current smokers followed by medicine (25.2%). The study also found a significant association between smoking in teachers and the smoking status of their parents, siblings, children and best friends. There is a need to create smoking cessation opportunities for teachers so as to establish a non-smoking environment in the schools and colleges.

TUS India (1997) Yun: Tobacco use survey
Yunus M, Khan Z. **A baseline study of tobacco use among the staff of Aligarh Muslim University, Aligarh, India.** *J R Soc Health* 1997 Dec;117(6):359-65.
(Dept. of Community Medicine, J N Medical College, Aligarh Muslim University, India)

A cross-sectional survey of 2,439 university employees and research scholars was carried out using a questionnaire. The objective was to assess the prevalence and type of tobacco use and to collect background data for planning health education programmes. The overall prevalence of tobacco use was 51.5% among males and 30.3% among females. There were no female smokers, the preferred habit of tobacco use among women being chewing. Prevalence of smoking was significantly higher among non-teaching staff. Among females, the prevalence of tobacco chewing was higher in non-teaching staff members. Tobacco use (smoking and other forms) rose with age. However, even at 20-30 years of age 25.4% of males were addicted to smoking. Most--60.6%--had smoked for more than 10 years. Among staff members (both teaching and non-teaching) the reason for smoking was either to relax or because of addiction, whereas the research scholars smoked to improve their image or for enjoyment/pleasure. The reasons given by users of other forms of tobacco were boredom, to pass the time or for no reason at all. Among non-users, the majority were aware of the harmful effects of smoking. Family pressure and traditions were also important reasons for not smoking.

1.6 Non-student youth

Two articles find higher tobacco use among non-student youth than among students, a third finds high prevalence of smoking and other risky behaviors among working youth, and very low knowledge of the risks.

TUS India (1993) Ban: Tobacco use survey with psycho-social analysis
Bansal Raj K, Banerjee S. **Substance use by child laborers.** *The Indian Journal of Psychiatry* 1993;35(3):pp 159-161.

The study highlights substance use patterns in 300 randomly selected child laborers aged 5-15 years, from 6 slums in Surat city. It identifies the micro-social and macro-social stressors, which initiate and perpetuate their substance use. It observed that 135 (45%) of the child laborers had used some substance, with a mean of 1.5 substances used per child. Tobacco smoking was the most common form of substance abuse followed by tobacco chewing, snuff, cannabis and opium. The author notes that most studies carried out so far in India have focused on substance abuse by young adults and college students. Scant attention has been paid to the various psychosocial aspects of children and adolescents who are increasingly using substances earlier, due to the changes caused by industrialization, urbanization and resultant adverse effects in the environment (WHO 1979 and 1986). This study found that the commonest reason for substance use was curiosity or experimentation. Substance abuse is known to be a psycho-social problem of multi-factorial nature, and this study found that unfavorable psychosocial environmental factors like urbanization, low socio-economic living conditions, educational and recreation deprivation, work load, low pay etc. played a significant role in substance abuse.

TUS India (1992) Ban: Random survey
Bansal RK. **Sexual behaviour and substance use patterns amongst adolescent truck cleaners and risk of HIV / AIDS.** *Indian J Matern Child Health.* 1992 Oct-Dec;3(4):108-10.

This study was conducted at transport nagar in Indore, a major industrial and commercial center of Madhya Pradesh. Usually each truck has a staff of 3, comprising 1 senior driver, 1 junior driver, and a cleaner, usually a child or an adolescent. 210 such adolescent truck cleaners were surveyed by random sampling of the parked trucks present in the transport nagar. A semi-structured questionnaire was administered to these adolescents using the oral interview technique. The age distribution of the adolescents indicated that 17 were 15-16 years old, 63 were 16-17, 61 were 17-18, and 69 were 18-19. When the income was low, the owners or the senior drivers provided meals and minor expenses. 80% of the adolescents were illiterate, 10.5% were literate, 6.2% had primary education, and 3.3% had middle school education. 88.1% of the cleaners were away from home for 24-28 days a month, 7.1% for less than 24 days, and 4.8% for over 28 days. 25.2% of the cleaners had a history of sexual activity, commonly with prostitutes. 88.6% of the senior drivers regularly visited prostitutes, and in many cases the adolescents' payment to the prostitute was financed by the senior driver. 94.3% of these adolescents had engaged in unprotected sexual intercourse, and the remaining 5.7% had used condoms infrequently. 98.5% of them had not heard of HIV and AIDS. 4.3% had a history of sexually transmitted diseases and had been treated by general practitioners. Substance abuse was fairly common among these young people (140 smoked, 9 chewed tobacco, 2 used opium, and 2 used alcohol more than twice per week), and the cost for those substances was primarily met by the senior truck driver or the owner. The trend was similar for sexual activity, as 25.2% had engaged in sex (12.9% once, 7.1% twice, and 5.2% several times).

Special programs are required for these adolescents to educate them about the risks of unprotected sex and drugs in order to prevent them from contracting HIV/AIDS.

TUS India (1989) Gup: Tobacco use survey
Gupta R, Narang RL, Verma S, Panda JK, Garg D, Munjal A, Gupta KR, Gupta A, Kumar A, and Singh S. **Drug abuse among non student youth labour,** in *The Indian Journal of Psychiatry*, Oct 1989, 29 (4), pp 559-362.

This is a study of 257 non-student youth from Ludhiana district, aged 15 to 24 years. It looks at socio-demographic variables, and extent and frequency of drug abuse. By vocation they were: factory workers (121), rickshaw pullers (102) and railway coolies (34). Details of drug use show that tobacco (60.31%) was most frequently used, followed by alcohol (51.36%). Common reasons for use were curiosity, to keep awake or alert, to overcome boredom and to celebrate social occasions. This finding of this study of non student youth corroborate the study of students by Mohan et al. (1978) which reported that tobacco was the most commonly reported substance used followed by alcohol, for a student population. Varma et al. (1979) reported that next to alcohol, tobacco was the drug most used by students.

1.7 General population

Articles in this section report on tobacco habits in the general population.

TUS India (2002) Ban: Exploratory study
Bansode NN. **An exploratory study on gutkha and smokeless tobacco consumption.** *Nurs J India.* 2002 Jun; 93(6):127-8.

(no abstract available)

TUS / ECON India (2002) Gup: Analytic report
Gupta I, Sankar D. **Tobacco Consumption in India: A fresh look using the National Sample Survey.** Discussion paper no. 47/2002, *Institute of Economic Growth,* Delhi. (Institute of Economic Growth, University Enclave, Delhi-110 007, India)

Reports prevalence for rural and urban households, men and women, and by age group, socio-economic category and State. For abstract, see ECON / TUS India (2002) Gup: Analytic report.

TUS India (2002) Sen: Prevalence survey
Sen U. **Tobacco Use in Kolkata.** *Lifeline,* May 2002, vol 8:7-9. WHO SEARO, New Delhi, India.

(Dept of Epidemiology and Biostatistics, Chittaranjan National Cancer Institute, Kolkata, India.)

A multi-stage cluster sample survey of 100 respondents from each of 60 clusters (total sample of 12,000) of adults (over 18 years) was carried out in Kolkata. Data were collected on demographic and socio-economic characteristics and tobacco use, using standard WHO definitions. Among men, 28% smoked and 36% chewed tobacco, amond women there were 0.5% smokers and 19% chewers. One third of men said they began tobacco use before age 20, 8% between 20 and 30, and a surprising 60% after the age of 30. Initiation age was much younger among smokers: 60% began before the age of 20, and only 8% after the age of 30 years. Tobacco use prevalence (all forms) was highest in the 30-50 age group. Smoking was strongly correlated with socio-economic group: prevalence was 50% among the lowest groups, 36% among the middle groups and 14% among the highest groups. An education gradient was also found, with 47% of respondents who were illiterate or had only informal or primary level education being smokers, and 27-26% smoking prevalence among those with middle-level or more income, but no difference between those with a middle-level education and graduates. Chewing was found much more among lower income people.

TUS India (2000) Ann: Opportunistic consumer survey
Annigeri, VB. **Tobacco Related Diseases: So Far So Bad.** Dharward, Karnataka, 2000. Working Paper No. 5. Part of the research project on "*Economics of Shifting from Tobacco Cultivation, An Action research Project*". Centre for Multi-Disciplinary Development Research, Dharward, Karnataka, 2000.

This 25 page working paper reports on a survey of 500 consumers of tobacco, half from rural areas in the Nippani belt of Belgaum district in Karnataka state, and the other half from taluka headquarters, to represent urban areas. An opportunistic sampling method was used, in which investigators approached people who were leaving places where they had just bought tobacco products, and went home with them to collect data on the person and they family members. The following data were collected:

Social category	cigarettes	Bidi	Gutka	Raw tobacco	snuff	Total
Scheduled castes	14	22	24	39	1	100
Scheduled tribes	8	26	23	42	1	100
Others	10	20	26	43	1	100

The data are also presented by age and gender, education. Tobacco was found to account for just over 7% of all household expenditures in the survey. The most common reasons given for using tobacco was the influence of friends (54%) and that parents and other family members used tobacco (26%). A regression was run to try and explain the number of years of tobacco use, as a function of sex, age, caste, education, occupational

status, expenditures on tobacco as a percent of total consumption expenditures, frequency of consumption and self-rated health. In all cases, age dominates (as would be expected, since the dependent variable is expressed in years of use); this is not the standard way of specifying a regression equation to explain consumption.

The introduction describes the varieties of tobacco, the steps involved in cultivation and curing, and key economic facts on tobacco production, export and taxation in India, as well as the patterns of consumption. It lists the diseases associated with tobacco use, and summarizes some of the epidemiological literature from India and elsewhere.

TUS India (1998) NSS: Population survey data
National Sample Survey Organization (NSSO)**: A Note on Consumption of Tobacco in India: NSS 50 Round (l993-94).** *Sarvekshana*, January-March l998, pp. 76-89. Journal of NSSO, Department of Statistics, Ministry of Planning. Government of India.

This report releases data on tobacco consumption habits of the Indian population as distinct from data on the quantity and value of tobacco consumption, which was released in an earlier issue of the journal (see: ECON India (1996) NSS: Analytical Report). The NSS asked members of each of 115,354 households about four types of tobacco use: smoking, chewing, snuff, and use of burnt tobacco powder or paste. They were asked whether they consumed tobacco in any of the four forms, and if so, whether their use was regular or casual (occasional). The answers were used to generate estimates of prevalence of each type of tobacco use, in rural/urban areas, and in each state and union territory of India, and compared to similar data from the 43rd round survey done in 1987/88.

TUS India (1997): Descriptive report
Types of tobacco used in India and its origin. *Anubhav*: Monthly on Social Issues, Dec. 1997, vol.1, issue 9, pp 9-11, Yuva, Pune.

Observing that the Portuguese traders introduced tobacco in India in the late 16th & 17th Century, this article describes briefly the varied forms of its use, reasons and the present scenario. In smoked form-cigarettes, *bidis, cigar, cheroot, chuttas, dhumti, hookli, chilum* and *hookah* are in use. Smokeless tobacco is being used in the form of *paan* with tobacco, *paan masala, gutkha, mainpuri* tobacco, *Mawa,* tobacco-lime preparation, application- *Mishri, bajjar, Gadhaku*, red tooth powder and creamy stuff. In India, there are various reasons for the use of tobacco. Many women say that they use tobacco to relieve teeth-related complaints. Among men the most important reason is peer group influence. Paan masala and gutka are very convenient to carry and are easily available at low cost even in remote villages; important reasons for their popularity. A sample of 25 women by SEWA, Ahmedabad (reference not cited in detail) has shown that at least 11 of them consume gutkha for relaxation while the rest said that it worked as a panacea for stomach ache, headache and dental pain. Many are attracted to gutkha by television advertisements. It is estimated that out of 400 million people above 15 years of age, 47

per cent use tobacco in one form or another; 72 per cent of tobacco users smoke bidi, 12 per cent smoke cigarettes and 16 per cent use tobacco in the smokeless form (specific reference not cited). The following three references were given at the end:
Times Of India, 'Tobacco-related diseases on the rise in India', warns WHO, 31 May 1997. Asian Age- 'Attention Gutkha Addicts. It can clamp your mouth shut' by N.Ganesh. Nation Needs Cancer Prevention' by Narayan Seva Sanstha, Udaipur.

TUS (1997) WHO: Descriptive report
WHO. **Tobacco or Health: A Global Status Report,** WHO, Geneva, 1997**.**

This global report gives a global overview on the issue of tobacco or health, followed by 2-page profiles for each member country of WHO. It estimates there are 1100 million smokers in the world, of whom 300 million are in developed countries and 800 million are in developing countries. However fewer cigarettes are smoked daily per smoker in developing countries (14) compared to developed countries (22). In South East Asia, the average number of cigarettes smoked per day is 14. Estimated smoking prevalence for men and women 15 years and older in the early 90s in South East Asia Region was 44% for men and 4 % for women. The world's 25 leading tobacco growing countries in 1994 contributed 90% of the world's tobacco. The list includes 6 countries from South East Asia: India, Indonesia, Pakistan, Bangladesh, Thailand and Korea. They contributed almost 15 % of global tobacco leaf production. Five of these 6 countries (excluding Pakistan) were also among the world's top 25 countries manufacturing cigarettes. Korea was the only South East Asian country in the world's top 25 importers of cigarettes, and only Indonesia rank amongst the world's leading 25 exporters of manufactured cigarettes. Thailand stands out in the region for its comprehensive tobacco control programme.

TUS India (1992) Bho: Descriptive report
Bhonsle RB, Murti PR and Gupta PC. **Tobacco Habits in India.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 25-46.
(Basic Dental Research Unit and WHO Collaborating Center for Oral Cancer Prevention, Tata Institute of Fundamental Research, Bombay, India)

Following the introduction of tobacco into India by the Portuguese in about 1600, its use spread rapidly to all parts of the country, percolating into all sections of society. Tobacco is smoked, chewed, sucked or applied to teeth and gums in diverse ways. Many of these methods are specific to particular geographic regions. Bidi and cigarette smoking are practiced widely in all regions. Other smoking habits include chutta and dhumti, which are also smoked in reverse (i.e., with the lighted end inside the mouth), hookli (clay pipe), chilum and hookah. Chewing tobacco in betel quid is the most popular form of smokeless tobacco use. Others comprise tobacco-lime mixture (khaini), tobacco-areca nut preparations like mawa, mainpuri tobacco and pan masalas. Mishri, gudhaku and creamy snuff are initially used as teeth cleaning material, but quickly become addictive.

1.8 Rural communities

This subsection contains eight abstracts on tobacco use in rural communities, mainly among adults. One study found that illiterate tobacco users expressed willingness to give up tobacco after the harmfulness of the habit was explained to them, which was also the case in an intervention in a village in Kerala (see Int India (1988) Bha in section 8).

TUS India (2002) Cha: Population survey
Chandra V, Ganguli M. **Smoking Among The Elderly in Rural Haryana: (India):** *Lifeline*: May 2002, 8:4. WHO SEARO, New Delhi, India.

Data were collected between 1991 and 1999, drawn from 28 villages in Haryana, India, with a total population of 63,237. The report is for 4,811 people aged 55 and older. Tobacco use prevalence was reported to be 71% (males 88%, females 53%). Men reported much earlier initiation ages (typically 15-24) that women, who typically began aged 25 or older. Cigarette smoking was uncommon (6.2%), most smokers used bidi (58.3%) or hookah (73.3%).

TUS India (1998) Cha: Tobacco use survey with socio-demographic analysis
Chaturvedi HK, Phukan RK, Zoramtharga K, Hazarika NC, Mahanta J. **Tobacco use in Mizoram, India: sociodemographic differences in pattern.** *Southeast Asian J Trop Med Public Health* 1998 Mar;29(1):66-70.
(Regional Medical Research Centre, NE Region (ICMR) Dibrugarh, Assam, India)

A study on tobacco use was carried out in Aizawl district of Mizoram, India, to assess the prevalence and pattern of tobacco use. An area served by two Sub-health centers representing town and village populations was selected for a household survey in which 375 people (age 10 years and above) were interviewed about their tobacco habits. Use of tobacco was high among males (56.6%) and females (45.7%), but the high prevalence of smoking among males (42.3%) and chewing among females (27.9%) indicates sex differences in tobacco use patterns. Age and occupation had significant association with tobacco use but influence of education was very low and its association was not significant. The mean age for starting tobacco chewing and smoking for males and females varied significantly. However, the mean age at which use started for adolescent and young (10-29 years) tobacco users was 17.2 years (SD +/- 2.3). Though there are some limitations to this study, it revealed differential patterns of tobacco use, which is valuable information for prevention efforts.

TUS/Nut India (1994) Cho: Tobacco use survey with analysis of health effects
Choudhary S, Choudhary SK, Mishra S. **Effect of Tobacco chewing on Physical Health of Tribal Population,** in the *Maharashtra Journal of Extension Education*, Vol. 13, 1994,pp 237-240.

The study was conducted in Nov-Dec 1991. Cases were selected from the rural tribal population of Rewa District, a village near Kankar. The main objectives of the study were (1) to estimate different diseases caused by tobacco chewing and (2) assess the nutritional status of tobacco chewers as compared to non tobacco chewers. The sample consisted of 200 individuals, of whom 128 were tobacco chewers and 72 were non-tobacco chewers. Tobacco chewers showed higher intensity of disease symptoms compared to non-tobacco chewers. The symptoms for mouth ulcers (35.16%), hypertension (7.03%), anemia (46.09%) and skin diseases (3.13 %) prevailed only in tobacco chewers and not in non-tobacco chewers. A higher incidence of headache (52.34%), night blindness (50.78%), burning abdomen (38.28%) and chest pain (34.38%) was observed in tobacco chewers as against 40.28 %, 6.94%. 25% and 11.11% in non tobacco chewers respectively. Persons with low nutritional status suffered more than those with high and medium nutritional status.

TUS India (1994) Geo: Tobacco use survey with socio-demographic analysis
George A, Varghese C, Sankaranarayanan R, Nair MK. **Use of tobacco and alcoholic beverages by children and teenagers in a low-income coastal community in south India.** *J Cancer Educ* 1994 Summer;9(2):111-3.
(Regional Cancer Centre, Trivandrum, Southern India)

To plan and implement cancer control measures, information about the baseline habit patterns of the community is needed. A coastal village near Trivandrum, Kerala, Southern India, supported mainly by the fishing industry, was identified for this study with regard to establishing measures to control oral cancer there. Adults in coastal Kerala have been found to have very high levels of tobacco and alcohol use, and oral cancer is prevalent in Kerala. Smoking and chewing tobacco and drinking alcoholic beverages are the major risk factors for this cancer. The socioeconomic status and literacy of the fishermen of Kerala are low. A survey was conducted to study the tobacco and alcohol use habits of 146 children and teenagers in this village. The percentages of study subjects with pan-tobacco-chewing, smoking, and drinking habits were 29%, 2%, and 3%, respectively. Use correlated negatively with education and positively with number of children per family. This survey provides information that can be used to plan cancer education efforts, including redesigning the school curriculum and focusing on high-risk groups.

TUS India (1992) Gav: Tobacco use survey with sociological analysis
Gavarasana S, Gorty PV, Allam A. **Illiteracy, ignorance, and willingness to quit smoking among villagers in India.** *Jpn J Cancer Res* 1992 Apr;83(4):340-3.
(Lions Cancer Treatment Research Center, Visakhapatnam, India)

During field work to control oral cancer, difficulties in communication with illiterates were encountered. A study to define the role of illiteracy, ignorance and willingness to quit smoking among the villagers was undertaken in a rural area surrounding Doddipatla Village, Andhra Pradesh, India. Out of a total population of 3,550, 272 (7.7%) persons,

mostly in the age range of 21-50 years, attended a cancer detection camp. There were 173 (63.6%) women and 99 (36.4%) men, among whom 66 (53 men and 13 women) were smokers; 36.4% of men and 63% of women were illiterate. Among the illiterates, it was observed that the smoking rate was high (56%) and 47.7% were ignorant of the health effects of smoking. However, after being imparted health education on the harmfulness of tobacco, the attitude of illiterate smokers was encouraging, as 83.6% were willing to quit smoking. Further research is necessary to design health education material for 413.5 million illiterates living in India (1991 Indian Census). A community health worker, trained in the use of mass media, using a person-to-person approach, may help smokers, including illiterates, to quit smoking.

TUS India (1991) Gav: Tobacco use survey with sociological analysis
Gavarasana S, Gorty P, Allam A. **Is Illiteracy an Impediment to the control of smoking habit?** *Oncology oral* Vol. 2**.** Ed. Verma AK. Proceedings of the international cancer congress on Oral Cancer, 1991; Bangalore, Macmillan India, pp 43-46.

The objective of the study was to find out the role of illiteracy in the control of cancer and in curbing tobacco usage. A survey was carried out among persons attending a camp conducted in 10 villages around village Doddipatla in West Godavari District of Andhra Pradesh, south India. A doctor examined all the tobacco users (smokers) and informed them on a one-to-one basis that tobacco causes cancer, chronic lung disease and heart disease; then he asked them whether they were willing to quit smoking. Out of 272 attending the camp, 36.4% were males and 63.6% were females. Of males, 63.6% and of females, 37% were literate. The rate of smoking was similar among both literates and illiterates (23% and 25.5% respectively), but a greater proportion of illiterates were unaware of the ill effects of tobacco use (20% among literates and 41% among illiterates were unaware). However, over eighty percent of illiterate smokers were willing to quit smoking after receiving health education. A similar proportion of those willing to quit was found among literate smokers. It was concluded that illiteracy was not an impediment to motivating smokers to quit if the information gap is bridged. A community health worker trained in use of mass media methods of health education for illiterates may help curb smoking habit in rural India.

TUS India (1989) Vai: Tobacco use survey with economic analysis
Vaidya SG, Naik V. **Tobacco habits in Goan Village,** in *Social Welfare,* 35 (12), March 1989, pp 40-41.

The paper reports a study conducted in rural areas of four talukas of the central zone. The study covered 54,809 tobacco habitues, of whom 34,031 were male and 20,858 were female. Estimates were done of the amount spent per year by a male habitue and a female habitue. Total spending on tobacco by village was estimated from the average amount spent by a male/female habitue in the selected villages, multiplied by the estimated number of habitues in the village. The process of calculating personal

expenses, for those who unthinkingly spend any amount from Rs. 1 to Rs. 10 per day on tobacco, does seem to set a thinking process in the individual.

TUS India (1986) Moh: Tobacco and other drug use survey
Mohan D, Sundaram KR, Sharma HK. **A study of drug abuse in rural areas of Punjab (India).** *Drug Alcohol Depend* 1986 May;17(1):57-66.

In 1976 an epidemiological survey of drug abuse was conducted in 24 rural villages of four Community Development Blocks (CDB) in three districts of Punjab State bordering Pakistan covering 1,276 households. The majority of households had one user. Both men and women reported the use of traditional drugs, i.e. alcohol, tobacco, opium and cannabis. In males, the commonest drug used was alcohol (58.3%), followed by tobacco (19.3%), opium (6.3%) and cannabis (1.2%). The majority of the female respondents were non-users, but a very small number reported use of tobacco, alcohol and opium. The observations are compared with other studies and implications discussed.

1.9 Urban communities

Articles on tobacco use by urban dwellers, mainly adults, are summarized in this subsection. One report on attitudes and behaviours of north Indian smokers, found that they continued smoking despite aversion to the habit and disapproval of their family members. In a Bombay study, over 60% of both male and female residents of lower class neighbourhoods interviewed were tobacco users; smokeless forms were the most popular. A Delhi study on smoking habits found two subpopulations: the white-collar cigarette smokers and the lower income beedi or chutta smokers. Another study conducted in Delhi on smoking examined only highly educated men and found that 32% smoked and three fourths of the smokers were worried about the ill effects of smoking on themselves and on others.

TUS India (2002) Moh: Cross-sectional survey
Mohan D, Chopra A, Sethi H. **The co-occurrence of tobacco and alcohol in general population of metropolis Delhi.** *Indian J Med Res.* 2002 Oct;116:150-4.
(Drug Dependence Treatment Centre, All India Institute of Medical Sciences, New Delhi, India.)

Background and objectives: The association between tobacco and alcohol use behaviours has not been explored in India. This study reports on the co-occurrence of tobacco and alcohol use in a representative general population in metropolis Delhi at two points of time a year apart. Methods: Matched data on 10,312 individuals age 10 years or older from 2,937 households were available for survey I and survey II. They included 5,414 males and 4,898 females. The subjects were interviewed by non clinical staff using a structured proforma based on DSM III R criteria on the use of tobacco, alcohol, cannabis and opioids. Results: Among women, use of only tobacco was reported. Among males,

the prevalence of use of 'only tobacco', 'only alcohol' and concurrent smoking and drinking was 18.1, 3.3 and 9.6 per cent respectively. Concurrent use was higher in the age group 31-40 yr and dependence higher in the 41-50 yr age group. Both at surveys I and II current smokers had higher percentage of alcohol drinkers compared to tobacco abstainers; dependent smokers had higher percentage of dependent drinkers. The use of alcohol at survey II was higher among tobacco smokers compared to tobacco abstainers identified at survey I (OR = 5.77, 95% CI 4.3-7.7). Interpretation and conclusion: Our results demonstrate a positive correlation between smoking and drinking. The findings lend support to existing evidence suggesting associations between tobacco and alcohol use. Smoking proved to be a powerful predictor of alcohol use. It is suggested that professionals who treat alcoholism should pursue the cessation of smoking among their patients.

TUS India (2002) Moh: Cross-sectional survey
Mohan D, Chopra A, Sethi H. **Incidence estimates of substance use disorders in a cohort from Delhi, India.** *Indian J Med Res.* 2002 Mar;115:128-35.
(Drug Dependence Treatment Centre, All India Institute of Medical Sciences, New Delhi, India.)

Background and objectives: There are no reports of incidence studies in the Indian setting on substance use disorders in the general population. This survey-resurvey carried out in metropolis Delhi estimated the incidence rates of substance use disorders. Methods: A cross-sectional survey was carried out at two points of time with an interval of one year in a representative sample from the general population of metropolis, Delhi. The instrument was precoded, structured and based on DSM III-R operationalised criteria for use of tobacco, alcohol, cannabis and opioids (past one month). Matched data for two points of time were available for 5414 males and 4898 females. Results: In the total cohort, the annual incidence rates (per 100 persons) among males for any drug use, alcohol, tobacco, cannabis and opioids were 5.9, 4.2, 4.9, 0.02 and 0.04 respectively. Among females, incidence of any drug use was 1.2/100 persons. Interpretation and conclusion: Results showed that males have higher incidence for both not-dependent and dependent use for all the drug categories. Females had a higher incidence of dependent tobacco use.

TUS / Circ / CResp India (2001) Kho: Cross-sectional survey
Khokhar A, Mehra M. **Life style and morbidity profile of geriatric population in an urban community of Delhi.** *Indian J Med Sci.* 2001 Nov;55(11):609-15.
(Department of Community Medicine, Maulana Azad Medical College, Delhi-110002.)

A cross-sectional study was carried to find out the lifestyle pattern and morbidity profile of geriatrics residing in urban community of Vikram Nagar, Delhi. Women constituted 56.25% and men 43.75% of a total of 128 study subjects. Hindus were 89.06% and Sikhs 10.93%. Age group of 60-75 years accounted for most of the study population. 85% of the subjects complained of one or more health problems. 90.62% of them suffered from

dental problems. A significantly higher proportion of women suffered from problems of locomotion/joints and anemia as compared to men whereas genitourinary problems were higher in men as compared to women. 42.55 of the women and 30.76% of the men were obese. Current smokers constituted 15.62% of the women and 30.76% of the men, whereas 30.35% of the men were current consumers of alcohol. As low as 10.15% of the population engaged in regular physical activity. 55.46% of the subjects were vegetarian. 22.65% suffered from disturbed sleep pattern. Smoking showed statistically significant association with hypertension and respiratory tract diseases. Physical activity showed association with obesity and disorder of locomotion. Behavior and lifestyle modification in the form of primordial prevention and counselling of the high risk groups should be carried out to improve the quality of life of the aged.

TUS India (1997) Sar: Tobacco use survey
Sarma PV, Dhand R, Malhotra A, Malhotra S, Sharma BK. **Pattern of tobacco smoking in north Indian adults.** *Indian J Chest Dis Allied Sci* 1990 Apr-Jun;32(2):83-93.
(Department of Internal Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh)

An exploratory study was conducted among 200 apparently healthy current smokers aged 15-45 years to determine their attitudes and behaviour regarding tobacco smoking, using a specifically designed precoded questionnaire. Females constituted 10% of the study group. The 73 participants who smoked cigarettes exclusively were from urban backgrounds and were noted to inhale the smoke more frequently than bidi or hukka smokers. Parental and peer group influence, as well as curiosity in late teenage years were the major reasons for starting smoking which was however continued mainly to obtain the stimulatory and or relaxing effects of nicotine. Health hazards of smoking, particularly lung cancer and heart disease, were widely known and fear of these was the most important reason for smokers wishing to quit the habit. Half of the subjects had attempted to stop but failed due to withdrawal symptoms and lack of a suitable substitute. The divergence between attitude and behaviour of smokers is highlighted by this study since smokers continued to smoke despite being averse to smoking and the disapproval of their habit by their family members. There were important differences in the pattern of smoking and perceptions of various groups of smokers regarding societal permissiveness, awareness of health hazards, and measures to control smoking.

TUS India (1996) Gup: Tobacco use survey with sociodemographic analysis
Gupta PC. **Survey of sociodemographic characteristics of tobacco use among 99,598 individuals in Bombay, India using handheld computers.** *Tobacco Control* 1996 Summer;5(2):114-20.
(Tata Institute of Fundamental Research, Bombay, India)

Objectives: To study the diversity and sociodemographic characteristics of tobacco use in Bombay, India. Design: Population-based, cross-sectional, house-to-house survey with face-to-face interviews in the city of Bombay during 1992-94. Data was input directly

into a programmed, handheld computer (electronic diary). Participants: Permanent residents of the city of Bombay aged 35 years and older. Main outcome measures: Tobacco use in various smoking and smokeless forms. Results: 99,598 individuals were interviewed (60% women, 40% men). Among women, prevalence of tobacco use was high (57.5%) but almost solely in the smokeless form. Among men, 69.3% reported current tobacco use and 23.6% were smokers. The most common smokeless tobacco practice among women was mishri use (44.5% of smokeless users) and among men betel quid with tobacco (27.1%). About half of smokers used bidi and half smoked cigarettes. Chewing areca nut without tobacco was rare (< 0.5% of smokeless users). Educational level was inversely associated with tobacco use of all kinds except cigarette smoking. Conclusions: The pattern of tobacco use varies across India and, in Bombay, is very different from other areas. Using handheld computers to collect data in the field was successful.

TUS India (1996) Nar: Tobacco use survey
Narayan KM, Chadha SL, Hanson RL, Tandon R, Shekhawat S, Fernandes RJ, Gopinath N. **Prevalence and patterns of smoking in Delhi: cross sectional study.** *BMJ* 1996 Jun 22;312(7046):1576-9.
(Diabetes and Arthritis Epidemiology Section, National Institute of Diabetes and Digestive and Kidney Diseases, Phoenix, AZ 85014, USA)

Objective: To determine the prevalence and predictors of smoking in urban India. Design: Cross sectional. Setting: Delhi, urban India, 1985-6. Subjects: Random sample of 13,558 men and women aged 25-64 years. Main outcome measures: Smoking prevalence; subjects who were currently smoking and who had smoked > or = 100 cigarettes or beedis or chuttas in their lifetime were defined as smokers. Results: 45% (95% confidence interval 43.8 to 46.2) of men and 7% (6.4 to 7.6) of women were smokers. Education was the strongest predictor of smoking, and men with no education were 1.8 (1.5 to 2.0) times more likely to be smokers than those with college education, and women with no education were 3.7 (2.9 to 4.8) times more likely. Among smokers, 52.6% of men and 4.9% of women smoked only cigarettes while the others also smoked beedi or chutta. Compared with cigarette smokers, people smoking beedi or chutta were more likely to be older and married; have lower education, manual occupations, incomes, and body mass index; and not drink alcohol or take part in leisure exercise. Conclusion: There are two subpopulations of smokers in urban India, and the prevention strategy required for each may be different. The educated, white collar cigarette smoker in India might respond to measures that make non-smoking fashionable, while the less educated, low income people who smoke beedi or chutta may need strategies aimed at socioeconomic improvement.

TUS India (1994) Bha: Tobacco use survey
Bhattacharjee J, Sharma RS, Verghese T. **Tobacco smoking in a defined community of Delhi.** *Indian J Public Health* 1994 Jan-Mar;38(1):22-6.
(National Institute of Communicable Diseases, Delhi)

A Community based study in urban Delhi, Delhi Admin Flats, Timarpur found that about 32 percent of adult males smoked. Proportion of smokers was highest in 41-50 age group, 31 percent of school teachers smoked. Out of all who tried to give up smoking, 8 percent reverted back after abstinence of two years or more. About three fourths of the smokers were worried about the ill effects of smoking on themselves and others. Significantly higher number of non-smokers expressed support for total stopping of advertisement and complete ban of sale of smoking tobacco.

TUS India (1992) Bas: Opinion Survey
Basu A, Ganguly SK, Datta S. **Demographic survey of opinions towards smoking: a pilot study.** J Indian Med Assoc 1992 Nov;90(11):292-94.
(Department of Radiotherapy, RG Kar Medical College Hospital, Calcutta.)

A survey (using a questionnaire) of 865 smokers analysed their opinions on aspects of smoking. The subjects were mostly males (97.11%), aged 21 to 50 years (80%). Heavy smoking is injurious to health is the opinion of most of the smokers (90%) particularly when maintained with other addictions (80%); tobacco is harmful not only when smoked but also when used in other forms (63%) and moderate smoking was thought to be not very harmful (43%). However, smoking is not necessary to make or maintain relations with others (70%). Statutory warning has no marked effect on the habit (70%), participants were dubious about the role of legal restrictions but thought that advertisements encourage the habit definitely (63%). Three out of 4 persons know the problems of smoking and almost the same proportion think that smoking can be stopped or at least checked. There were differences of opinion about who to consult, if problems arise from smoking. Family physicians could play an important role in quitting decisions.

1.10 Women

A study of women in Mumbai found that one third used tobacco while pregnant, and their babies had double the incidence of low-birth weight, compared to women who did not use tobacco. Other articles provide general information on how tobacco affects women (including pregnant women), children and families in India. (See also Section 4.7.2 on adverse pregnancy outcomes).

TUS India (1999) Sud: Descriptive Report
Sudarshan. R., and Mishra, N. **Gender and Tobacco Consumption in India.** *Asian J of Women's Studies* 1999; 15,1:84-114.
(National Council of Applied Economic Research, New Delhi)

Debates around the production and consumption of tobacco have attempted to weigh the adverse ecological and health impact of tobacco cultivation against its potential to generate employment, income, and foreign exchange. Over the last decade, opinion in

favour of reducing consumption has gained strength. This paper briefly reviews the origins and spread of the habit from the Americas to Europe and Asia, and contemporary debates for and against tobacco use. The situation regarding tobacco use in India is described using gender disaggregated data from recent surveys conducted by the National Council of Applied Economic Research (NCAER) and the National Sample Survey (NSS). The data bring out regional disparities and differences between male and female consumption patterns. It is suggested that some conventional wisdom regarding tobacco consumption can be questioned. For example, the highest levels of prevalence are not among the urban and affluent, but among the very poor. Women and children are the new focus of tobacco companies. In India the most interesting emerging trend in consumption is the development of new smokeless tobacco products, such as gutka, which is widely consumed by women. The implications are that tobacco policy has to be multi-faceted; and that health research and tobacco control policy need to clearly evaluate the health effects of new products.

TUS / Preg-Outcome India (1990) Meh: Comparative study
Mehta AC and Shukla S. **Tobacco and pregnancy.** *Journal of Obstetrics and Gynecology of India* 1990;40(2):pp 156-160.

A preliminary survey on tobacco use during pregnancy was conducted at N. Wadia Maternity Hospital, Mumbai in April 1987, and 500 women were interviewed. The main objective of this study was to determine the incidence of Low Birth Weight (LBW) babies amongst tobacco users and nonusers. All the respondents were treated in free wards. Of the women interviewed, 322 (64.4%) were from the antenatal clinics and 178 (35.6%) were delivered cases. Out of the 500 women, 167 (33.4%) consumed tobacco during their pregnancy. Among users, 158 used it by applying to teeth and gums, 8 chewed tobacco and only one smoked. As many as 195 (39%) husbands of these 500 women consumed tobacco while their wives were pregnant: 41 applied it to teeth and gums, 86 chewed it, and 68 smoked tobacco, 98 men took more than one mode. The LBW incidence for the hospital was 46.63%. In women who used no tobacco, the proportion of LBW was 36.28%, and amongst those who consumed tobacco in pregnancy the incidence was 64.62%. Krishna (1978) had reported that his study had shown a 15.8% incidence of tobacco use in pregnancy and all were chewing it. His study was conducted in Pune region. Verma et al. (1983) studied a population in Jabalpur, and a large majority of pregnant women ingested tobacco, rather than applying on gums or keeping in mouth. Both authors reported significantly lower birth weights in offspring of tobacco users compared to babies of nonusers. References: Krishna Kewal; *British Journal of Obstetrics and Gynecology,* 85, 726, 1978; Verma, R.C., Chansoriya M, Kaul K.K. *Indian Pediatrics,* 20, 105, 1983.

TUS India (1993) Agh: Descriptive report
Aghi M. **Tobacco Issues and concerns of women, children and families**, paper presented at the Tobacco Forum, IDRC, Ottawa Canada, in 1993.

Unaware of the ill effects of tobacco, rural women of India use tobacco in many ways. Rural women of Andhra, who smoke cheroots in reverse, use tobacco to freshen their breath in the morning, get rid of morning sickness when pregnant and to ease labour pains during delivery. In India, women and girls work in exploitative conditions in the production of bidis. Seen in a social perspective, educating rural Indian women on the ill effects of tobacco is only a part of what is needed to solve their many problems: illiteracy, poverty, malnourishment, inequality, bias and prejudices.

1.11 Data collection instruments

TUS India (2002) WHO: Multicenter study to validate a screening instrument.
WHO ASSIST Working Group. **The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST): development, reliability and feasibility.** *Addiction.* 2002 Sep;97(9):1183-94.

Aims: The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) was developed for the World Health Organization (WHO) by an international group of substance abuse researchers to detect psychoactive substance use and related problems in primary care patients. This report describes the new instrument as well as a study of its reliability and feasibility. Setting: The study was conducted at participating sites in Australia, Brazil, Ireland, India, Israel, the Palestinian Territories, Puerto Rico, the United Kingdom and Zimbabwe. Sixty per cent of the sample was recruited from alcohol and drug abuse treatment facilities; the remainder was drawn from general medical settings and psychiatric facilities. Methods: The study was concerned primarily with test item reliability, using a simple test-retest procedure to determine whether subjects would respond consistently to the same items when presented in an interview format on two different occasions. Qualitative and quantitative data were also collected to evaluate the feasibility of the screening items and rating format. Participants: A total of 236 volunteer participants completed test and retest interviews at nine collaborating sites. Slightly over half of the sample (53.6%) was male. The mean age of the sample was 34 years and they had completed, on average, 10 years of education. Results: The average test-retest reliability coefficients (kappas) ranged from a high of 0.90 (consistency of reporting 'ever' use of substance) to a low of 0.58 (regretted what was done under influence of substance). The average kappas for substance classes ranged from 0.61 for sedatives to 0.78 for opioids. In general, the reliabilities were in the range of good to excellent, with the following items demonstrating the highest kappas across all drug classes: use in the last 3 months, preoccupied with drug use, concern expressed by others, troubled by problems related to drug use, intravenous drug use. Qualitative data collected at the end of the retest interview suggested that the questions were not difficult to answer and were consistent with patients' expectations for a health interview. The data were used to guide the selection of a smaller set of items that can serve as the basis for more extensive validation research. Conclusion: The ASSIST items are reliable and feasible to use as part of an international screening test. Further evaluation of the screening test should be conducted.

TUS India (2003) Moh: Cross-sectional survey with comparative study
Mohan D, Neufeld K, Chopra A, Sethi H. **Agreement between head of household informant and self-report in a community survey of substance use in India.** *Drug Alcohol Depend.* 2003 Jan 24;69(1):87-94.
(Department of Psychiatry, Drug Dependence Treatment Centre, All India Institute of Medical Sciences, New Delhi, India. davindermohan@hotmail.com)

This survey of 500 households in a New Delhi urban slum compared reports of substance use by the head of the household informant with individual self-report. Information from the two sources was compared for 1,132 people above the age of 15 years. The paired agreement regarding the use of substances was high (kappa=0.92; S.E.=0.01, z=92.0). The agreement regarding the presence of symptoms and classification of dependence for the use of alcohol, tobacco and opiates ranged from good to excellent and head of household reports had a high positive predictive value for the use of these substances. This method provides useful estimates of drug use and dependence for substances associated with observable physiologic withdrawal syndromes, and is less costly and quicker to perform than traditional self-report methodologies.

2. All Cause Mortality and Morbidity Related to Tobacco

The first report in this section is a wide review of mortality and morbidity associated with tobacco use. The second report recommends the use of verbal autopsy through the Sample Registration System to obtain cause-specific mortality. Other reports elucidate the effects on overall mortality and/or morbidity of tobacco use in India and point toward the need to obtain cause-specific mortality rates and relative risks for the manifold forms of tobacco use in the country. It has been estimated that among men, 19-40% of all deaths and among women at least 4% of all deaths are caused by tobacco in India.

All Mor India (2003) Cri: Review
Critchley JA, Unal B. **Health effects associated with smokeless tobacco: a systematic review.** *Thorax.* 2003 May;58(5):435-43.
(Department of Public Health, University of Liverpool, Liverpool L69 3GB, UK. Department of Public Health, Dokuz Eylul University School of Medicine, Izmir, Turkey.)

Background: It is believed that health risks associated with smokeless tobacco (ST) use are lower than those with cigarette smoking. A systematic review was therefore carried out to summarise these risks. Methods: Several electronic databases were searched, supplemented by screening reference lists, smoking related websites, and contacting experts. Analytical observational studies of ST use (cohorts, case-control, cross sectional studies) with a sample size of >/=500 were included if they reported on one or more of

the following outcomes: all cause mortality, oral and pharyngeal cancers, other cancers, cardiovascular diseases, dental diseases, pregnancy outcomes, surgical outcomes. Data extraction covered control of confounding, selection of cases and controls, sample size, clear definitions and measurements of the health outcome, and ST use. Selection, extraction and quality assessments were carried out by one or two independent reviewers. Results: A narrative review was carried out. Many of the studies lacked sufficient power to estimate precise risks, mainly due to the small number of ST users. Studies were often not designed to investigate ST use, and many also had major methodological limitations including poor control for cigarette smoking and imprecise measurements of exposure. Studies in India showed a substantial risk of oral or oropharyngeal cancers associated with chewing betel quid and tobacco. Studies from other regions and of other cancer types were not consistent. Few studies have adequately considered the non-cancer health effects of ST use. Conclusions: Chewing betel quid and tobacco is associated with a substantial risk of oral cancers in India. Most recent studies from the US and Scandinavia are not statistically significant, but moderate positive associations cannot be ruled out due to lack of power. Further rigorous studies with adequate sample sizes are required, especially for cardiovascular disease.

All Mor India (2001) Jha: Proceedings
Jha P, Sinha S, Asma S, Unni K, Kumar S, Gajalakshmi CK, and Gupta PC, eds. **Counting the Dead in India in the 21st century** – Proceedings of the International Meeting on Verbal Autopsy and on the Epidemiological Aspects of the Sample Registration System, New Delhi, May 25-26, 2001. Hosted by Tata Institute of Fundamental Research, Mumbai and co-sponsored by the Office of the Registrar General-India, New Delhi, World Health Organisation, Geneva and The Centres for Disease Control and Prevention, USA.

Background: The primary system for collection of mortality data in India is the Sample Registration System (SRS). The SRS provides annual estimates of birth, death and other fertility and mortality indicators at the national and state level. The SRS consists of 6,671 sample units (4,436 rural and 2,235 urban) covering 1.1 million households and a population of about 6 million. Sample units are selected from the preceding census frame to be representative of the population. In May 24-26, 2001, the Registrar General of India (RGI) organized consultations with state-level RGI staff and global experts on using the SRS to obtain cause-specific mortality through verbal autopsy, to provide data on epidemiologically-relevant factors such as smoking, alcohol, risk factors for HIV/ AIDS, etc. This report provides recommendations emerging from the meeting, and the presentations made at the workshop. Key Next Steps The key action suggested by the workshop participants would be organization and funding of pilot efforts on verbal autopsy in a few states. A follow up to the workshop should be held to review the results of the pilot verbal autopsy studies. It was also recommended that a special workshop be jointly organised in the fall of 2001 with the National AIDS Control Program on methods to reliably detect HIV/AIDS deaths. Work of Global Importance to Public Health Implementing reliable, routine, low-cost and long-term measurement systems is key to monitoring trends in health conditions of the poor, detecting new epidemics, evaluating

the success of control programs, and improving accountability for expenditures on disease control. The workshop participants applauded the visionary leadership being shown by the Office of the Registrar General in their efforts to put into place a sustainable system for routine ascertainment of cause of deaths in India. Such a system would constitute a major tool for the improvement of public health in India and would place India as a global leader in evidence-based disease control.

All Mor India (2000) Gaj: Cohort studies
Gajalakshmi CK. **Tracking the Epidemic: Tobacco Control activities in Tamil Nadu.** *Lifeline,* WHO SEARO, New Delhi. March 2000, pp 4-5.

The Division of Epidemiology and Cancer Registry at the Cancer Institute in Chennai, India, is conducting prospective and retrospective epidemiological studies in Chennai and in the Villupuram district in Tamilnadu in collaboration with the Clinical Trial Service Unit and Epidemiological Studies Unit, Oxford, UK. The urban and rural cohorts of the prospective studies will be followed up until they die to monitor the evolution of tobacco-attributable deaths. The retrospective studies are analysing death data on individuals who died after the age of 25 years. Close family members and associates are being asked about the habits and symptoms and signs of illness prior to death to supplement the cause of death noted on the death certificate. Preliminary findings of the retrospective study in Chennai were that one-third of male deaths at ages 25-69 years are related to tobacco use. In response to the preliminary findings, the Division has organised public education programmes, like lectures and handbill campaigns in both study areas. A sensitisation programme for health educators in the district was also held. A programme in Villapuram and Cuddalore districts to detect cancers in the oral cavity, cervix and breast was started under the district cancer control programme funded by the Government of India.

All Mor India (2000) Gup: Cohort study
Gupta PC, Mehta HC. **Cohort study of all-cause mortality among tobacco users in Mumbai, India.** *Bull World Health Organ* 2000;78(7):877-83.
(Epidemiology Research Unit, Tata Institute of Fundamental Research, Mumbai, India. pcgupta@tifr.res.in)

Introduction: Overall mortality rates are higher among cigarette smokers than non-smokers. However, very little is known about the health effects of the other forms of tobacco use widely prevalent in India, such as bidi smoking and various forms of smokeless tobacco (e.g. chewing betel-quid). We therefore carried out a cohort study in the city of Mumbai, India, to estimate the relative risks for all-cause mortality among various kinds of tobacco users. Methods: A baseline survey of all individuals aged 35 years or older using voters lists as a selection frame was conducted using a house-to-house approach and face-to-face interviews. Results: Active follow-up of 52,568 individuals in the cohort was undertaken 5-6 years after the baseline study, and 97.6% were traced. A total of 4,358 deaths were recorded among these individuals. The annual age-adjusted mortality rates were 18.4 per 1000 for men and 12.4 per 1000 for women.

For men the mortality rates for smokers were higher than those of non-users of tobacco across all age groups, with the difference being greater for lower age groups (35-54 years). The relative risk was 1.39 for cigarette smokers and 1.78 for bidi smokers, with an apparent dose-response relationship for frequency of smoking. Women were basically smokeless tobacco users, with the relative risk among such users being 1.35 and a suggestion of a dose-response relationship. Discussion: These findings establish bidi smoking as no less hazardous than cigarette smoking and indicate that smokeless tobacco use may also cause higher mortality. Further studies should be carried out to obtain cause-specific mortality rates and relative risks.

All Mor India (1993) Gup: Cohort study
Gupta R, Gupta KD, Sharma S, Gupta VP**. Influence of cessation of smoking on long term mortality in patients with coronary heart disease**. *Indian Heart J*. 1993 Mar-Apr;45(2):125-9.
(Division of Cardiology, K D Gupta Medical Centre, Jaipur.)

Cessation of smoking in patients with coronary artery disease (CAD) has shown variable results. The long term mortality in patients of coronary heart disease (CHD) who quit smoking following diagnosis of their disease has been variable. We have analysed the long term effects of cessation of smoking on mortality in a cohort of 173 patients with CAD and compared the mortality of this group with 299 nonsmokers and 52 current smokers. The baseline data were identical for major risk factors like age, hypertension, diabetes, cholesterol levels, and congestive heart failure among the three groups ($p > 0.1$). There were more patients with previous myocardial infarction in past (38.7%) and current smokers (40.4%) than among nonsmokers (25.4%). All patients were followed for a period extending upto 11 years. The mean duration of follow up was 6.81 +/- 2.95 years in non-smokers, 5.98 +/- 2.94 years in exsmokers, and 6.32 +/- 3.44 years in current smokers. Actuarial analysis shows that overall mortality was significantly more among exsmokers than nonsmokers (Logrank test = 3.72, $1p < 0.05$). The exsmokers showed similar mortality as current smokers during the first three years of follow up (Logrank test = 1.10, $1p < 0.1$); but afterwards the mortality was significantly less in exsmokers than in current smokers (Logrank test = 6.29, $1p < 0.025$). However, the overall mortality was lowest in nonsmokers when compared to that of exsmokers and current smokers (Logrank test = 3.92, $p < 0.05$). The total mortality was 28.1% in nonsmokers, 32.4% in exsmokers, and 46.2% in current smokers. The incidence of sudden death was, however, similar in all the groups.

All Mor India (1988) Gup: Summary note
Gupta PC: **Health consequences of tobacco use in India.** *World Smoking and Health,* Spring l988, pp5-10.

(no abstract available)

All Mor India (1997) TOI : Descriptive report
Times of India. **'Tobacco-related diseases on the rise in India', warns WHO, 31 May 1997** (Cited in *Anubhav* : Monthly on Social Issues Dec.1997,vol.1;issue 9:p 17, Yuva: Pune).

Citing WHO sources, this article warns that the biggest and sharpest increase in tobacco related disease is expected in China and India, where the use of tobacco has grown most steeply. The report notes that tobacco consumption levels are high, especially among males. High consumption levels are also reported among women and youth. It is estimated that unless the use of tobacco related substances changes, premature deaths will rise. For each 1000 tonnes of tobacco produced, about 1000 people will eventually die.

All Mor India (1989) Gup: Analytic Report
Gupta PC. **An Assessment of Excess Mortality Caused by Tobacco Usage in India.** In: Sanghvi LD and Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 57-62.

It is well known that cigarette smokers experience significantly higher mortality than non-smokers. In India, cigarette smoking forms only a minor percentage of overall tobacco usage and therefore, western results cannot be extrapolated. Three reports on mortality experience of tobacco users (including chewers and smokers) in India are available and they all show that tobacco users age 15 years and over experienced significantly higher mortality than nonusers. The relative risk for overall mortality ranged between 1.3 and 1.9 for men and women. Percentage of people using tobacco in the general population is available from house-to-house studies in six different parts of India and it ranges from 44% to 74%. Among men tobacco is used by 60% to 80% but among women there is a wide variation, between 15% to 67%. It can be thus estimated that among men at least 19% and up to 40% and among women at least 4% of all deaths are caused by tobacco. In India among individuals age 15 years and over, about 2.76 million deaths occur among men and 2.3 million among women. Total number of deaths caused by tobacco by all known and unknown causes are thus estimated as at least 630,000, possibly higher, up to a million each year. These findings emphasize the fact that tobacco usage is a serious health problem in India right now and will become worse unless remedial actions are initiated.

All Mor India (1993) Ram: Descriptive report
Ramchandran CR**. Tobacco and Health.** *Health for millions* 1993;1(6):pp 15-19.

India was one of the first countries in the world to report the adverse health consequences of tobacco use. Niblock in 1902 reported that about 1/3 of all cancer admissions to Madras General Hospital were because of cancer of cheek associated with tobacco chewing. Currently the National Cancer Registry Programme (NCRP) of the Indian Council of Medical Research provides data to estimate the volume of tobacco-related

malignancy in the country. According to these estimates nearly one third of all cancer cases that occur in the country are attributable to tobacco use. The NCRP data shows that oral cancer predominantly occurs amongst the working class, almost equally amongst male and female tobacco users. Studies from India have shown that a tobacco smoker carries a three fold higher risk of a coronary heart disease (CHD). Death due to CHD is about three times higher among smokers as compared to nonsmokers. Smoking causes premature CHD, peripheral vascular disease and stroke. The risk of an individual developing CHD is strongly correlated to the frequency and type of smoking. Use of tobacco in any form during pregnancy increases the risk of an adverse obstetric outcome: there is a high risk of abortions, pre-term births, intra-uterine growth retardation and consequent low birth weight deliveries and still births. Indian studies have shown that tobacco chewing has adverse effect on birth weight. ICMR data indicates that if all forms of tobacco usage are taken together, prevalence is between 30-70% among men and 15-50% among women. The National Sample Survey included tobacco prevalence in the 1987-88 survey. It gives an average tobacco use prevalence at 35% for men and 12% for women. Analysis of available mortality rates for various parts of the country show that the mortality rate due to all causes among users is about 1.4 to 1.6 times higher than among people who do not use tobacco.

All Mor India (1990): Descriptive Report
Anon. **Adverse effects of tobacco use: Children and Youth as Consumers.** *Social Welfare* June 1990;37(3):pp 25-26.

In countries where smoking is a long established custom about 90% of lung cancer causes, 30% of cases of bronchitis and emphysema are attributable to tobacco use, as are 20% of coronary heart disease and stroke deaths. This has serious implications for the health of children and young people. The earlier they become regular smokers and persist in the behaviour as adults the greater the risk of dying prematurely. Chronic ill health and mortality associated with smoking typically becomes evident only after two or three decades of tobacco use. But effects are detectable much earlier: a number of 19 year old boys were trained to run a standard 12 minutes race. Smokers could on an average cover a distance of only 2.8 km compared with 3 km for the nonsmokers. Smokers are more likely than nonsmokers to develop severe influenza.

All Mor India (1989) Not: Descriptive Report
Notani PN, Jayant K and Sanghvi LD. **Assessment of morbidity and mortality due to tobacco usage in India.** In: Sanghvi LD and Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 63-78.

Estimates were attempted of the number of persons in India suffering and dying from diseases attributable to tobacco, based on available relative risks for morbidity and mortality for important diseases associated with tobacco and prevalence of different types of tobacco habits in India, for 1986. Morbidity: The estimated number of avoidable

incident cancer cases (among oral cavity, pharynx, larynx, esophagus and lung) in 1986 amounted to 108 thousand (93,000 males and 15,000 females). Taking the conservative estimate of a 2-fold risk for smokers developing coronary heart disease, the number of attributable cases worked out to be nearly 1.3 million (21% of prevalent cases). Taking a 4-fold higher prevalence of chronic obstructive lung disease in smokers than in non-smokers, the proportion of cases attributable to smoking and hence avoidable ranged between 7 million to 13 million. Mortality: Deaths attributed to smoking were estimated at 63% for cancers of the major tobacco-related sites (oral cavity, pharynx and larynx, esophagus and lung), (totaling 61,000 male and 8,000 female cancer deaths), 22% of deaths due to coronary heart disease (97,000 in males and 4,000 in females), 45% of deaths due to COLD (25,000 male and 2,000 female deaths). The estimated number of avoidable deaths due to tobacco use in 1986 amounted to 629,000 avoidable deaths (530,000 male and 99,000 female deaths in 1986), i.e. 12.6% of overall deaths.

All Mor India (1988) Sai: Descriptive report
Sain B. **Drug Danger and Social behavior.** *New Challenges*, Sharda Prakashan, New Delhi 1988, pp 1-38 (Chapter on Smoking).

Smoking tobacco causes impotency and leprosy. Three French specialists from the Centre of Studies and Research on Impotence have said that in eight out of 10 cases impotency is due to the deterioration of blood vessels in the penis. In an article in LANCET the researchers claimed that this phenomenon is closely associated with tobacco addiction and with high fat diets. In Sweden also researchers have found that chain smoking of tobacco causes chronic impotence. Eight young men around 22 got back their sexual vigour when they stopped smoking. Smoking weakens hearing too and even 20 cigarettes a day can weaken normal reception of speech and create visionary defects. Heavy smoking and drinking can make the addicts susceptible to leprosy, opines Dr. M.M. Bajaj from the Dept of Physics and Astrophysics, Delhi University, Delhi. According to him a team of researchers from the Dept. are working on possibility of smoking, drinking and non-vegetarian food together being one of the causes of leprosy. Speaking at the 73rd Indian Science Congress Conference in New Delhi he said that certain experiments conducted with the help of laser Raman spectroscopy had shown that parts of immunoglobin G molecules that had been badly damaged in leprosy patients. Smoking and drinking are known to contribute to such damages. Dr. G. Raja Mohan Counseling Psychologist, Dept. of Psychology, Madras believes that smokers are more prone to hyper-suggestibility frequently inviting and accepting suggestion of others. The study was conducted in Madras comprising a sample of 60 heavy smokers (10 or more cigarettes a day for two years) and 60 nonsmokers. The subjects were males aged 20-30 years. All the subjects were literate, from different socio-economic status. A significant difference was found between smokers and nonsmokers. Smokers were described as being more loyal to friends, more likely to share things, do more things with friends than alone and form stronger attachment than nonsmokers. Smokers have a greater need for change than nonsmokers. References given by the author: G.Raja Mohan 'Personality Characteristics of Heavy Smokers' Report on National Seminar on Drug Abuse 29-30

September 1986. Mittal, S.D. 'Protection of Non Smokers' Social Welfare New Delhi Oct. 1985, New England Indian Journal of Medicine 1988.

3. Cancers

The association of tobacco use with cancer is very clear in India. This section on cancers covers research on the association of tobacco use with cancer in general, and cancers of various sites of the respiratory and digestive tracts. Abstracts of studies investigating cancers at more than one site are cross-referenced in each relevant section.

3.1 All cancers (in relation to tobacco use)

There are six articles summarised in this section. Three report on the link between cancer patterns and tobacco use in Kolkatta, Mumbai and Chennai (Madras). The fourth is an overview of tobacco related cancers in India. The fifth looks at cancer incidence over two decades from around 1970-1990. The sixth is a report of a cancer detection programme in a community, where data were also gathered on tobacco habits.

All Can India (2002) Sen: Population-based data - descriptive report
Sen U, Sankaranarayanan R, Mandal S, Ramanakumar AV, Parkin DM, Siddiqi M. **Cancer patterns in eastern India: the first report of the Kolkata cancer registry.** *Int J Cancer*. 2002 Jul 1;100(1):86-91.
(Chittaranjan National Cancer Institute, Kolkata, India.)

There are no population-based data available for the cancer patterns in Eastern India. This is the first report of cancer incidence in the region from the population-based cancer registry in Kolkata (Calcutta), the capital city of the state of West Bengal, India, for the period 1998-1999. The cancer registry collects data on all new cases of cancer diagnosed in the resident population of Kolkata. Since cancer is not a notifiable disease in India, registration is carried out by active data collection by the registry staff. The cancer registry staff visits 50 data sources comprising cancer hospitals, secondary and tertiary care hospitals, nursing homes, diagnostic laboratories and death registration offices; scrutinizes medical records and collects details on incident cancer cases. A customized version of CanReg-3 software was used for data entry and analysis. A total of 11,700 cases were registered during the 2-year period from 1 January 1998 to 31 December 1999. The overall age-adjusted (world population) incidence rates were 102.1 per 100,000 males and 114.6 per 100,000 females. The most frequently reported malignancies in males were lung cancer (16.3%), followed by cancers of the oral cavity (7.1%), pharynx (5.7%) and larynx (5.7%). In females, the most frequently reported malignancies were breast (22.7%) followed by uterine cervix (17.5%), gallbladder (6.4%) and ovary (5.8%). The data reported by the Kolkata cancer registry provide information

on the cancer profile in Eastern India for the first time. The highest incidence rate of lung cancer in males in India is reported from Calcutta. A high risk of gallbladder cancer is observed in women. The observed cancer patterns indicate that tobacco-control measures and early detection of head and neck, breast and cervical cancers are of importance for cancer control in this population.

All Can India (1997) TOI: News Article
Anon. **Study shows majority of cancer cases are induced by tobacco**, in *The Times of India* daily dated May 28, 1997, p 3.

The article reports that the 1993 Cancer registry of the Tata Memorial Hospital in Mumbai provides evidence of clear correlation between smoking and cancer. Between 1984 and 1993 the hospital diagnosed 1,40,175 cancer cases of which a large percentage were tobacco induced. Amongst males almost 40 to 50% of cancers occurred at sites that are tobacco related. A ten year study of blue collar male workers between ages 41 to 59 conducted by TMH noted six fold higher incidence of upper alimentary and respiratory tract cancers amongst bidi and cigarette smokers than amongst non smokers. The incidence rate was 45 per 100,000 non smokers every year as compared to 265 per 100,000 smokers. The Piramal sports complex in Mumbai keeps a tab on smoking habits of young people (below 40 years) from the city. A quick sample analysis of 845 clients who underwent fitness assessment tests at the centre since 1996, points to the significant adverse health impact of cigarette smoking. Of the 76 persons who said they smoked, 82% were men in the 21 to 40 years age group. Among the 18.4% of smokers who were women, the largest percentage were found in age group below 20 years and 21-30 yrs. Overall the fitness data among smokers reveals poor lung capacity (62%), high resting heart rate (26%) and high B.P. (17%).

All Can India (1996) Gaj: Descriptive report
Gajalakshmi CK, Ravichandran K, Shanta V. **Tobacco-related cancers in Madras, India.** *Eur J Cancer Prev* 1996 Feb;5(1):63-8.
(Epidemiology Division, Cancer Institute (WIA), Madras, India)

Tobacco is the single most important cause of avoidable morbidity and early mortality in many countries. Tobacco-related cancer (TRC) cases constitute 48.2% in men and 20.1% in women of the total cancers seen in India per year. The age-adjusted rate (AAR) of TRC ranges from 44 to 67 among males and from 23 to 27 among females in different registries in India. Of these cases, only 15% were in the lung. The religion-specific risk ratio of the TRC sites in Madras suggests that when Muslims were compared with Hindus pharynx and lung were the two sites that showed higher risk in males, while the pharynx, lung and oesophagus had higher risk in females. When Christians were compared with Hindus, there was seen to be a higher risk of lung cancer and lower risk of cancer of the oesophagus in males, and lower risk for cancer of the mouth in females. The overall percentage increase in AAR of TRCs in males was 39.7 and in females was 20.1 for the period 1987-91, compared with 1982-86, with variation in the percentage increase in all

the TRC sites in Madras. The change in the incidence rate of TRCs seen in Madras is consistent with the change in the per capita consumption of tobacco over the years. (Comment in *Eur J Cancer Prev*. 1996 Feb;5(1):3-4.)

All Can India (1993) IIP: News Article
Anon. A study of ICMR. **One third of Cancer Patients linked to Tobacco use.** *Monthly Public Opinion Survey,* The Indian Institute of Public Opinion, New Delhi, Sept. 1993, pp 20-21.

A major national study of economics of tobacco related health problems conducted by the Indian Council of Medical Research estimated that of the 6.45 lakh people who got cancer in 1991, 2.18 lakh were tobacco users. Men have a higher rate of tobacco related cancer ie. 1.51 lakh out of 3.15 lakh cancer patients. On the other hand, cancer caused by tobacco accounts for 20 percent of all cancers (66,400 out of 3,29,000) among women. Tax revenues: Nearly five lakh hectares of cultivable land is used for growing tobacco and five lakh tonnes of tobacco are produced annually. The Central Government collects at least the Rs. 1,550 Crores as taxes on tobacco products every year .To obtain an accurate estimate of the cost of treating tobacco related diseases, three studies were initiated, one on the treatment costs of tobacco related cancers, another on coronary pulmonary disease and the third on chronic obstructive pulmonary disease. Cost of treatment: Interim analysis showed that a person and his/her relatives spend at least Rs. 4,000 before a diagnosis of Cancer is made. Subsequently there is an average expenditure of about Rs. 7000 for the actual treatment. These estimates exclude the loss due to non productivity owing to the absence of the patient from work and the Government expenditure for its various health schemes. The study has found that among the lower socio economic strata, tobacco use was mainly to suppress hunger. Tobacco smoking is not only associated with cancer of the lung but also with cancers of the upper respiratory tract, upper digestive tract, pancreas, urinary bladder and renal pelvis. A link between smoking and coronary heart disease (CHD) is also established. Put together it means that tobacco revenue is not worth being encouraged because the expenditure on the after effects is much higher than the revenue generated.

All Can India (1992) Jay: Incidence study
Jayant K and Yeole BB. **Tobacco-related cancers in Bombay, India: a study of incidence over two decades.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 139-147.
*(Cancer Research Institute, Bombay, India; and *Bombay Cancer Registry, Bombay, India)*

A study of the site-specific incidence rates of cancers of the upper alimentary and respiratory tracts over two decades among males in Bombay showed that the incidence of cancers of the tongue, oropharynx and larynx have decreased significantly, whereas that

of oral cancer excluding the tongue has remained more or less stable. The incidences of cancers of the hypopharynx, oesophagus and lung increased marginally, and successive birth cohorts showed no consistent pattern. Limited data on tobacco habits in Bombay indicate a marked decrease in the proportion of bidi smokers in younger cohorts, which conforms with the observed decline in the incidence of cancers for which bidi smoking is the predominant risk factor. For cancers of the hypopharynx, oesophagus and lung, for which tobacco chewing or cigarette smoking is an equally or more important risk factor than bidi smoking, no consistent pattern was seen. Tobacco-related cancers constitute about 50% of cancers among men in India. As the recent national trends in per capita consumption of tobacco are different from those in Bombay, the decline in predominantly bidi dependent cancers seen in Bombay cannot be extrapolated to the country as a whole. Consequently, control programmes are needed for all smokers in the country, and especially for cigarette smokers in urban areas.

All Can India (1989) San: Descriptive report
Sanghvi LD. **Tobacco Related Cancers**. In: Sanghvi LD and Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 9-15.

Tobacco related cancers in India can be broadly classified on the basis of major risks of different tobacco habits. Tobacco chewing is a major risk for oral cancer; bidi smoking for cancers of the pharynx and larynx, and cigarette smoking for lung cancer. Historically, tobacco chewing and hookah smoking were common in the early part of the century. They have been gradually replaced by bidi smoking. Cigarette smoking which is a late comer on the Indian scene is also gaining momentum. On the basis of the data collected under the National Cancer Registry Project, it is estimated that almost one-third of all new cancer cases i.e. 190,000 cancer cases each year are related to tobacco habits. On the basis of these estimates, there will be at any given time about 500,000 cancer cases related to tobacco habits, leading to more than 100,000 deaths every year. Trends of different tobacco habits during the last two decades suggest that in the coming decades, cancer related to bidi and cigarette smoking will be increasing very rapidly.

3.2 Oral cavity cancer

Countries of South and Southeast Asia are high incidence areas for oral cavity cancers. Among them, India has several regions reporting rates higher than 6.0 per 100,000 per year for mouth and 3.5 for tongue cancer in males. Cancer of the oral cavity constitutes about 12 per cent of all cancers in India. Oral cancer incidence increases with age and is most common in persons over 60 years, and uncommon below 35 years. In India, cancers of the buccal mucosa and gums are more common than cancer of the tongue. Four sections of this database are devoted to summaries of articles on oral cancers and precancers.

3.2.1 Oral cancer epidemiology

Abstracts of thirty-two articles are given in this section. They include case-control studies (conducted at Bangalore, Chennai (Madras), Thiruvananthapuram (Trivandrum), and Nagpur), case series, cross-sectional, and detection camp reports, overviews of research, reviews, descriptive reports and a predictive study. Smoking, drinking, pan chewing (with or without tobacco) are all factors implicated in oral cancer.

OC Epi India (2002) Bal: Case-control study
Balaram P, Sridhar H, Rajkumar T, Vaccarella S, Herrero R, Nandakumar A, Ravichandran K, Ramdas K, Sankaranarayanan R, Gajalakshmi V, Munoz N, Franceschi S. **Oral cancer in southern India: the influence of smoking, drinking, paan-chewing and oral hygiene**. *Int J Cancer* 2002 Mar 20;98(3):440-5.
(Regional Cancer Center, Trivandrum, Kerala, India.)

Between 1996 and 1999 the authors carried out a case-control study in 3 areas in Southern India (Bangalore, Madras and Trivandrum) including 591 incident cases of cancer of the oral cavity (282 women) and 582 hospital controls (290 women), frequency-matched with cases by age and gender. Odds ratios (ORs) and 95% confidence intervals (CIs) were obtained from unconditional multiple logistic regressions and adjusted for age, gender, center, education, chewing habit and (men only) smoking and drinking habits. Low educational attainment, occupation as a farmer or manual worker and various indicators of poor oral hygiene were associated with significantly increased risk. An OR of 2.5 (95% CI 1.4-4.4) was found in men who smoked 20 or more bidi or equivalents versus 0/day. The OR for alcohol drinking was 2.2 (95% CI 1.4-3.3). The OR for paan chewing was more elevated among women (OR 42; 95% CI 24-76) than among men (OR 5.1; 95% CI 3.4-7.8). A similar OR was found among chewers of paan with (OR 6.1 in men and 46 in women) and without tobacco (OR 4.2 in men and 16.4 in women). Among men, 35% of oral cancer is attributable to the combination of smoking and alcohol drinking and 49% to pan-tobacco chewing. Among women, chewing and poor oral hygiene explained 95% of oral cancer.

OC Epi India (2002) Sha: Editorial
Sharma, D.C. **Genetic Explanation for Oral Cancer in India.** *Lancet Oncology,* 2002: 3 (7): 392.

Human papillomavirus (HPV) plays an important part in the development of oral cancer, say a group of Indian scientists. They suggest that the high rate of oral cancer in tobacco-addicted populations in eastern India may be partly the result of genetic factors. Their study, reported in the International Journal of Cancer (2002; 97:649–53), involved 110 Indian patients who were highly addicted to tobacco and had developed oral squamous-cell carcinoma. 33.6% of these patients had evidence of HPV infection—far more than similar groups from other countries. Two earlier studies of oral cancer in India showed presence of HPV in 67% of cases in southern India and 15% cases in western India.

OC Epi India (2001) Iyp: Case series
Iype EM, Pandey M, Mathew A, Thomas G, Sebastian P, Nair MK. **Oral cancer among patients under the age of 35 years.** *J Postgrad Med*. 2001 Jul-Sep;47(3):171-6.
(Department of Surgical Oncology, Epidemiology and Clinical studies, Community Oncology and Radiation Oncology, Regional Cancer Centre, Medical College, Thiruvananthapuram - 695 011, India. emathewiype@yahoo.com)

Background: Cancer of the oral cavity is one of the commonest cancers among males. Aims: To assess aetiological factors, patient characteristics, treatment and outcomes in young patients with oral cancer. Settings and design: A retrospective descriptive study of patients under the age of 35 years with cancer of the oral cavity treated between 1982-1996, with the last follow-up till 2001, using the tumour registry data of Regional Cancer Centre (RCC), Trivandrum, Kerala, India. Subject and method: Detailed clinical, treatment and follow-up data were obtained from the computerised records of RCC and recorded on a preset proforma. This was analysed with emphasis on age, sex, risk factors, site, histology, clinical extent and treatment methods and survival in the study group. Statistical analysis: The survival analysis was done using the Kaplan-Meier method and the difference in survival was analysed using log-rank test. Results: Out of 264 patients analysed, tongue was the commonest site identified in 136 (52%) patients followed by buccal mucosa in 69 (26%) patients. A male female ratio of 2.3:1 was observed with a significantly higher male preponderance in buccal mucosa (4.3:1). Prior exposure to tobacco or alcohol was noted in 59.4% patients, with more habitues in buccal mucosa cancer. Histological confirmation was present only in 83.7% patients and among them most were squamous cell carcinoma (85.9%). Radiotherapy, surgery or combined modalities of treatment were employed for majority of patients. The 5-year survival was 57.3%. The stage of the tumour was found to be significant in predicting disease free survival (P=0.03). Conclusions: The importance of early detection for clinical down staging is stressed. There is a need to investigate the aetiology of intra oral cancers in younger patients since a significant proportion (almost 40%) of these patients do not have associated risk factors for cancer.
http://www.jpgmonline.com/displayarticles2.asp?h=v47i3id748.htm&r=http://www.ncbi.nlm.nih.gov:80/entrez/query.fcgi?cmd=Linkiiidb=PubMediiidbFrom=PubMediiifrom_uid=11832617

OC Epi India (2001) Iyp: Case studies
Iype EM, Pandey M, Mathew A, Thomas G, Sebastian P, Nair MK. **Squamous cell carcinoma of the tongue among young Indian adults**. *Neoplasia* 2001 Jul-Aug;3(4):273-7.
(Division of Surgical Oncology, Regional Cancer Centre, Trivandrum, Kerala, 695001 India.)

Oral cancer is one of the commonest cancers among males in India. This study was carried out to evaluate the demographics, risk profile, clinicopathologic features, and treatment outcome in young patients with squamous cell carcinoma (SCC) of the tongue.

Patients under the age of 35 years with SCC of the tongue presenting between 1982 and 1996 were identified using the institution's centralized electronic database. Demographic, clinical, and pathologic characteristics were abstracted from the case records. Survival was calculated by the Kaplan-Meier method. One hundred and fifteen patients with histologically confirmed SCC of the tongue were analyzed. The mean age at presentation was 30.5 years with a 1.7:1 male to female ratio. Prior exposure to tobacco and alcohol was noted in 58 (50.5%) patients. At presentation, 70 (60.9%) were in stages III and IV, and 59 (51.3%) patients had regional lymph node involvement. The overall disease-free survival (DFS) at 3 and 5 years were 63% and 54.9%, respectively. A statistically significant difference in DFS was seen between patients with N(0) and N(1) disease compared to N(2) or N(3) disease. Various other factors like age, sex, habits, and stage of the disease were found to have no significant effect on DFS. Results of the present study suggest that contrary to common belief, survival among young patients is almost similar to that of older patients.

OC Epi India (2000) Doi: Cross-sectional survey
Doifode VV, Ambadekar NN, Lanewar AG. **Assessment of oral health status and its association with some epidemiological factors in population of Nagpur, India.** *Indian J Med Sci* 2000 Jul;54(7):261-9.
(Indira Gandhi Medical College, Nagpur)

A cross sectional study was undertaken in the field practice area of Urban Health Training centre, Bapunagar, Nagpur to assess the oral health status of the community and to study its relationship with some epidemiological factors. Observations of the study reveal that dental caries (43.2%) and periodontal diseases (34.8%) were the most common dental disorders. Other disorders were dentofacial anamoly (24.2%), opacities and enamel disorders (18.7%) and oral mucosal lesions (7.1%). Oral precancerous lesions (2.4%) were also found to be an important problem. Prevalence of oral cancer was 0.1%. In general oral problems were more common in lower socioeconomic groups and in ghutka chewers, pan, tobacco eaters, candy eaters. Also use of tooth brush and tooth powder for cleaning teeth were found to be associated with lower prevalence of oro-dental disorders. Most of the problems were common in younger and middle aged population except cancer and precancerous lesions which were common in middle and older population. But oral submucous fibrosis was exclusively found in younger and middle aged subjects.

OC Epi India (1999) Gup: Predictive study
Gupta PC. **Mouth cancer in India: a new epidemic?** *Indian Med Assoc* 1999 Sep;97(9):370-3
(Epidemiology Research Unit, Tata Institute of Fundamental Research, Mumbai)

Oral cancer has been traditionally described as a major form of cancer in India although on the basis of cancer registry data, it was thought that the incidence had decreased. There are several recent reports in the literature, however, predicting an increase in

mouth cancer incidence in India. This prediction is based upon observation of an increasing prevalence of oral submucous fibrosis, especially in younger individuals, caused by gutka, an industrially manufactured food item. A comparison of the age distribution of recently reported oral submucous fibrosis cases and incident cases reported in the past clearly establishes that the disease is now occurring at much younger ages. A comparison of the age specific incidence rates of mouth cancer (ICD 143-5) during 1983-87 and 1995 in the city of Ahmedabad shows that the incidence has significantly increased in the younger population (< 50 years). Since tongue cancer (ICD 141) does not show a similar increase, it is concluded that the increase in mouth cancer incidence is real. Urgent public health measures are required to curb this new but avoidable epidemic.

OC Epi / OphC India (1998) Rao: Case-control study
Rao DN, Desai PB. **Risk assessment of tobacco, alcohol and diet in cancers of base tongue and oral tongue--a case control study.** *Indian J Cancer* 1998 Jun;35(2):65-72.
(Division of Epidemiology and Biostatistics, Tata Memorial Hospital, Parel, Mumbai, India)

This is a retrospective case-control study of male tongue cancer patients seen at Tata Memorial Hospital, Bombay, during the years 1980-84. The purpose of the study was to identify the association of tobacco, alcohol, diet and literacy status with respect to cancers of two sub sites of tongue namely anterior portion of the tongue (AT) (ICD 1411-1414) and base of the tongue (BT) (ICD 1410). There were 142 male AT patients and 495 BT patients interviewed during the period. 635 interviewed male patients who were free of any disease were considered as control. Bidi smoking was found to be a significant risk factor for BT patients and tobacco chewing for AT patients respectively. Alcohol drinkers showed about 45% to 79% excess risk for both sites of tongue cancer. Illiteracy and non vegetarian diet proved to be a significant factor for AT patients only. The study brings out that the location of cancer is related to the type of tobacco use and other related habits and this in turn may provide meaningful interpretation of variations observed in the incidence of tongue cancer around the world.

OC Epi India (1997) Dat: Case-control study
Datta K, Saha RK, Chakrabarti RN. **A simple risk estimates study for oral cavity cancer: practical approach in Indian context.** *J Indian Med Assoc* 1997 Mar; 95(3):70-1.
(Chittaranjan National Cancer Institute, Calcutta)

A study was conducted on 131 cases of oral cavity cancer (OCC), 145 cases of oral leucoplakia and 704 subjects without any oral lesions to investigate risk factors associated with the development of carcinoma of oral cavity in a hospital based cancer registry. Personal interviews, as well as physical examinations of the subjects enabled evaluation of a variety of potential risk factors. Potential risk factors like tobacco chewing, tobacco smoking, snuff dipping, alcohol consumption, bad oral and dental

hygiene and age were each given certain numerical values. Each subject was first given a score and then analysed and correlated with any presenting lesions. The study revealed that tobacco chewing and bad oral and dental hygiene contributed mainly to high scoring. Among the subjects in the high risk group (scoring more than 400) 63% had OCC, 21% had oral leucoplakia and 16% had no clinical oral lesions. Among the medium risk group (scoring between 100 and 400) 6% had OCC, 21% had leucoplakia and 73% had no oral lesions. In the low risk group (scoring below 100) 8% had leucoplakia and 92% had no clinical oral lesions. Using the scoring system, it is suggested that the high risk group for OCC could be identified from general population and cancer detection tests could be specially directed towards this target group to detect maximum number of cases with minimum possible resources.

OC Epi India (1996) Gho: Case-control study
Ghosh S, Shukla HS, Mohapatra SC, Shukla PK. **Keeping chewing tobacco in the cheek pouch overnight (night quid) increases risk of cheek carcinoma.** *Eur J Surg Oncol* 1996 Aug;22(4):359-60.
(Department of Surgery, Institute of Medical Sciences, Banaras Hindu University, Varanasi, India)

Chewing Chewable Indian Tobacco (CIT) is a popular addiction in India. Some of the addicts keep the bolus of chewed tobacco tucked in the gingivo-labial sulcus (cheek pouch) overnight. This habit is known as night quid. To assess the influence of night quid on the development of oral cancer we carried out this case control observational study in the Out Patient Department of Surgery, Sir Sunder Lai Hospital, Varanasi, India. A total of 105 consecutive oral cancer patients (epidermoid carcinoma) and 71 sex- and age-matched CIT addicts of the same duration of addiction were investigated for the habit of night quid. The habit increased the risk of development of cheek carcinoma significantly, with an Odd's Ratio of 12.5. Simply giving up the habit of night quid could help reduce oral cancer in CIT addicts.

OC Epi India (1994) Aga: Camp report
Agrawal RC, Saxena AK, Srivastava SM, Sahay S**. Early detection and prevention of oral cancers.** *In: Oral Oncology* Volume III A Research. Ed. Verma AK. 3rd International Congress on Oral Cancer, Madras. MacMillan India, Bangalore, 1994, pp 53-55.
(Cancer Hospital and Research Institute, Gwalior, India)

This study reports efforts to detect cancer cases in early stages of the disease through cancer detection camps. The methodology included organising camps in rural and urban areas for mass screening of the population and on the spot cancer detection, suggesting preventive measures and referring the suspected cases requiring detailed examination to cancer hospitals. Of the total 9,624 patients, 1,192 were suspected cancer cases. But despite up to three follow-up visits per suspected case, only 329 of these patients reported

to hospital and out of them 92 cases were confirmed. A positive correlation between use of tobacco and incidence of oral cancer was reported.

OC Epi India (1994) Des: Cross-sectional survey
Deshmukh PT, Raizada RM, Chaturvedi VN. **Epidemiological study of Oral Premalignant lesions in 3460 rural inhabitants of Maharashtra State.** In: *Oral Oncology* Volume III A Research. Ed. Verma AK. 3rd International Congress on Oral Cancer, Madras. MacMillan India, Bangalore, 1994, pp 44-46.
(JNMC, Savangi, Meghe, MGIMS, Sewagram, Maharashtra)

Objective: To study the prevalence of oral precancerous lesions and various habits influencing their causation in rural inhabitants. Methods: Screening of 3,460 subjects regarding their personal habits smoking, chewing and teeth biting was done. They were then examined for precancerous lesions, recording their site, size, number and anatomical location. Data were then statistically analysed. Results: Prevalence of precancerous lesions was found to be 21.9/1000 which included melanoplakia, leukoplakia and Oral Submucous Fibrosis (OSMF). Out of 254 individuals who used tobacco, 17 precancerous lesions were found, whereas 36 with lesions among 618 individuals taking tobacco and lime together were noted. A clear cut dose-response relationship of tobacco chewing was observed in all types of lesions.

OC Epi India (1994) Rao: Case-control study
Rao DN, Ganesh B, Rao RS, Desai PB. **Risk assessment of tobacco, alcohol and diet in oral cancer--a case-control study**. *Int J Cancer* 1994 Aug 15;58(4):469-73.
(Division of Epidemiology and Biostatistics, Tata Memorial Hospital, Parel, Bombay, India.)

A retrospective case-control study of 713 male oral-cancer patients seen at Tata Memorial Hospital, Bombay, during 1980-1984 was done to assess the association between chewing, smoking and alcohol use. Male controls were chosen among persons who attended the hospital during the same period and were diagnosed as free from cancer, benign tumour and infectious disease. Statistical analysis was based on unconditional logistic regression; the confidence interval for RR was calculated using the standard error of the estimates. Established factors such as tobacco chewing and bidi smoking showed a significant association with oral cancer. For alcohol use, the relative risk was 1.42 and a dose-response relationship, in terms of frequency and duration of the habit, was also observed. The illiterate group showed an almost 2-fold significant excess risk compared to the literate group. After adjusting for confounding variables such as age, residence, illiteracy and known factors such as tobacco chewing and bidi smoking, the study has brought out the significance of a non-vegetarian diet as a high-risk factor for oral cancer compared to a vegetarian diet. Further studies are required to identify specific items in the non-vegetarian diet which may be associated with oral cancer.

OC Epi India (1993) van: Cross-sectional survey
van der Eb MM, Leyten EM, Gavarasana S, Vandenbroucke JP, Kahn PM, Cleton FJ. **Reverse smoking as a risk factor for palatal cancer: a cross-sectional survey in rural Andhra Pradesh, India**. *Int J Cancer* 1993 Jul 9;54(5):754-8.
(Department of Clinical Oncology, University Hospital Leiden, The Netherlands.)

A cross-sectional survey of reverse smoking and its association with pre-malignant and malignant lesions of the palate was conducted in the north coastal areas of Andhra Pradesh, India. A total of 480 randomly selected persons were interviewed. Information about smoking status, diet and access to mass media was obtained in each case and an examination of the oral cavity was performed. Reverse smoking of chutta was practised by 33% of the total rural population. The prevalence rate of all palatal lesions was 55%. The prevalence rates of the separate lesions: leukoplakia palatii, palatal keratosis and palatal cancer, were 9.8%, 18.1% and 1.9%, respectively. The presence of pre-malignant lesions was strongly associated with reverse smoking and also associated with conventional chutta smoking. Reverse smoking induced significantly more lesions than conventional chutta smoking, and was a major determinant of subsequent palatal cancer: all 9 newly diagnosed palatal cancers were observed within the group of reverse smokers. There was an inverse relationship between the incidence of palatal lesions and vitamin A intake. The study of access to mass media indicated that the most favourable medium for promoting a prevention campaign would be the cinema.

OC Epi India (1992) Daf: Cohort study
Daftary DK, Murti PR and Shah HT. **Reverse chutta smoking and palatal lesions.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay,1992, pp 85-90.
(Basic Dental Research Unit and WHO Collaborating Center for Oral Cancer Prevention, Tata Institute of Fundamental Research, Bombay, India)

In Srikakulam district, Andhra Pradesh, India, chutta is often smoked with the lighted end inside the mouth. This habit is responsible for the high incidence of palatal cancer and for specific palatal changes. Palatal changes are precancerous, and they include several components, such as keratosis, excrescences, patches, red areas, ulcerations and non-pigmented areas. Red areas appear to be the most dangerous and histologically: 52% of them exhibit epithelial dysplasia. Over a 10-year period, 10 palatal cancers arose, all from pre-existing palatal changes in reverse chutta smokers; malignant transformation occurred only in red areas and patches. During same period, 75% of the palatal changes remained stationary and 14% regressed spontaneously. Cessation of the habit led to higher regression rates of palatal changes, and currently this appears to be the most effective method for managing palatal changes.

OC Epi India (1992) Kur: Case series study
Kuriakose M, Sankaranarayanan M, Nair MK, Cherian T, Sugar AW, Scully C, Prime SS. **Comparison of oral squamous cell carcinoma in younger and older patients in India.** *Eur J Cancer B Oral Oncol* 1992 Oct; 28B(2):113-20.
(Department of Oral Medicine, Surgery and Pathology, Bristol Dental Hospital and School, U.K)

This study examines the demographic, aetiological and clinico-pathological features of 37 patients with oral squamous cell carcinoma (SCC) who were less than 35 years old and a comparable number of patients who were greater than 60 years old. The study was undertaken at the Regional Cancer Centre, Trivandrum, India, between 1988 and 1990. In patients younger than 35 years old, oral SCC occurred more commonly in females, was apparent in all social classes and was associated with fewer aetiological factors. The tumours manifested predominantly as invasive lesions affecting the tongue and there was early spread to lymph nodes. By contrast, in patients older than 60 years of age, oral SCC was more common in males, occurred more frequently in social classes III and IV and was always seen in association with smoking, alcohol or pan chewing. These latter tumours presented as exophytic lesions of the buccal mucosa or gingivae and spread late to lymph nodes. The results indicate that the biological behaviour of oral SCC in young patients may be distinct from that occurring in older patients.

OC Epi India (1992) Meh: Overview
Mehta FS. **An overview of research on oral cancer and precancer at the Basic Dental Research Unit.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 79-84.
(Basic Dental Research Unit and WHO Collaborating Center for Oral Cancer Prevention, Tata Institute of Fundamental Research, Bombay, India)

Since 1966 the Basic Dental Research Unit has undertaken extensive epidemiological studies on oral cancer and precancer in seven areas of India and among Bombay policemen. Using a house-to-house approach, the tobacco habits of well over 200 000 villagers were recorded by trained interviewers. Cross-sectional studies were then carried out in which these individuals were examined by dentists for the presence of oral cancer and precancerous lesions, About 66,000 of the villagers in four cohorts were re-examined annually over 10 years. All oral lesions were photographed in colour, and several hundred biopsies and smears for cytological examination were obtained from the lesions. Oral cancer and precancerous lesions were strongly associated with tobacco use, and in most instances the oral cancer originated from precancer. It was also demonstrated that it is possible to persuade people to quit their tobacco habits, thereby leading to a decreased incidence of precancer. Several other strategies for the control of oral cancer were tried, such as using basic health workers for primary and secondary prevention and mouth self-examination techniques for early detection; these are being further investigated.

OC Epi India (1992) Mur: Overview
Murti PR, Bhonsle RB, Gupta PC and Daftary DK. **Oral health consequences of tobacco use in Ernakulam district, Kerala, India.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 91-105.
(Basic Dental Research Unit and WHO Collaborating Center for Oral Cancer Prevention, Tata Institute of Fundamental Research, Bombay, India)

Bidi smoking and betel-quid (pan) chewing are the most common forms of tobacco use in Ernakulam district. They are strongly associated with oral cancer, various precancerous lesions and conditions, and others which do not seem precancerous. Nodular leukoplakia and submucous fibrosis are a very high-risk precancerous lesion and condition, respectively; other clinical types of leukoplakia also indicate a significant risk for oral cancer. Malignant transformation was not associated with leukoedema, leukokeratosis nicotina palati, palatal erythema, central papillary atrophy of the tongue, pan-chewer's lesion or oral lichen planus-like lesion. Most of these oral lesions remained stationery, some regressed and few recurred; submucous fibrosis, however, did not regress. Overall tobacco use was found to influence the entire natural history of precancer, indicating the need to implement tobacco control measures.

OC Epi India (1992) San: Review
Sankaranarayanan R, Nair MK, Mathew B, Balaram P, Sebastian P, Dutt SC. **Recent results of oral cancer research in Kerala, India.** *Head Neck* 1992 Mar-Apr;14(2):107-12.
(Department of Radiotherapy, Regional Cancer Centre, Trivandrum, India)

Findings from a research program in oral cancer at Regional Cancer Centre, Trivandrum, Kerala, India are reviewed. There is evidence of immune impairment in oral cancer patients. Plant lectins are being investigated for specific binding characteristics in various oral precancers and different histological subtypes of oral cancer. Tobacco and alcohol have been identified as the major risk factors for oral cancer. The chemopreventive potential of carotenoids and retinoids have been evaluated in oral leucoplakias. Beta-carotene and vitamin A in heavier doses induced remission of oral leukoplakias in 25%-50% of trial participants who continued with their tobacco and alcohol habits during the trial. The remission could be maintained with lower doses. Less than 20% of our patients with oral cancer were initially seen in localized stages. Various community-oriented programs for prevention of primary and secondary oral cancers are being evaluated. These include anti-tobacco health education, oral self-examination, and oral examination by trained volunteers. The results of radical radiotherapy and surgical salvage of radiation failure are also discussed. The 5-year disease-free survival rate of 34% is a reflection of the advanced stages of the disease when initially seen. Salvage rates with surgery for radiation failures were encouraging.

OC Epi India (1991) Akh: Case-control study
Akhileswaran R, Vidyasagar MS, Rao KK, Kasturi DP, Fernandes DJ, Naseer CH. **Analysis of habits in oral cancer in Rural South India**. In: *Oral oncology* Volume II Ed. Verma AK. International Congress on Oral Cancer. Macmillan India, Bangalore, 1991, pp 35-38.
(Kasturba Medical College and Hospital Manipal)

In this case-control study, 200 cases of histologically confirmed oral cancer were studied in relation to stage of disease, site, histology and residual disease after primary treatment, with duration of tobacco and related habits. All 200 had habits of pan, tobacco chewing or smoking and some drank alcohol too. These cases were divided in 3 groups depending on the duration of tobacco and related habits.
Almost 90% of the patients had tobacco related habits of 20 or more years duration. The number of habit-years seems to affect the disease process. Most of the oral cancers presented with stage III or stage IV disease. Thus intervention and educative programmes are needed to decrease the prevalence of OC.

OC Epi India (1991) Hai: Camp report
Hai AA, Sinha DN, Hussain SN, Mittal V. **Cancer Detection camp-The Patna Experience.** In: *Oral oncology* Volume II Ed. Verma AK. International Congress on Oral Cancer. Macmillan India, Bangalore, 1991, pp 16-19.
(Department of Surgery, Patna Medical College Patna, India)

Two small cancer detection camps were organized in vicinity of Patna. Forty-six percent of the population screened was addicted to tobacco (43% in camp 1 and 48% in Camp 2) In Camp 1, college students were the most common users of Khaini. In Camp 1 and 2 respectively, 11 and 35 had premalignant changes (mainly leukoplakia). In Camp 1 all the cases with leukoplakia had a history of addiction. Seven cases (1.5%) out of all the persons examined in the camps had frank malignancy. Of these malignancies 6 were Khaini users, most of whom had used khaini for more than 10 years. The longest duration of khaini addiction in one individual was 28 years and he had developed frank malignancy over last one year. Another finding was of poor dental hygiene. Conclusions drawn from the experience were that tobacco plays the most significant role in the aetiogenesis of oral cancers and the risk of cancer seems to be dose and duration related. A population-based study in the area was recommended.

OC Epi India (1991) Ram: Case series study
Ramesh V, Srinivasan B. **Verrucous Carcinoma – An epidemiological study**. In: *Oral oncology* Volume II Ed. Verma AK. International Congress on Oral Cancer. Macmillan India, Bangalore, 1991, pp 13-15.

Fifteen cases of verrucous carcinoma detected out of 50,000 out-patients (0.03%) between 1988 and 1991 at the Raja Muthaiah Dental College and Hospital, Annamalai

University, South India, were reviewed. The occurrence of squamous cell carcinoma and verrucous carcinoma in the oral cavity was in the ratio of 5:1. Verrucous carcinomas were seen in the age groups of 35 to 75 years with an average age of 54 years, mostly in males. The average age for squamous cell carcinoma was 63 years. In two cases, verrucous carcinoma transformed in to squamous cell carcinoma. One case exhibited a coexistent lesion of submucous fibrosis. All the patients with verrucous carcinoma gave a history of tobacco chewing with placement of the quid in the cheek mucosa, the predominant site of verrucous carcinoma.

OC Epi India (1991) Siv: Camp report
Sivakumar M, Ravivarma NA, Ramankutty P. **An epidemiologic study of Oral Cancer in South Kanara, Karnataka India.** In: *Oral oncology* Volume II Ed. Verma AK. International Congress on Oral Cancer. Macmillan India, Bangalore, 1991, pp 16-19. (Dept. of Community Dentistry KMC Manipal India)

The objective of this study was to determine the prevalence of oral cancer and precancerous lesions among people and to study the role of habits like tobacco chewing, smoking and alcohol consumption in the etiopatho-genesis of oral cancer. Health camps were conducted in 7 villages in 4 fours taluks in south Kanara, attended by a total of 12,033 individuals. All persons with oral cavity lesions underwent histopathological examination. Of the 4,011 subjects aged 20 to 80 years screened for detection of oral cancer, 2,031 were males and 1,980 were females. Among them 77.6% of males and 54.4% of females had either one or more habits like chewing, smoking and alcoholism. There were 8 cases of oral cancer of which 6 were females and 2 were males. The prevalence rate of oral cancer was 2 per 1000. This study revealed that the chewing of tobacco habit is predominant in this region and 7 of the 8 cases of oral cancer had chewing habits as a common factor. This fact emphasises the need to undertake preventive measures to control oral cancer in the community in this part of the country.

OC Epi India (1991) Tul: Descriptive report
Tuli SN, Kapoor HL. **Mouth Cancer in Himachal Pradesh.** In: *Oral oncology* Volume II Ed. Verma AK. International Congress on Oral Cancer. Macmillan India, Bangalore, 1991, pp 9-12.

Oral cancers constitute 4.6% of total cancer cases in the State of Himachal Pradesh (Northern India). Males are more affected than females in the ratio of 1.6: 1. The main etiological factors include smoking, tobacco chewing, constant irritation, caries in teeth, oral sepsis, ill-fitting dentures and faulty restorations, as in most other parts of India. More emphasis has to be laid on avoidance of tobacco habits, which are largely responsible for causing oral cancer. The authors conclude that oral cancer is not a major problem in the state of Himachal Pradesh, compared to most other states of Indian sub-continent, mainly due to absence of tobacco chewing in the State.

OC Epi India (1990) Gou: Case-control study
Goud ML, Mohapatra SC, Mohapatra P, Gaur SD, Pant GC, Knanna MN. **Epidemiological correlates between consumption of Indian chewing tobacco and oral cancer.** *Eur J Epidemiol* 1990 Jun;6(2):219-22.
(Department of Social and Preventive Medicine, Warangle Medical College, Andhra Pradesh, India)

The problem of cancer is universal; the only variation occurs in the type, site or other clinico-epidemiological parameters. Oral cancers caused by chewing tobacco are common in India and some parts of the Indian sub-continent. Oral cancers caused by other carcinogens are not common in these areas. The present study shows a significant association (P less than 0.001) between the use of Indian chewing tobacco and oral cancer. Number of quids, mean quantity of tobacco and mean duration of keeping the quids in the mouth had direct dose and effect relationships in causation of oral cancer. A dose of 10 gms of chewing tobacco for about 26 years was observed to have produced cancerous lesions in the buccal cavity. (Comment in: *Eur J Epidemiol* 1991 Jan;7(1):93-7.)

OC Epi India (1990) Nan: Case-control study
Nandakumar A, Thimmasetty KT, Sreeramareddy NM, Venugopal TC, Rajanna, Vinutha AT, Srinivas, Bhargava MK. **A population-based case-control investigation on cancers of the oral cavity in Bangalore, India**. *Br J Cancer* 1990 Nov;62(5):847-51.
(Department of Population Based Cancer Registry, Kidwai Memorial Institute of Oncology, Bangalore, India.)

A case-control study on cancers of the oral cavity was conducted using data from the population based cancer registry, Bangalore, India. 348 cases of cancers of the oral cavity (excluding base tongue) were age and sex matched with controls from the same residential area but with no evidence of cancer. The relative risk due to pan tobacco chewing was elevated in both males and females, being appreciably higher in the latter (relative risk 25.3%; 95% confidence interval 11.2-57.3). A statistically significant (linear test for trend P less than 0.001) dose response was seen with years, times per day and period of time chewed. Any smoking (cigarette or bidi or both) caused only slightly elevated risk of developing oral cancer, and a history of alcohol drinking or inhalation of snuff did not influence the risk. A new finding of our study was the markedly elevated risk of oral cancer in persons consuming ragi (Eleusine coracana, family graminae) in comparison to those not consuming ragi as staple cereal in their diet. There also appeared to be some interaction between ragi consumption and tobacco chewing with substantially higher relative risks in those who pursued both habits compared to those who gave a history of either one.

OC Epi India (1990) San: Review
Sankaranarayanan R. **Oral cancer in India: an epidemiologic and clinical review.** *Oral Surg Oral Med Oral Pathol* 1990 Mar;69(3):325-30.

(Regional Cancer Centre, Kerala, India)

This article reviews the epidemiologic and clinical aspects of oral cancer in India, where the disease ranks number one among all cancers in male patients and number three among cancers in female patients. Causal association between oral cancer and the chewing of betel quids containing tobacco leaves or stem and other tobacco habits has been extensively studied. But there is need for more in-depth studies on the role of alcohol, diet, and oral hygiene practices in India. The exciting opportunity provided by the well-established oral precancerous lesions for intervention and early detection programs is also discussed. The peak age frequency of occurrence is at least a decade earlier than that described in Western literature. Sex ratio reveals a 2:1 preponderance of male patients. Only 10% to 15% of cases present in localized stages. The poor survival revealed by existing studies is mainly due to the overwhelming proportion of advanced cases. The excellent opportunity for more research and efforts in prevention and control of oral cancer in India is highlighted in this review.

OC Epi India (1990a) San: Case-control study
Sankaranarayanan R, Duffy SW, Padmakumary G, Day NE, Nair MK. **Risk factors for cancer of the buccal and labial mucosa in Kerala, southern India.** *J Epidemiol Community Health* 1990 Dec;44(4):286-92.
(Regional Cancer Centre, Trivandrum-India)

Study objective: The aim was to investigate risk factors for cancer of the buccal and labial mucosa in Kerala, southern India. Design: case-control study. Setting: Regional Cancer Centre, Trivandrum, Kerala, and local teaching hospitals. Participants: Cases were all those registered with oral cancers at the Regional Cancer Centre during 1983 and 1984 (n = 414). Controls (n = 895) were selected from admissions to the cancer centre who were found to have non-malignant conditions, or from patients attending outpatients in teaching hospitals of Trivandrum medical college with non-malignant conditions. Results: The risk in males of the following habits was investigated: pan (betel)-tobacco chewing, bidi and cigarette smoking, drinking alcohol, and taking snuff. Only pan-tobacco chewing was investigated in females as very few indulged in other habits. Among males, predisposing effects were found for pan-tobacco chewing (p less than 0.001), bidi smoking (p less than 0.001), drinking alcohol (p less than 0.001), and taking snuff (p less than 0.01). Pan-tobacco chewing also had a predisposing effect in females (p less than 0.001). Duration of use was a better predictor of risk than either daily frequency of use or total lifetime exposure, both for pan-tobacco chewing (especially if the habit started before age 21 years) and bidi smoking. However, there were also very high risks associated with the current occasional use of both factors. Pan-tobacco chewing was the most important risk factor, with relative risk of 13.24 with 31-40 years' use, and 37.75 with greater than 40 years' use among males. Corresponding relative risks in females were 21.30 and 54.93. No effect of cigarette smoking was observed (relative risk 0.64, p greater than 0.1). Conclusions: A substantial majority of cases of buccal and labial cancers are attributable to chewing pan-tobacco.

OC Epi India (1989) Cha: Case series study
Chattopadhyay A. **Epidemiologic study of oral cancer in eastern India.** *Indian J Dermatol* 1989 Sep;34(3):59-65.

From January 1967 to December 1987, 732 consecutive cases of oral squamous cell carcinoma were analysed at a Dental College and Hospital in Calcutta. Incidence of oral cancer was 47.73 per 100,000. Male: Female ratio was 1.76. Mean age was 52.07 years. Buccal mucosa was the commonest site involved, next was gingiva and alveolar ridge. Tobacco chewing, smoking and pan chewing were the deleterious habits which were significantly more common among the affected group compared to the control group.

OC Epi India (1989) San: Case-control study
Sankaranarayanan R, Duffy SW, Day NE, Nair MK, Padmakumary G. **A case-control investigation of cancer of the oral tongue and the floor of the mouth in southern India.** *Int J Cancer* 1989 Oct 15;44(4):617-21.
(MRC Biostatistics Unit, Cambridge, UK)

A case-control study of cancer of the tongue and floor of mouth was conducted in Kerala, Southern India, on 228 cases and 453 hospital-based controls, matched for age, sex and religion. The authors studied pan (betel)-tobacco-chewing, bidi (local type of cigarette)-and-cigarette-smoking, alcohol-drinking and snuff use, for their associations with risk, in males. Among females, only pan-tobacco-chewing was analyzed, as very few females indulged in the other habits. In males, a significantly increased risk was observed in association with pan-tobacco-chewing, bidi-smoking, bidi-plus-cigarette-smoking (but not cigarette-smoking alone) and alcohol-drinking (p less than 0.001 in all cases), although the effect of alcohol was no longer significant when adjusted for the other significant predisposing factors. Among females, pan-tobacco-chewing had a similar predisposing effect to that observed in males (p less than 0.001). In males an adjusted relative risk of 6.14 was associated with chewing 10 or more pan-tobacco quids per day (relative to those who never chewed). The corresponding relative risk in females was 9.27. In males, an adjusted relative risk of 7.46 was observed for those smoking 20 or more bidis per day (relative to never-smokers).

OC Epi India (1989) San: Case-control study
Sankaranarayanan R, Duffy SW, Padmakumary G, Day NE, Padmanabhan TK. **Tobacco chewing, alcohol and nasal snuff in cancer of the gingiva in Kerala, India.** *Br J Cancer* 1989 Oct;60(4):638-43.
(Regional Cancer Centre, Trivandrum, India)

A case-control study of cancer of the gingiva was carried out in Kerala, Southern India, using 187 cases and 895 hospital-based controls. The authors investigated the effects on risk in males of pan (betel)-tobacco chewing, bidi and cigarette smoking, drinking alcohol and taking snuff. In females only pan-tobacco chewing was investigated as very

few females indulged in the other habits. Among males, significant positive associations with risk were observed for pan-tobacco chewing (P less than 0.001), bidi smoking (P less than 0.001) alcohol drinking (P less than 0.001) and snuff use (P less than 0.05). In females, pan-tobacco chewing had a similar predisposing effect (P less than 0.001). Daily frequency of pan-tobacco chewing was the strongest predictor of risk in males, with a relative risk of 15.07 associated with chewing ten or more quids per day. The corresponding relative risk among females was 13.69. In males a relative risk of 3.20 was associated with smoking more than 20 bidis per day, and relative risks of 2.62 and 3.90 were associated with regular use of alcohol and snuff respectively. Surprisingly high relative risks were observed in association with occasional use of pan-tobacco, bidi, cigarettes, alcohol and snuff. A stepwise logistic regression analysis yielded four predictors: pan-tobacco daily frequency, duration of bidi use, and alcohol and snuff use (regular versus never). There were also significantly elevated risks associated with occasional indulgence in these four habits. Total lifetime exposure was no better at predicting risk than daily frequency or duration of habits.

OC Epi India (1987) Gup: Letter
Gupta PC, Mehta FS, Pindborg JJ. **Oral Cancer in Rural India**. *The Lancet*; May 9, 1987:1087.

Where oral cancer is common the mortality from this disease is high. Yet the mouth is easily accessible and oral cancer is detectable at an early stage. Most patients seek medical help only when the disease is advanced. Since high risk individuals seldom volunteer for oral examination at central screening centres, one suggested approach is for secondary prevention via case-finding in house-to-house surveys.

The incidence of oral cancer, especially palatal cancer, is high in Srikakulam district, Andhra Pradesh, due to the widespread habit of reverse *chutta* smoking – ie, smoking home-made cheroots with the lighted end inside the mouth. In an educational intervention study for primary prevention of oral cancer nineteen villages were selected in this district. 12,038 tobacco chewers and smokers aged 15 years and over were examined in a baseline survey and followed-up annually by house-to-house visits. The examination was done by dentists specially trained in the early detection of oral cancer. During the baseline examination and eight years of follow-up, 37 oral cancers were diagnosed, 4 of them palatal cancers. One was already advanced at the baseline examination; one patient died of oral cancer without a re-examination; and in two patients the diagnosis was based on hospital records. The remaining 33 were detected by examining dentists at a reasonably early stage, but of these 33 patients, who might have benefited from early detection, 24 (72%) refused to attend for treatment despite the best persuasive efforts of the dentists and social scientists on the team. One patient claimed that he was sent back from hospital without treatment, and he reused to go again. Of the 24 patients refusing treatment 19 died, most them within two years, and of the five survivors four have been followed up for one year and one for two years.

Although poverty was widespread in the area and the study population itself was poor the refusal of treatment was not for financial reasons since patients were reimbursed for travel treatment, and allied expenses. Ignorance of the seriousness of disease was the

main reason. However, it is well-known that in rural India death is not considered as an event that needs to be postponed, especially after middle age. Even when death is imminent, medical assistance is mainly sought to alleviate physical discomfort. Oral cancer patients coming to hospital from a rural area constitute only a small, self-selected group of all oral cancer in the population. Thus for research on the incidence and natural history of oral cancer a house-to-house survey should be a preferred approach. The findings suggest that the house-to-house approach (even though it can be done by specially trained basic health workers) may not prove very effective in reducing mortality from oral cancer among rural people.

OC Epi India (1986) Jay: Descriptive report
Jayant K, Deo MG. **Oral cancer and cultural practices in relation to betel quid and tobacco chewing and smoking.** *Cancer Detect Prev* 1986;9(3-4):207-13.

Oral cancer is the most common cancer in India, Pakistan, and Sri Lanka and ranks high in several Southeast Asian countries. The association of these cancers with cultural practices like chewing was recognized almost a century ago. Continued work since then has identified tobacco use as the most important avoidable cause of oral cancer. Critical appraisal of specific cultural practices that lead to high risk of oral cancer are presented with a focus on possible strategies for prevention programs. The need to monitor cultural changes such that these changes lead to prevention of cancer and not a shift from one type of cancer to another will be emphasized.

(For more on oral cancer, see also 4.4 Immune System)

3.2.2 Oral lesions and conditions, precancerous and non-cancerous

(See also sectionson: Oral submucous fibrosis, Oral cancer and Oral cavity cancer, Oral cancer epidemiology and Interventions to reduce tobacco use)

Investigations of the role of tobacco and betel quid habits, interacting with diet and alcohol intake, on different types of oral precancerous and other non-cancerous lesions are reported in fifteen articles. One describes how an intervention to reduce tobacco use lowered the incidence of lesions substantially. The articles include cohort studies, case-control studies, cross-sectional studies and descriptive reports, one histological comparative study and an analytical report. One article (OL India (1992) Sti) describes the microscopic changes in mouth tissue and tobacco related carcinogens in the saliva of tobacco users in Orissa. Precancerous lesions include the clearly precancerous ones like leukoplakia (and preleukoplakia), nodular leukoplakia, erythroplakia, and oral submucous fibrosis (with and without blanching or petechiae). Other lesions and conditions include oral lichen planus and oral lichen planus-like lesion, betel-quid chewer’s mucosa, betel cheilitis, smoker's palate, central papillary atrophy of the tongue and leukoedema, local melanin depigmentation, and stomatitis nicotina.

OL India (2002) Heb: Case-control study
Hebert JR, Gupta PC, Bhonsle RB, Mehta H, Zheng W, Sanderson M, Teas J. **Dietary exposures and oral precancerous lesions in Srikakulam District, Andhra Pradesh, India**. *Public Health Nutr* 2002 Apr;5(2):303-12.
(Department of Epidemiology and Biostatistics, University of South Carolina School of Public Health, Columbia 29208, USA. jhebert@sph.sc.edu)

Objective: To test the effect of dietary nutrients on oral precancerous lesions in a reverse-smoking (i.e. smoking with the glowing end inside the mouth) population in South India. Design: Case-control. Cases with precancerous lesions were matched to an equal number of lesion-free controls matched on age (+/- 5 years), sex and village. All subjects used tobacco in some form. Dietary data were obtained using an interviewer-administered food-frequency questionnaire, designed for use in this population. All interviews were conducted blinded to the disease status of the subject. Data were analysed using logistic regression. Setting: Nineteen rural villages in Srikakulam District, Andhra Pradesh. Subjects: From a survey of 6007 tobacco users, 485 (79% women) were found to have precancerous, mostly palatal, lesions (cases), and 487 lesion-free subjects were selected as controls. Results: All eligible subjects consented to participate and nearly all (> 99%) had complete data for analyses. Reverse smoking was the most common form of tobacco use among cases (81.9%) and controls (73.5%), and reverse smokers were 5.19 times more likely than chewers to have these lesions (95% confidence interval = 1.35, 19.9). After controlling for relevant covariates, including the type of tobacco use, protective linear effects were observed for zinc (70% reduction across the interquartile range, $P < 0.002$), calcium (34% reduction, $P < 0.002$), fibre (30% reduction, $P < 0.009$), riboflavin (22% reduction, $P < 0.03$) and iron (17% reduction, $P < 0.05$). Conclusions: Several dietary nutrients appear to protect against oral precancerous lesions that are strongly associated with reverse smoking. The results of this study indicate scope for targeting dietary factors in preventing oral cancer, which should be coupled with aggressive anti-tobacco use efforts.

OL India (2000) Has: Case-control study
Hashibe M, Mathew B, Kuruvilla B, Thomas G, Sankaranarayanan R, Parkin DM, Zhang ZF. **Chewing tobacco, alcohol, and the risk of erythroplakia.** *Cancer Epidemiol Biomarkers Prev* 2000 Jul;9(7):639-45.
(Department of Epidemiology, University of California-Los Angeles School of Public Health, 90095-1772, USA)

Although chewing tobacco, smoking, and alcohol drinking have been suggested as risk factors for oral cancer, no study has examined the relationship between those factors and the risk of erythroplakia, an uncommon but severe oral premalignant lesion. This study analyzed the effects of chewing tobacco, smoking, alcohol drinking, body mass index, and vegetable, fruit, and vitamin/iron intake on the risk of erythroplakia and explored potential interactions between those factors in an Indian population. A case-control study

including 100 erythroplakia cases and 47,773 controls was conducted, as part of an on-going randomized oral cancer screening trial in Kerala, India. The analysis was based on the data from the baseline screening for the intervention group, where the diagnostic information was available. The information on epidemiological risk factors was collected with interviews conducted by trained health workers. The erythroplakia cases were identified by health workers with oral visual inspections, and then confirmed by dentists and oncologists who made the final diagnosis. The odds ratios (OR) and their 95% confidence intervals (CIs) were calculated by the logistic regression model using SAS software. The adjusted OR for erythroplakia was 19.8 (95% CI, 9.8-40.0) for individuals who had ever chewed tobacco, after controlling for age, sex, education, body mass index, smoking, and drinking. The adjusted OR for ever-alcohol-drinkers was 3.0 (95% CI, 1.6-5.7) after controlling for age, sex, education, body mass index, chewing tobacco, and smoking. For ever-smokers, the adjusted OR was 1.6 (95% CI, 0.9-2.9). A more than additive interaction on the risk of erythroplakia was suggested between tobacco chewing and low vegetable intake, whereas a more than multiplicative interaction was indicated between alcohol drinking and low vegetable intake, and between drinking and low fruit intake. The authors concluded that tobacco chewing and alcohol drinking are strong risk factors for erythroplakia in the Indian population. Because the CIs of interaction terms were wide and overlapping with those of the main effects, only potential interactions are suggested. (Comment in: Cancer Epidemiol Biomarkers Prev. 2000 Jul;9(7):637-8.)

OL India (1999) Gup: Case-control study
Gupta PC, Hebert JR, Bhonsle RB, Murti PR, Mehta H, Mehta FS. **Influence of dietary factors on oral precancerous lesions in a population-based case-control study in Kerala, India.** *Cancer* 1999 May 1;85(9):1885-93.
(Epidemiology Research Unit, Tata Institute of Fundamental Research, Bombay, India)

Background: Although tobacco is the primary etiologic factor for oral precancerous lesions in India, evidence from other sources indicates that diet may modify risk. This case-control study was designed to minimize a variety of biases in its attempt to investigate the relation between diet and oral precancerous lesions. Methods: In a house-to-house survey of 5,056 tobacco users in a rural area of Ernakulam district in Kerala, India, 226 individuals (44 females and 182 males) were found to have precancerous lesions (cases), which in 4 cases proved to be cancer. From among the examinees, an equal number of controls who were free of oral mucosal lesions and were matched to the cases regarding age (+/-5 years), gender, ward of residence, and use of tobacco also were enrolled. Dietary data were obtained using a customized interviewer-administered food-frequency questionnaire. All subjects and interviewers were blinded to the disease status of the subject. Results: After controlling for tobacco use, intake of fruits, vegetables, and beta-carotene evinced inverse trends in risk ($P<0.05$), with an average reduction of over 10% per quartile of exposure. Associations with certain micronutrients appeared to differ according to gender, with an apparent 20% reduction in risk per mg of zinc consumed per day among men and the suggestion of an increased risk among those women in the lowest quartile of iron intake (an increase of approximately 2.5-fold) and ascorbic acid intake (an increase of approximately 70% increase) compared with other women

(P<0.10). Conclusions: Consumption of vegetables, fruits, and several micronutrients may inhibit precancerous lesions of the oral cavity.

OL India (1997) Bho: Descriptive report of cohort studies
Bhonsle RB, Gupta PC, Murti PR. **Clinical features of less-reported oral mucosal lesions related to betel-quid chewing.** *Dental Journal of Malaysia* 1997;18:52-57.

In Ernakulam district of Kerala, India, several prospective long-term epidemiologic studies were carried out involving over 27 thousand villagers in house-to-house visits. In these studies in addition to well recognized betel quid associated oral mucosal lesions like oral cancer, leukoplakia, oral submucous fibrosis and oral lichen planus, several other oral mucosal lesions also associated with this habit, having specific clinical features were observed. They included betel-quid chewer's mucosa, lichen planus-like lesion, betel cheilitis, petechiae and blanching in oral submucous fibrosis. The clinical features of these oral mucosal lesions identified during the studies are described in this paper.

OL India (1997) Gup: Cohort study
Gupta PC, Bhonsle RB, Murti PR. **Oral mucosal lesions related to betel-quid chewing – an epidemiologic assessment from a 10-year follow-up study of 12,212 individuals in Ernakulam District, Kerala, India.** *Dental Journal of Malaysia* 1997;18:38-42.

A cohort of 12,212 villagers was selected on the basis of their reported tobacco use in Ernakulam district Kerala state. It was followed annually over a period of 10 years for education on tobacco habits and the development of oral precancerous changes in house-to-house surveys with 98% follow-up. Analysis of incidence rates revealed that some lesions were almost solely associated with smoking habits, whereas oral submucous fibrosis and oral lichen planus-like lesion were solely associated with betel-quid chewing habits. Oral lichen planus and leukoplakia were associated with smoking as well as betel-quid chewing habits. A comparison of the incidence rates amongst those who reportedly stopped their betel-quid chewing habit versus those who did not, demonstrated that whereas leukoplakia, oral submucous fibrosis and oral lichen planus-like lesion were directly associated with the betel quid chewing habit, oral lichen planus was not. Epidemiological findings thus justified a separate categorization of oral lichen planus-like lesion as a distinct entity.

OL India (1997) Mur: Descriptive report
Murti PR, Gupta PC, Bhonsle RB. **Betel-quid and other smokeless tobacco habits in India: oral health consequences.** *Dental Journal of Malaysia* 1997;18:16-22.

Smokeless tobacco habits are practised in India in various ways, of which betel quid chewing is the most widespread. A large spectrum of oral lesions is associated with betel quid chewing. This paper gives an overview on this and other popular smokeless tobacco habits in India and the common lesions associated with these habits.

OL India (1995) Gup: Cohort study
Gupta PC, Murti PR, Bhonsle RB, Mehta FS, Pindborg JJ. **Effect of cessation of tobacco use on the incidence of oral mucosal lesions in a 10-yr follow-up study of 12 212 users.** *Oral Dis* 1995 Mar;1(1):54-8.
(Basic Dental Research Unit and WHO Collaborating Centre for Oral Cancer Prevention, Tata Institute of Fundamental Research, Bombay, India)

Objective: To study the effect of cessation of tobacco use on the incidence of lichen planus, leukoplakia and other oral mucosal lesions. Design: A 10-yr cohort study in a rural population of Ernakulam district, Kerala, India. Material and methods: Some 12,212 tobacco users were interviewed and examined in a baseline survey and re-examined annually for 10 years. At each examination they were exposed to health educational programs to encourage them to quit their tobacco use. The incidence rates were calculated using person-years method among those who stopped their tobacco use and all others. Results: A total of 77,681 person-years of observation accrued among men and 32,544 among women. Among men 6.5% of these and among women 14.4% were in the stopped category. The incidence of oral lichen planus did not show any consistent association with cessation of tobacco habits (incidence ratio 1.35) but for leukoplakia there was a substantial drop in the incidence after cessation (incidence ratio 0.31). Several other tobacco-associated oral mucosal lesions such as oral lichen planus-like lesion, smoker's palate, preleukoplakia, central papillary atrophy of the tongue and leukoedema showed either zero, or very small incidence, after cessation. Conclusion: The reported association between tobacco use and lichen planus appears to be indirect but for all other lesions it is direct. The cessation of tobacco use led to a substantial fall in the incidence of leukoplakia and other lesions implying a reduced risk for oral cancer after cessation of tobacco use.

OL India (1993) Meh: Manual
Mehta F.S., Hamner III J.E. **Tobacco related oral mucosal lesions and conditions in India – A guide for Dental Students, Dentists, and Physicians**, Basic Dental Research Unit, Tata Institute of Fundamental Research, Mumbai.

In day-to-day clinical experience, students of dentistry and dental and medical practitioners encounter a wide spectrum of oral mucosal lesions. They range from innocuous mucosal alterations needing simple therapeutic remedies and patient counseling to life threatening lesions. Many of these lesions, and almost all the potentially dangerous ones, are caused by some type of tobacco use (different habits are described in Appendix I). An estimated 47% of Indians aged 15 years and over use tobacco in one form or another. A variety of oral mucosal changes attributable to its use are observed in up to 50% of tobacco users. As dentists are often the first to examine the patient's mouth, they are in a key position to detect these lesions at an early stage and initiate suitable remedial measures, contributing to better prognosis and patient welfare. This is especially true for early detection of oral cancer. The requisites for early

diagnosis are correct examination technique of the mouth (described in Appendix II) and knowledge of the clinical appearance of oral lesions in all their diversity and natural history, as described and illustrated in this text.

The purpose of this volume is to familiarise readers with the most common tobacco-related oral lesions seen in India whose detection is likely to be missed. Lesions often culminate in oral cancer and facial deformity, both of which are preventable. As early as 1954, Dr. Fali S. Mehta initiated studies among the tribal people of Maharashtra to investigate the effects of tobacco on periodontal tissues. In 1959, he initiated a 10-year prospective study on oral precancer among 4,734 policemen in Bombay. Dr Mehta established the Basic Dental Research Unit at the Tata Institute of Fundamental Research in 1964 to investigate the effects of the use of tobacco on the oral mucosa, study the natural history of oral precancer and preventive strategies for oral cancer. Professor Pindborg was the Co-principal Investigator, and Dr. James E. Hamner, III, the NIH Project Officer for this investigation. Over 200,000 villagers in seven districts of six states of India were examined in several cross-sectional studies, and 66,000 of them were followed-up for over ten years. These studies generated valuable scientific data on the most common tobacco-related oral mucosal lesions in India, the basis for this publication.

OL India (1992) Hed: Histological comparative study
Hedin CA, Pindborg JJ, Daftary DK, Mehta FS. **Melanin depigmentation of the palatal mucosa in reverse smokers: a preliminary study**. *J Oral Pathol Med* 1992 Nov;21(10):440-4.
(Department of Periodontology, Malarsjukhuset, Eskilstuna, Sweden)

The melanin pigmentation in the palate of Indian reverse smokers was histologically studied in 80 biopsies, which were compared with corresponding tissue from 49 nontobacco users. The morphology of epithelium containing melanin in its basal part was normal in smokers and nonsmokers, in contrast to areas with a local melanin depigmentation of the epithelium found in some of the reverse smokers. Here an epithelial thinning, inflammation in the underlying connective tissue, and eventually a cancer was found. The histologic appearance was in accordance with the theory that as long as a smoker's melanosis or a genetic melanin pigmentation is present, melanin functions as a defence against toxic agents penetrating into the oral mucosa.

OL India (1992) Mur: Descriptive report
Murti PR, Gupta PC, Bhonsle RB, Daftary DK, Mehta FS, Pindborg JJ. **Smokeless Tobacco Use in India: Effects on Oral Mucosa.** In: *Smokeless Tobacco or Health - An International Perspective*. September 1992. USA. Smoking and Tobacco Control Monograph 2. NIH Publication No. 92-3461. pp 51-65.

Smokeless tobacco (ST) is used in diverse forms in India for chewing, sucking in the mouth until it becomes bland, or applying over the teeth and gums. Tobacco is chewed most commonly in betel quid. ST use results in oral cancer, precancer, and other oral lesions. Tobacco smoking and other factors such as nutrition and viruses like HPV and

HSV may modify the effect of ST use. There is a need to study the exact role of other factors in the causation of oral cancer. Long-term studies have demonstrated that in most instances oral cancer arises from precancerous lesions or conditions. The methods currently available to identify cancer potential in precancer, however, have limited usefulness. Therefore, research should be extended in that direction.

OL India (1991) Bho: Cross-sectional survey
Bhowate RR, Jawle SS, Rao SP, Pakhan AJ, Chinchkhede DH. **Epidemiology of oral premaligant lesions in rural areas of Wardha District.** In: *Oral oncology*, Volume II, Ed. Verma AK. International Congress on Oral Cancer, Madras. Macmillan India, Bangalore, 1991, pp 24-27.
(Department of Dental Surgery, MGIMS, Sevagram, Maharashtra)

Objective: To find out the prevalence of oral premalignant lesions among habitual tobacco users. Methods: A community survey of 2000 persons of all ages was conducted in the rural field practice area of the Department of Community Medicine MGIMS, Sevagram, taking a detailed history of tobacco consumption and performing oral examination. Results: Out of a total of 2000 individuals examined, 437 individuals were habituated to tobacco. Two thirds were males and most (43.9%) were between the ages of 20-39 years. This was also the group among whom most of the premalignant lesions and conditions were found. Three of the habitués were below the age of nine years. Amongst users, 73.4% were consuming tobacco with lime, 13.5 % were chewing betel nut or pan without tobacco, 7.7% were taking tobacco with betel nut and/or pan, while 5.2% had smoking as the predominant habit. As many as 52.4% of habitués to tobacco/pan/betel nut were found to be suffering from oral lesions. No lesions were found among non-users. Tobacco-lime users had a higher proportion of leukoplakia than those with other habits. A dose response relationship was found with increasing amounts of tobacco consumed per day. Conclusion: This study confirms the necessity of oral health surveys in high-risk groups like adolescents and young adults to detect early premalignant lesions.

OL India (1989) Gav Cross-sectional survey
Gavarasana S, Susarla MD. **Palatal mucosal changes among reverse smokers in an Indian village.** *Jpn J Cancer Res* 1989 Mar;80(3):209-11.
(Lions Cancer Treatment & Research Centre, Visakhapatnam, A.P., India)

The smoking habits of 324 villagers of Uppada, East Godavari District, A.P., India, and their effect on the palatal mucosa leading to cancer, were studied. The frequency of reverse smoking (i.e., smoking with the lighted end inside the mouth) was 6.23 times higher in females than in males. The frequency of preleukoplakia was 2.26 times higher, that of leukoplakia was 13.84 times higher, and that of stomatitis nicotina was 7.13 times higher in reverse smokers than in regular smokers. These frequencies are lower compared to earlier studies done in the 60's and 70's in the districts of Visakhapatnam and Srikakulam.

OL India (1989) Gup: Analytical Report
Gupta, PC. **Leukoplakia and incidence of oral cancer**. *J Oral Pathol Med* 1989;18:17.

Reports from India showing comparatively lower prevalence rates of oral leukoplakia and lower malignant transformation rates than in western countries appear paradoxical because of high incidence rates of oral cancer in India. On a closer examination of available data however, it becomes clear that there is no inconsistency. This is because oral cancer can develop without a preceding leukoplakia, as found in at least two follow-up studies in Ernakulam, Kerala.

OL India (1989) Gup: Cohort study
Gupta PC, Bhonsle RB, Murti PR, Daftary DK, Mehta FS, Pindborg JJ. **An epidemiologic assessment of cancer risk in oral precancerous lesions in India with special reference to nodular leukoplakia.** *Cancer* 1989 Jun 1;63(11):2247-52.
(Basic Dental Research Unit, Tata Institute of Fundamental Research, Bombay, India)

A cohort of 12,212 tobacco users was followed up annually to assess malignant potential of oral precancerous lesions in the Ernakulam district in Kerala, India. A total of 19 new oral cancers were diagnosed over a period of 8 years, and 15 (79%) of these arose from some preexisting precancerous lesion or condition. Nodular leukoplakia showed highest rate of malignant transformation (16% per year) as six of 13 nodular leukoplakia underwent malignant transformation over a mean follow-up period of 2.8 years. The relative risk (3243.2) compared with individuals with tobacco habits but without any precancerous oral lesion was also the highest for nodular leukoplakia. In addition, nodular leukoplakia was associated with submucous fibrosis in two patients, which progressed to oral cancer and was the clinical diagnosis for four lesions that turned out to be malignant on histopathologic examination. Nodular appearance was noted in two other precursor lesions as well. Thus, 14 of 19 oral cancers (74%) were either preceded by nodular leukoplakia and with lesions showing a distinct nodular appearance, or had the clinical appearance of nodular leukoplakia.

OL India (1989) Meh: Cross-sectional survey with follow-up
Mehta FS, Bhonsle RB, Murti PR, Daftary DK, Gupta PC, Pindborg JJ. **Central papillary atrophy of the tongue among bidi smokers in India: a 10-year study of 182 lesions.** *J Oral Pathol Med* 1989 Sep;18(8):475-80.
(Basic Dental Research Unit, Tata Institute of Fundamental Research, Bombay, India)

The occurrence of central papillary atrophy of the tongue among tobacco users, its clinical characteristics and the long-term behavior in relation to changes in tobacco use was studied in 182 individuals in Ernakulam district, Kerala, India. Almost all (98%) lesions occurred among bidi smokers. Clinically, about 31% occurred in combination with bidi smoking associated lesions such as palatal erythema (14%), leukoplakia (8%) or

both (3%). Histologic evaluation in 12 biopsies using single PAS stained sections showed candidal hyphae in 67%. A 10-yr follow-up (mean: 6.7 yr) of the 182 lesions showed that the regression was highest (87%) among those who stopped their smoking habit and persistence among those who did not reduce or stop their smoking habits. The findings from this study confirm a strong link between bidi smoking and central papillary atrophy of the tongue in rural Indian populations.

3.2.3 Oral submucous fibrosis (OSF)

Oral submucous fibrosis (OSF) is a painful, disabling potentially cancerous condition of the oral mucosa associated with areca nut use, in which the elasticity of the mucosa is reduced and fibrous bands develop. Recent epidemiological studies show an association with chewing of areca nut with or without tobacco or other components. The following articles discuss various aspects of the role of areca nut and tobacco in the development of this condition. Users of gutkha, a mixture of areca nut, lime, catechu, unspecified flavouring agents, etc and tobacco, have been found to develop this painful condition in just a few years of use. One article referenced here, but whose abstract is listed in the educational intervention section shows how an educational intervention helped users stop consumption of mixtures containing areca nut.

OSF / Nut India (2002) Has: Case-control study
Hashibe M, Sankaranarayanan R, Thomas G, Kuruvilla B, Mathew B, Somanathan T, Parkin DM, Zhang ZF. **Body mass index, tobacco chewing, alcohol drinking and the risk of oral submucous fibrosis in Kerala, India.** *Cancer Causes Control.* 2002 Feb;13(1):55-64.
Department of Epidemiology, UCLA School of Public Health and Jonsson Comprehensive Cancer Center, Los Angeles, CA 90095-1772, USA.

Objective: While chewing areca nut is considered a risk factor for oral submucous fibrosis, the effects of cigarette smoking, alcohol drinking, and body mass index (BMI) have not been examined; nor are they well established. In this study we investigated the association between BMI, smoking, drinking, and the risk of oral submucous fibrosis. Methods: We conducted a case-control study within the framework of an ongoing randomized oral cancer screening trial in Kerala, India. Trained health workers conducted interviews with structured questionnaires and oral visual inspections to diagnose oral premalignant lesions. A total of 170 oral submucous fibrosis cases (139 women and 31 men) and 47,773 controls were identified. The odds ratios (OR) and 95% confidence intervals (CI) were calculated by logistic regression in SAS. Results: The adjusted OR for ever-tobacco chewing was 44.1 (95% CI = 22.0-88.2). An inverse dose-response relationship was seen between BMI and the risk of oral submucous fibrosis when both genders were combined (p for trend = 0.0010), with an OR of 0.5 (95% CI = 0.3-0.9) for the highest BMI quartile compared to the lowest. Alcohol drinking may possibly be associated with the risk of oral submucous fibrosis; the adjusted OR for ever drinking was 2.1 (95% CI = 1.0-4.4). Cigarette smoking did not appear to be a risk factor for women or for men. Both smoking and drinking were rare habits among women.

Conclusion: This study suggested, for the first time, that BMI was inversely associated with the risk of oral submucous fibrosis for both genders when potential confounding factors were adjusted. Our results indicated that alcohol drinking might be a moderate risk factor and confirmed the previous observation that chewing tobacco was a strong risk factor for oral submucous fibrosis.

OSF India (2001) Raj: Clinical, histological and biophysical study

Rajendra R, George B, Sivakaran S, Narendranathan N. **Visceral organ involvement is infrequent in oral submucous fibrosis (OSF*).*** *Indian J Dent Res* 2001 Jan-Mar;12(1):7-20.

(Department of Oral Pathology and Microbiology, Govt. Dental College, Department of Cardiology, SCTIMST, and Department of Gastroenterology, Medical College, Trivandrum, India. Inforec@md2.vsnl.net.in)

This study explored whether oral fibrosis is part of a systemic spectrum of disease involving multiple organs. Associated visceral organ involvement evidence by systemic fibrosis has not been explored in oral submucous fibrosis (OSF). The investigations were limited to loco-regional sites of naso/oropharynx and oesophagus. The patients diagnosed on clinical and histological grounds for OSF were concurrently tested by biophysical means for the presence of endomyocardial fibrosis (EMF), pancreatic (PF) and retroperitoneal fibrosis (RPF), which are endemic to the area studied. Twenty-five (n = 25) cases of OSF who visited the Department of Oral pathology & Microbiology. Govt. Dental College, Trivandrum, India for symptomatic relief of their illness comprised the study group. Ten (n = 10) age and sex matched healthy volunteers comprised the control. All the subjects had undergone cardiologic and gastrointestinal investigations to rule out the possibility of concurrent EMF and PF. The patients were all of Indian ethnic extraction and most (> 90%) were from low socio economic classes. The mean age of the patients was 54.16 +/- 14.6 years, including 18 females and 7 males (F:M = 2.57:1). The severity of fibrosis was unrelated to the age of patients (P > 0.05). All the patients were chewers of areca quid (12%) or tobacco (88%). In addition to quid chewing 3/25 (12%) patients smoked 'bidi' and 6/25 (24%) consumed home brewed liquor (arrack/toddy) which contains about 40-50% ethanol. Statistically no relationship was observed between the clinical stages of OSF and severity of epithelial dysplasia in this study (P > 0.05). Out of the 25 patients, 5 (20%) showed sclerotic aortic value which may be an age related finding. Also 7 (28%) patients were found to be hypertensive and interstitial lung disease was present in 2 (8%). The possibility of EMF in one female patient who showed thickened RV apical endocardium was ruled out by cardiac catheterisation. Thus none of the patients showed evidence of endomyocardial fibrosis. The pancreas was found to be hyperchoic in 8(32 1/4) by ultra sonography. Liver was found to be hyperchoic in 6 (24%). Fat stain in stool samples was found to be positive in 13(58%). The hyperchogenecity of pancreas may be due to alcoholism or an underlying endocrine pancreatic insufficiency like diabetes and not due to pancreatic fibrosis. The positivity of fat stain could be due to fatty liver/alcoholism. Thus the study fails to reveal any evidence of pancreatic fibrosis in the group. The lack of any evidence of an associated visceral organ fibrosis in OSF made it prudent to believe that this is a loco-

regional disease, initiated by local factors and propagated under their influence without systemic involvement.

OSF India (1998) Gup: Case-control study
Gupta PC, Hebert JR, Bhonsle RB, Sinor PN, Mehta H, Mehta FS. **Dietary factors in oral leukoplakia and submucous fibrosis in a population-based case control study in Gujarat, India.** *Oral Dis* 1998 Sep;4(3):200-6.
(Epidemiology Research Unit, Tata Institute of Fundamental Research, Bombay, India)

Objectives: To investigate the relationship of specific nutrients and food items with oral precancerous lesions among tobacco users. Design: A population-based case-control study. Setting: Villages in Palitana taluk of Bhavnagar district, Gujarat, India. Subjects and methods: An interviewer-administered food frequency questionnaire, developed and validated for this population, was used to estimate nutrient intake in blinded, house-to-house interviews. Among 5018 male tobacco users, 318 were diagnosed as cases. An equal number of controls matched on age (+/- 5 years), sex, village, and use of tobacco were selected. Main outcome measures: Odds ratios (OR) from multiple logistic regression analysis controlling for relevant variables (type of tobacco use and economic status). Results: A protective effect of fibre was observed for both oral submucous fibrosis (OSF) and leukoplakia, with 10% reduction in risk per g day-1 ($P < 0.05$). Ascorbic acid appeared to be protective against leukoplakia with the halving of risk in the two highest quartiles of intake (versus the lowest quartile: OR = 0.46 and 0.44, respectively; $P < 0.10$). A protective effect of tomato consumption was observed in leukoplakia and a suggestion of a protective effect of wheat in OSF. Conclusion: In addition to tobacco use, intake of specific nutrients may have a role in the development of oral precancerous lesions.

OSF India (1998) Haz: Case-control study (letter)
Hazare VK, Goel RR, Gupta PC. **Oral submucous fibrosis, areca nut and pan masala use: A case-control study**. *National Medical Journal of India*. 11(6): 299, 1998.

A case-control study was undertaken on oral submucous fibrosis at the Government Dental College and Hospital, Nagpur, Maharashtra with 200 outpatients with OSF and age-matched controls from among the other outpatients. The major habits reported were *pan masala* use, followed by *karra* and then tobacco–lime and betel quid in different combinations. *Karra* is a locally made mixture of pieces of areca nut with a small amount of tobacco flakes and a few drops of slaked lime. The odds ratio for any use of areca nut was 49.3 ($P<0.01$). A dose response relationship was seen with frequency of chewing areca nut per day (in any form, but mostly with tobacco). Over 70% of the cases were less than 35 years old. As many as 5.5% of cases had associated oral cancer and 3.5% had associated leukoplakia.

OSF India (1998) Sha: Case-control study
Shah N, Sharma PP. **Role of chewing and smoking habits in the etiology of oral submucous fibrosis (OSF): a case-control study**. *J Oral Pathol Med* 1998 Nov;27(10):475-9.
Department of Dental Surgery, All India Institute of Medical Sciences, New Delhi.

Oral submucous fibrosis (OSF), a premalignant and crippling condition of the oral mucous membrane, was studied to identify its relationship to various chewing and smoking habits. Two hundred and thirty-six consecutive cases of OSF were compared with 221 control subjects matched for age, sex and socio-economic conditions. It was found that chewing of areca nut/quid or pan masala (a commercial preparation of areca nuts, lime, catechu and undisclosed colouring, flavouring and sweetening agents) was directly related to OSF. Also, pan masala was chewed by a comparatively younger age group and was associated with OSF changes earlier than areca nut/quid chewing. However, chewing or smoking tobacco with various other chewing habits did not increase the risk of developing OSF. It was also found that frequency of chewing rather than the total duration of the habit was directly correlated to OSF.

OSF India (1998) Gup: Cross-sectional survey
Gupta PC, Sinor PN, Bhonsle RB, Pawar VS, Mehta HC. **Oral submucous fibrosis in India: a new epidemic?** *Natl Med J India* 1998 May-Jun;11(3):113-6.
(Tata Institute of Fundamental Research, Maharashtra, India)

Background: Oral submucous fibrosis (OSF) is a precancerous condition caused by use of the areca nut. The reported prevalence of OSF in Bhavnagar district during 1967 was 0.16%. We investigated whether the impression of an increase in the incidence of the disease was real. Methods: A house-to-house survey was conducted in Bhavnagar district, Gujarat state. The use of areca nut-containing products and tobacco was assessed through an interviewer administered questionnaire. The oral examination was done by dentists. The diagnostic criteria for OSF was the presence of palpable fibrous bands. Results: A total of 11,262 men and 10,590 women aged 15 years and older were interviewed for their tobacco habits. Among 5018 men who reported the use of tobacco or areca nut, 164 were diagnosed as suffering from OSF. All but four cases were diagnosed among 1786 current areca nut users (age-adjusted relative risk: 60.6). Areca nut was used mostly in mawa, a mixture of tobacco, lime and areca nut, and 10.9% of mawa users had OSF (age-adjusted relative risk: 75.6). The disease as well as areca nut use was concentrated (about 85%) in the lower (< 35 years) age group. Conclusions: An increase in the prevalence of OSF, especially in the lower age groups, directly attributable to the use of areca nut products was observed. This could lead to an increase in the incidence of oral cancer in the future.

OSF India (1997) Dab: Descriptive report
Dabade G, Gopal S. **Gutkha: Another name for health problems**, article in *Anubhav: Monthly on Social Issues*, Dec. 1997, vol.1, issue 9, pp 22-23, Yuva: Pune.

The authors note that Oral Sub Mucous Fibrosis (OSMF) occurs to a greater extent among Indians compared to the rest of Asia. They quote a study done by Dr. Chaturvedi, Department of Ear Nose Throat, Gandhian Institute of Medical Sciences, Wardha, which estimated that there are around 2.5 million persons suffering from the disease in India. The prevalence rate is 0.2 per cent to 0.5 per cent. In Ernakulam in South India, the incidence of OSMF was reported to be as high as 8 per 1 lakh of men and 19 per 1 lakh of women per year. In Bangalore city alone the prevalence is 0.18 per cent. The worst affected are people aged 20 to 40 years. A survey by an NGO Shodha of Dharwar found that many school children have taken to the gutka habit, perhaps as a result of observing elders or peer groups.

OSF India (1996) Bab: Comparative clinico-pathological study
Babu S, Bhat RV, Kumar PU, Sesikaran B, Rao KV, Aruna P, Reddy PR: **A comparative clinico-pathlogical study or oral submucous fibrosis in habitual chewers of pan masala and betelquid.** *J Toxicol Clin Toxicol* l996, 34(3): 317-22.
(Food Toxicology Research Center, National Institute of Nutrition, Hyderabad, India.)

Background: Oral submucous fibrosis associated with chewing of betel nut products has an estimated prevalence of 0.2-1.2% in India. The increasing use of pan masala/gutka, a mix of tobacco and a less moist form of betelquid lacking the betel leaf, seems associated with an earlier age of onset of oral submucous fibrosis. Method: A prospective study examined the in vivo effects of pan masala/gutka and betelquid chewing on buccal mucosal cytology in 50 patients with oral submucous fibrosis and 40 controls. Results: The percentage of nucleolated intermediate cells or proliferative fraction of buccal mucosa cells was significantly higher in all habitual chewers than controls. Pan masala/gutka chewers presented with oral submucous fibrosis after 2.7 +/- 0.6 years of use whereas the betelquid users presented with oral submucous fibrosis reported 8.6 +/- 2./3 years of use ($p<0.05$). Conclusions: Habitual chewing of pan masala/gutka is associated with earlier presentation of oral submucous fibrosis than betelquid use. Factors which may be responsible for these differences are the tobacco content, the absence of the betel leaf and its carotenes and the much higher dry weight of pan masala/gutka.

OSF India (1995) Mur: Descriptive report
Murti PR, Bhonsle RB, Gupta PC, Daftary DK, Pindborg JJ, Mehta FS**. Etiology of oral submucous fibrosis with special reference to the role of areca nut chewing.** *J Oral Pathol Med* 1995 Apr;24(4):145-52.
(Basic Dental Research Unit, Tata Institute of Fundamental Research, Bombay, India)

Oral submucous fibrosis (OSF) is a high risk precancerous condition, predominantly affecting Indians. Consumption of chilli was hypothesized as an etiologic factor on the basis of ecological observations and a solitary animal experimental study. Subsequent epidemiologic studies (case-series reports, large cross-sectional surveys, case-control studies, cohort and intervention studies) have identified areca nut as the major etiologic

agent. Tissue-culture studies involving human fibroblasts, areca nut extracts and areca nut alkaloids support this etiologic hypothesis by showing fibroblastic proliferation and increased collagen formation. Currently, genetic susceptibility and autoimmunity are receiving attention. The influence of nutritional factors, if any, remains unclear.

OSF India (1992) Sin: Case-control study
Sinor PN, Murti PR, Bhonsle RB and Gupta PC. **Mawa chewing and oral submucous fibrosis in Bhavnagar, Gujarat, India.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 107-112.
(Basic Dental Research Unit and WHO Center for Oral Cancer Prevention, Tata Institute of Fundamental Research, Bombay, India)

Mawa is an areca-nut preparation containing tobacco and lime. Its use is very popular among youth in Bhavnagar. Recently, there has been an increased occurrence of submucous fibrosis in this area. A case-control study on submucous fibrosis in Bhavnagar showed a relative risk of 109.6 for all forms of areca-nut use, 106.4 for mawa chewing and 780.0 for chewing mawa as well as betel quid (pan). The relative risks increased with the increase in the duration and frequency of areca nut chewing; a bivariate analysis also showed a multiplicative effect. Clinically, submucous fibrosis in Bhavnagar differed in regard to age, sex and location distribution from cases in Ernakulam. These variations could be due to the differences in the types of areca-nut chewing in these areas – mawa chewing in Bhavnagar and betel-quid chewing Ernakulam. The findings raise several research questions and indicate a need for public health measures against areca-nut containing products.

OSF / Int India (1990) Mur: Intervention study
Murti PR, Gupta PC, Bhonsle RB, Daftary DK, Mehta FS, Pindborg JJ. **Effect on the incidence of oral submucous fibrosis of intervention in the areca nut chewing habit**. *J Oral Pathol Med* 1990 Feb;19(2):99-100.

(For abstract see Int / OSF India (1990) Mur: Intervention study)

OSF India (1990) Sin: Case-control study
Sinor PN, Gupta PC, Murti PR, Bhonsle RB, Daftary DK, Mehta FS, Pindborg JJ. **A case-control study of oral submucous fibrosis with special reference to the etiologic role of areca nut.** *J Oral Pathol Med* 1990 Feb;19(2):94-8.
(Basic Dental Research Unit, Tata Institute of Fundamental Research, Bombay, India)

A case-control study to elucidate the etiology of oral submucous fibrosis was conducted in Bhavnagar, Gujarat. Sixty consecutively arriving oral submucous fibrosis patients at a dental clinic were selected as cases. An equal number of controls matched for age, sex,

religion and socioeconomic status were selected from individuals who did not exhibit any oral mucosal lesion or condition. Among cases, 98% chewed areca nut regularly in one form or the other whereas among controls 35% chewed areca nut, giving an overall relative risk of 109.6. Areca nut chewing was practiced most commonly in the form of mawa: a mixture containing mainly areca nut (over 90% by weight), some tobacco, and a few drops of lime. Mawa chewers and those who chewed mawa along with other chewing habits showed very high relative risks. The relative risks increased with increase in the frequency as well as the duration of chewing habits. In a bivariate analysis the effect of frequency and duration of chewing appeared to be multiplicative. The present findings confirm areca nut as the most important etiologic factor in oral submucous fibrosis.

OSF India (1987) Bho: Descriptive report
Bhonsle RB, Murti PR, Daftary DK, Gupta PC, Mehta FS, Sinor PN, Irani RR, Pindborg JJ. **Regional variations in oral submucous fibrosis in India.** *Community Dent Oral Epidemiol* 1987 Aug;15(4):225-9.

Regional variations in the characteristics of submucous fibrosis were studied in two districts in India. In Pune district this condition involved soft palate, uvula and retromolar areas significantly more often than in Ernakulam district. The tongue, floor of the mouth and the hard palate were not involved in Pune. The age of the patients in Pune district was lower than in Ernakulam district. Associated oral cancer, leukoplakia and petechiae were observed solely among patients in Ernakulam. The most important etiologic factor for submucous fibrosis is the chewing of areca nut, and in both areas studied all patients chewed areca nut. In Pune, cured areca nut without other ingredients was chewed by 66% and in Ernakulam, raw areca nut was chewed as an ingredient of pan with tobacco by 100%. In Ernakulam, the juice and the quid were mostly spat out, whereas in Pune they were swallowed. The regional variations in the characteristics of submucous fibrosis could be related to differences in the areca nut chewing habit.

3.3 Oropharyngeal cancer

Five abstracts of case-control studies of cancer of the oropharynx (which also includes base of the tongue) are included in this section. Significant risk from bidi smoking was observed in all four studies. Tobacco chewing and cigarette smoking were found to be significant risk factors in two studies.

OphC / Nut India (2001) Pat: Case-control study
Patel PS, Raval GN, Patel DD, Sainger RN, Shah MH, Shah JS, Patel MM, Dutta SJ, Patel BP. **A Study of Various Sociodemographic Factors and Plasma Vitamin Levels in Oral and Pharyngeal Cancer in Gujarat, India.** *Asian Pac J Cancer Prev*. 2001 Jul-Sep;2(3):215-224.

Biochemistry Research Division, The Gujarat Cancer & Research Institute, Ahmedabad - 380 016, INDIA. gcri@ad1.vsnl.net.in

For abstract, see Nut / OphC India (2001) Pat: Case-control study. This study of 56 healthy individuals, 146 patients with oral precancerous conditions (OPC) and 132 untreated oral and pharyngeal cancer patients found an increased incidence of OPC in the age group of <30 years which was associated with tobacco chewing, and that main incidence of cancer was in the age group 30-60 years where the habit of tobacco smoking was more prevalent.

OPhC / LC / AeroDigC India (2000) Dik: Case-control study
Dikshit RP, Kanhere S. **Tobacco habits and risk of lung, oropharyngeal and oral cavity cancer: a population-based case-control study in Bhopal, India.** *Int J Epidemiol* 2000 Aug;29(4):609-14.
(Department of Pathology, Gandhi Medical College, Bhopal, India)

Background: Tobacco habits in India vary by region. Few studies, and none from central India, have reported on type of tobacco used and risk of the most common cancers in India. We conducted a population-based case-control study to evaluate the risk of tobacco particularly bidi smoking and tobacco quid chewing on the most common cancer sites among males in Bhopal. Methods: In all, 163 lung, 247 oropharyngeal and 148 oral cavity cancer cases from the Population-Based Cancer Registry records and 260 controls randomly selected from a tobacco survey conducted in the Bhopal population formed the study population. Results: A significant risk of bidi and cigarette smoking with a dose-response relationship was observed for lung and oropharyngeal cancer. Tobacco quid chewing showed no risk for lung, marginally increased risk for oropharyngeal and about a sixfold increased risk for oral cavity cancer. Population-attributable risk percent (PARP) was 82.7% and 71.6% for smokers for development of lung and oropharyngeal cancer, while the same was found to be 66.1% for tobacco chewers for the development of oral cavity cancer. Conclusions: These data provide strong evidence that smoking bidi is even more hazardous than cigarette smoking in the development of lung and oropharyngeal cancer. An intervention study to prevent the use of tobacco will be useful in this population as it also underwent gas exposure due to a chemical accident in 1984.

OPhC / La C India (1999) Rao: Case-control study
Rao DN, Desai PB, Ganesh B. **Alcohol as an additional risk factor in laryngopharyngeal cancer in Mumbai--a case-control study**. *Cancer Detect Prev 1*999;23(1):37-44.
(Division of Epidemiology and Biostatistics, Parel, Mumbai, India.)

A retrospective case-control study of 1,698 male pharyngeal and laryngeal cancers seen at the Tata Memorial Hospital, Mumbai from 1980 to 1984 was undertaken to assess the association between the cancers and chewing, smoking, and alcohol habits. Male controls were chosen from persons who attended the hospital during the same period and who

were diagnosed as free from cancer, benign tumor, and infectious disease. Statistical analysis was based on unconditional logistic regression method. Bidi smoking and alcohol drinking emerged as significant factors for pharyngeal and laryngeal cancers. Illiterates had 50 to 60% excess risk for pharyngeal cancer only. Nonvegetarian diet did not emerge as significant factor in this study.

OPhC / Oc Epi India (1998) Rao: Case-control study
Rao DN, Desai PB. **Risk assessment of tobacco, alcohol and diet in cancers of base tongue and oral tongue--a case control study.** *Indian J Cancer* 1998 Jun;35(2):65-72.
(Division of Epidemiology and Biostatistics, Tata Memorial Hospital, Parel, Mumbai, India)

This is a retrospective case-control study of male tongue cancer patients seen at Tata memorial Hospital, Bombay, during 1980-84. The purpose was to identify the association between tobacco, alcohol, diet and literacy status and cancers of two sub sites of tongue namely anterior portion of the tongue (AT) (ICD 1411-1414) and base of the tongue (BT) (ICD 1410). 142 male AT patients and 495 BT patients were interviewed. 635 interviewed male patients who were free of any disease were considered as control. Bidi smoking was found to be a significant risk factor for BT patients and tobacco chewing for AT patients. Alcohol drinkers showed about 45% to 79% excess risk for both sites of tongue cancer. Illiteracy and non vegetarian diet were significant for AT patients only. The study shows an association between the location of cancer and type of tobacco use and other related habits.

OPhC India (1998) Was: Case-control study
Wasnik KS, Ughade SN, Zodpey SP, Ingole DL. **Tobacco consumption practices and risk of oro-pharyngeal cancer: a case-control study in Central India.** *Southeast Asian J Trop Med Public Health* 1998 Dec;29(4):827-34.
(Public Health Institute, Nagpur, India)

A hospital based, group matched case control study was conducted to assess the association between tobacco consumption practices and risk of developing oro-pharyngeal cancer in Central India. The study included 123 cases of oro-pharyngeal cancer, diagnosed on the basis of histopathology at three tertiary care centers in Nagpur city. Each case was matched for age and sex with two hospital controls: one selected from non-cancer patients and another from patients having cancer of other sites. Tobacco chewing (OR=7.98, 95% CI 4.11-13.58) and tobacco smoking (OR=2.25, 95% CI 1.22-3.70) were found to be significantly associated with oro-pharyngeal cancer on unconditional multiple logistic regression analysis. Further analysis revealed a dose-response relationship between increasing frequency, duration and retention time of tobacco in mouth and risk of oro-pharyngeal cancer. Other risk factors which were also found to contribute significantly in the outcome of oro-pharyngeal cancer in the study population were: use of traditional/local substances (eg pan, betel nut, lime) with or without tobacco, use of tobacco containing material for teeth cleaning, type of smoking

(eg bidi, chillum, cigarette) and outdoor occupations. High values of estimates of attributable risk percent (ARP) and population attributable risk percent (PARP) confirmed the positive impact of reduction or elimination of the tobacco consumption practices on reducing the risk of oro-pharyngeal cancer in the population of Central India.

3.4 Laryngeal cancer

This section contains abstracts of two hospital-based case-control studies of laryngeal cancer, one in Mumbai and the other in Trivandrum. Smoking and alcohol drinking emerged as significant risk factors for this disease in both studies. The Trivandrum study also found an association with occasional pan–tobacco chewing.

LaC / Oph C India (1999) Rao: Case control study
Rao DN, Desai PB, Ganesh B. **Alcohol as an additional risk factor in laryngopharyngeal cancer in Mumbai--a case-control study**. *Cancer Detect Prev 1*999;23(1):37-44.
(Division of Epidemiology and Biostatistics, Parel, Mumbai, India.)

A retrospective case-control study of 1,698 male pharyngeal and laryngeal cancers seen at the Tata Memorial Hospital, Mumbai from 1980 to 1984 was undertaken to assess the association between the cancers and chewing, smoking, and alcohol habits. Male controls were chosen from persons who attended the hospital during the same period and who were diagnosed as free from cancer, benign tumor, and infectious disease. Statistical analysis was based on unconditional logistic regression method. Bidi smoking and alcohol drinking emerged as significant factors for pharyngeal and laryngeal cancers. Illiterates had 50 to 60% percent excess risk for pharyngeal cancer only. Nonvegetarian diet did not emerge as significant factor in our study.

LaC India (1990) San: Case-control study (hospital based)
Sankaranarayanan R, Duffy SW, Nair MK, Padmakumary G, Day NE. **Tobacco and alcohol as risk factors in cancer of the larynx in Kerala, India.** *Int J Cancer* 1990 May 15;45(5):879-82.
(MRC Biostatistics Unit, Cambridge, UK)

A case-control study of cancer of the larynx was carried out in Kerala, Southern India, on 191 male cancer cases and 549 male hospital-based controls. Risk factors investigated were pan (betel)-tobacco chewing, bidi and cigarette smoking, drinking alcohol and inhaling snuff. Significant positive associations with risk were observed for bidi smoking (p less than 0.001), bidi and cigarette smoking (p less than 0.001) and drinking alcohol (p less than 0.001). A predisposing effect of smoking cigarettes alone approached significance (0.1 less than p less than 0.05). What appeared to be an almost significant protective effect of pan-tobacco chewing (0.1 less than p less than 0.05) was found to be an artefact of confounding with smoking, and indeed a significant predisposing effect

was observed of occasional chewing (p less than 0.001). After a stepwise logistic regression to eliminate those factors which were not significant when adjusted for other factors, significant effects remained of durations of bidi smoking and cigarette smoking, daily frequency of bidi and cigarette smoking and duration of alcohol drinking. Relative risks of 7.12, 5.18 and 2.58 were observed for durations of more than 20 years of bidi smoking, cigarette smoking and drinking alcohol respectively, and a relative risk of 12.68 was observed for those smoking more than 20 bidis/cigarettes per day, in each case relative to a baseline of those negative for the relevant habit.

3.5 Oesophageal cancer

Abstracts of seven studies on risk factors for oesophageal cancer are given here. Areca nut or pan and tobacco chewing, bidi/cigarette smoking, alcohol and diet were the risk factors found to be important.

Eso India (2001) Phu: Case-control study
Phukan RK, Ali MS, Chetia CK, Mahanta J. **Betel nut and tobacco chewing; potential risk factors of cancer of oesophagus in Assam, India.** *Br J Cancer* 2001 Sep 1;85(5):661-7.1
(Regional Medical Research Centre, Indian Council of Medical Research, North East Region, Assam, Dibrugarh, India)

Cancer of the oesophagus is the most commonly diagnosed cancer in males in Assam, in north-eastern India, and ranks second for females. The chewing of betel nut, with or without tobacco and prepared in various ways, is a common practice in the region and a case-control study has been designed to study the pattern of risk associated with different ways of preparing and chewing the nuts. 358 newly diagnosed male patients and 144 female have been interviewed together with 2 control subjects for each case chosen at random from among the attendants who accompanied patients to hospital. There were significant trends in risk ratios associated with the frequency of chewing each day, with the duration of chewing in years and with the age at which the habit was started that were apparent for both males and females and which remained significant after allowance was made for other known risk factors, notably tobacco smoking and alcohol consumption. The adjusted ratios, in comparison with non-chewers, were 13.3 M and 5.7 F for chewing more than 20 times a day, 10.6 M and 7.2 F for persons who had chewed for more than 20 years and 10.3 M and 5.3 F for those who had started before the age of 20. Among the different combinations of ingredients that were chewed the adjusted odds ratios were highest for those who had been using fermented betel nut with any form of tobacco (7.1 M and 3.6 F). The risk associated with tobacco smoking and alcohol consumption, which are high in some parts of the world, were less in Assam than those associated with the chewing of betel nut.

Eso India (2000) Nay: Case-control study.
Nayar D, Kapil U, Joshi YK, Sundaram KR, Srivastava SP, Shukla NK, Tandon RK. **Nutritional risk factors in esophageal cancer**. *J Assoc Physicians India* 2000 Aug;48(8):781-7.
(Department of Human Nutrition and Institute of Rotary Cancer, All India Institute of Medical Sciences, Ansari Nagar, New Delhi 110 029)

Objective: The present case-control study was undertaken with the objective to study the nutritional risk factors associated with esophageal cancer. Methodology: One hundred and fifty diagnosed esophageal cancer patients and an equal number of healthy individuals constituted the patient and control groups, respectively. Dietary consumption pattern during the preceding 20 years prior to the diagnosis of esophageal cancer was assessed utilising the standard food frequency questionnaire method. Information on alcohol consumption, smoking habits, chewing of betel leaf with tobacco was also collected. Results: Multivariate analysis revealed that the risk of esophageal cancer was 7.81 times ($p < 0.01$) higher with daily consumption of alcohol. The risk increased to 3.16 times ($p < 0.01$) with the daily habit of chewing of betel leaf with tobacco. Nearly a two fold risk was observed when the consumption of "other vegetables" was less than four times per week. A 1.95 times ($p < 0.01$) increase in risk was observed with the daily habit of bidi smoking. Conclusion: Cancers in general are multifactorial in origin, and several environmental interactions are possible. It is not easy to quantify the contribution of diet to cancer risk. However, the results of the present study suggested that nutritional factors do play a role.

Eso India (1996) Nan: Case-control study
Nandakumar A, Anantha N, Pattabhiraman V, Prabhakaran PS, Dhar M, Puttaswamy K, Venugopal TC, Reddy NM, Rajanna, Vinutha AT, Srinivas. **Importance of anatomical subsite in correlating risk factors in cancer of the oesophagus--report of a case--control study**. *Br J Cancer* 1996 May;73(10):1306-11.
(National Cancer Registry Programme (Indian Council of Medical Research), Kidwai Memorial Institute of Oncology, Bangalore, India.)

In Bangalore, cancer of the oesophagus is the third most common cancer in males and fourth most common in females with average annual age-adjusted incidence rates of 8.2 and 8.9 per 100,000 respectively. A case-control investigation of cancer of the oesophagus was conducted based on the Population-based cancer registry, Bangalore, India. Three hundred and forty-three cases of cancer of the oesophagus were age and sex matched with twice the number of controls from the same area, but with no evidence of cancer. Chewing with or without tobacco was a significant risk factor. In both sexes chewing was not a risk factor for cancer of the upper third of the oesophagus. Among males, non-tobacco chewing was a significant risk factor for the middle third but not for the other two segments and tobacco chewing was a significant risk factor for the lower third of the oesophagus, but not for the other two segments. Bidi smoking in males was a significant risk factor for all three segments being highest for the upper third, less for the

middle third and still less for the lower third. The risk of oesophageal cancer associated with alcohol drinking was significant only for the middle third.

Eso India (1996) Rao: Review
Rao DN, Desai PB, Ganesh B. **Epidemiological observations on cancer of the oesophagus – a review of Indian studies.** *Ind. J. Cancer*, June l996, 33: 55-75.
(Div. of Epidemiology and Biostatistics, Tata Memorial Hospital, Parel, Mumbai, India.)

This is an epidemiological review on cancer of the oesophagus. In this attempt, all aspects of epidemiological factors based on national and international studies on oesophageal cancer have been brought out. The problem of this cancer in Indian contect has been documented. The association of tobacco and alcohol habits with oesophageal cancer has been confirmed from the studies conducted in India. There is an urgent need to educate the common people about the harmful effects of these two habits and governments and voluntary organisations should take effective steps for its prevention.

Eso India (1991) Ans: Case series
Ansari MM, Beg MH, Haleem S. **Clinicopathological profile of carcinoma of oesophagus at Aligarh.** *J Indian Med Assoc.* 1991 Aug;89(8):217-9.
(Department of Surgery, JN Medical College, AMU, Aligarh.)

Forty-seven patients with oesophageal carcinoma were managed over 6 years. Average duration of illness was 5.5 months. History of chronic smoking and/or tobacco chewing was present in 80.85% of patients. Carcinoma included squamous cell variety (80.85%) and adenocarcinoma (19.15%). Thirty-one patients were in stage III while 16 patients were in stage II. Surgery included oesophagogastrectomy/oesophagogastrostomy (16 patients), feeding gastrostomy (11 patients), Mousseau-Barbin tube insertion (10 patients), only 10 patients were subjected to palliative radiotherapy. All patients after palliative treatment died within one year whereas 3-year and 5-year survivals after oesophagogastrectomy/oesophagogastrostomy were 68.75% and 31.25% respectively. Local lymph node metastasis adversely affected the 5-year survival rate.

Eso India (1991) San: Case-control study.
Sankaranarayanan R, Duffy SW, Padmakumary G, Nair SM, Day NE, Padmanabhan TK. **Risk factors for cancer of the oesophagus in Kerala, India.** *Int J Cancer* 1991 Oct 21;49(4):485-9.
(Dept. of Cancer Epidemiology and Clinical Research, Regional Cancer Centre, Trivandrum, India)
A case-control study of oesophageal cancer was carried out in Trivandrum, Kerala, involving 267 cases and 895 controls. Risk factors studied in males were pan (betel)-tobacco chewing, bidi and cigarette smoking, drinking alcohol and taking snuff. Only pan-tobacco chewing was investigated in females as very few indulged in the other habits. Among males significant associations with higher risk were observed for bidi

smoking (p less than 0.001), bidi plus cigarette smoking (p greater than 0.05) and drinking alcohol (p less than 0.001). While a significant effect of duration of pan-tobacco chewing (p less than 0.005) was observed in males, there was no significant trend, the risk first falling then rising as duration of use increased. This was partly due to confounding with smoking. No effect of pan-tobacco use was observed in females. A step-wise model was fitted, retaining only those risk factors which were significant when adjusted for other factors; the risk factors included were duration of pan-tobacco chewing, duration of bidi smoking, daily frequency of bidi and cigarette smoking and alcohol use (yes or no). An adjusted relative risk of 2.03 was observed for a pan-tobacco habit of more than 40 years' duration, of 4.70 for more than 20 years of bidi smoking, of 4.80 for more than 20 bidis/cigarettes per day, and of 2.33 for regular alcohol use (in each category relative to a baseline of those never indulging in the relevant habit).

Eso India (1989) Rao: Case-control study.
Rao DN, Sanghvi LD, Desai PB. **Epidemiology of esophageal cancer.** *Semin Surg Oncol* 1989;5(5):351-4.
(Department of Medical Records and Statistics, Tata Memorial Hospital, Bombay, India)

The incidence of cancer of the oesophagus is high in India but not as high as the rates reported from the Caspian Littoral of Iran. Incidence data available for three places in India--Bombay, Madras, and Bangalore--show regional variations. In Bombay, the rates for males are high compared to Madras and Bangalore. A case control study of 503 oesophageal cancer cases in males and 634 controls registered at the Tata Memorial Hospital during the period 1980-84 was carried out to determine the association of oesophageal cancer with two types of dietary practices, viz., vegetarian and non-vegetarian, in addition to tobacco and alcohol habits. In the presence of an alcohol habit, the relative risk for tobacco chewing and smoking was observed to be high in the non-vegetarian group compared to the vegetarian group. A vegetarian diet was protective.

3.6 Head and neck cancers

An editorial on head and neck cancers reviews some major tobacco related cancers in India.

H&NC India (1989) San: Editorial
Sanghvi LD, Rao DN, Joshi S. **Epidemiology of head and neck cancers.** *Semin Surg Oncol* 1989;5(5):305-9.
(National Cancer Registry Project, Tata Memorial Hospital, Bombay, India)

Head and neck cancers are common in India and account for about 30% of cancers in males and about 13% in females. In males, oral cavity and pharynx are the most commonly affected sites, followed by larynx. In females, oral cavity is the preponderant site. Reliable data on incidence rates from several cancer registries in India is compared

with selected data from the United States and France. A wide variety of tobacco habits prevalent in the country are primarily responsible for the occurrence of these cancers. Among them, bidi smoking, tobacco chewing, and cigarette smoking, in that order, account for a large majority of these cancers. In addition, alcohol and some aspects of the Indian diet have been suspected as contributing to head and neck cancers. The government of India has accorded high priority to prevention of tobacco-related cancers by the turn of the century in its National Cancer Control Programme.

3.7 Lung cancer

Case-control studies of lung cancer patients show that smoking (bidis or cigarettes) is the main risk factor in India for lung cancer in men. The odds ratio in one study for ever smoking was 5.0 for men and 2.47 for women, controlling for other risk factors.

LC India (2001) Gup: Case-control study.
Gupta D, Boffetta P, Gaborieau V, Jindal SK. **Risk factors of lung cancer in Chandigarh, India.** *Indian J Med Res* 2001 Apr;113:142-50.
(Department of Pulmonary Medicine, Postgraduate Institute of Medical Education & Research, Chandigarh, India)

Background and objectives: There is a paucity of data from India on the risk factors for lung cancer. In the present paper results of a case-control study on lung cancer undertaken at Chandigarh, north India, are described. Methods: Two hundred and sixty five (235 men, 30 women) histologically confirmed lung cancer patients and 525 (435 men, 90 women) hospital controls matched for age and sex were interviewed using a pre-designed questionnaire. Effects of individual variables for various aspects of tobacco smoking, indoor and outdoor air pollution and occupational exposures were assessed using unconditional logistic regression models. Results: Eighty nine per cent of men and 33 per cent of women among the patients were ever-smokers as compared to 60 per cent of men and 20 per cent of women among controls. The Odds Ratio (OR) for ever-smoking was 5.0 (CI 3.11-8.04) among men and 2.47 (CI 0.79-7.75) among women. Among the patients, men were found to smoke a higher average number of cigarette-equivalents per day, for longer duration and started at an earlier age as compared to controls. Smoking of bidi and hooka as well as cigarettes had similar ORs for cumulative consumption. ORs for female smokers were lower than those for male smokers. Cumulative exposure of > 45 yr in women to indoor air pollution from use of coal or wood for cooking or heating showed an OR of 1.43 (CI 0.33-6.30). Residence in urban areas did not entail an increased risk for developing lung cancer. Very few subjects studied were employed in high-risk occupations. Interpretation and conclusions: Smoking (cigarettes or bidis) was the principle risk factor for lung cancer among men. In women there could be several other risk factors besides smoking, as the association with smoking was not as strong.

LC / OPhC / AeroDigC India (2000) Dik: Case-control study.
Dikshit RP, Kanhere S. **Tobacco habits and risk of lung, oropharyngeal and oral cavity cancer: a population-based case-control study in Bhopal, India.** *Int J Epidemiol* 2000 Aug;29(4):609-14.
(Department of Pathology, Gandhi Medical College, Bhopal, India)

Background: Tobacco habits in India are unique and vary in different regions. Few studies, and none from central India, have reported on type of tobacco used and risk of the most common cancer types in India. We conducted a population-based case-control study to evaluate the risk of tobacco particularly bidi smoking and tobacco quid chewing on the most common cancer sites among males in Bhopal. Methods: In all, 163 lung, 247 oropharyngeal and 148 oral cavity cancer cases from the Population-Based Cancer Registry records and 260 controls randomly selected from a tobacco survey conducted in the Bhopal population formed the study population. Results: A significant risk of bidi and cigarette smoking with a dose-response relationship was observed for lung and oropharyngeal cancer. Tobacco quid chewing showed no risk for lung, marginally increased risk for oropharyngeal and about a sixfold increased risk for oral cavity cancer. Population-attributable risk percent (PARP) was observed to be 82.7% and 71.6% for smokers for the development of lung and oropharyngeal cancer, while the same was found to be 66.1% for tobacco chewers for the development of oral cavity cancer. Conclusions: These data provide strong evidence that smoking bidi is even more hazardous than cigarette smoking in the development of lung and oropharyngeal cancer. An intervention study to prevent the use of tobacco will be useful in this population as it also underwent gas exposure due to a chemical accident in 1984.

LC India (1999) Thi: Clinical profile of case series
Thippanna G, Venu K, Gopalakrishnaiah V, Reddy PN, Charan BG. **A profile of lung cancer patients in Hyderabad.** *J Indian Med Assoc.* 1999 Sep;97(9):357-9.
(Department of Respiratory Medicine, Government General and Chest Hospital, Hyderabad.)

One hundred and sixty cases of bronchogenic carcinoma were retrospectively analysed. Male to female ratio was 8.4:1, most were in the age group 40-60 years. The most common (38%) radiological presentation was mass lesion. The predominant histological cell type was squamous cell carcinoma (67%). Most of the patients presented in an advanced stage of the disease of inoperability. The study underlines the various diagnostic modalities in diagnosing lung cancer and emphasises the need for practising doctors to keep in mind the possibilities of bronchogenic carcinoma in all cases of unresolved pneumonia and mass lesion on chest x-ray especially in high risk patients.

LC India (1998) Gup: Clinical profile of case series
Gupta RC, Purohit SD, Sharma MP, Bhardwaj S. **Primary bronchogenic carcinoma: clinical profile of 279 cases from mid-west Rajasthan**. *Indian J Chest Dis Allied Sci*. 1998 Apr-Jun;40(2):109-16.

(Department of Respiratory Diseases and Tuberculosis, J.L.N. Medical College, Ajmer.)

This retrospective study was undertaken to study the clinical profile of primary bronchogenic carcinoma seen during the last eight years in a teaching hospital. Out of a total of 279 diagnosed cases, 86% were males with an average age of 57 years, of whom 81.6 smoked. Forty percent of female patients were smokers with a significant overlap in use of smoking objects. Twenty four (8.8%) patients were less than 40 years of age at the time of diagnosis. Average duration of illness was 4.5 months. Weight loss (77%) and fever (34%) were the most common general symptoms. Other chest symptoms include cough (68%), dyspnoea (59%), chest pain (22%), hemoptysis (20%) and dysphagia (6%). Fiberoptic bronchoscopy (FOB) (75%) and fine needle aspiration cytology (FNAC) (74.8%) were found to be the most efficient diagnostic procedures. Histologically, squamous cell carcinoma, adenocarcinoma, large cell carcinoma and small cell carcinoma were seen in 42%, 20%, 18% and 14% cases, respectively. Six percent of patients showed malignant cells only and were marked as unclassified. Radiologically, obstructive pneumonitis was the commonest presentation (59.5%) followed by mass lesion (31.8%) and rib destruction (5.1%). Inspite of its limitation, this study for the first time reports the lung cancer pattern from mid-west Rajasthan.

LC / OthC / Occ India (1993) Not: Case-control-study
Notani PN, Shah P, Jayant K, Balakrishnan V. **Occupation and cancers of the lung and bladder: a case-control study in Bombay.** *Int J Epidemiol.* 1993 Apr;22(2):185-91. (Epidemiology Unit, Cancer Research Institute, Tata Memorial Centre, Parel, Bombay, India.)

(For abstract see: OthC / LC India (1993) Not: Case-control-study)

LC India (1987) Jin: Case series
Jindal SK, Malik SK, Datta BN. **Lung cancer in Northern India in relation to age, sex and smoking habits.** *Eur J Respir Dis.* 1987 Jan;70(1):23-8.

Primary lung cancer in Northern India was analysed in relation to age, sex and smoking history in 480 histologically diagnosed cases. The M:F ratio rose progressively up to the 51-60 years age group and was about the same thereafter. The M:F ratio was very high in smokers and was almost identical for all cell types (greater than 20:1). In non-smokers, the M:F ratio differed with the cell type. The smoker:non-smoker ratio differed significantly in the age groups below and above 40. In those up to 40 years of age, the predominant cell type was small cell carcinoma and the cell type had no significant association with smoking habit. Above 40 years of age, the squamous cell type was most common in smokers and adenocarcinoma in non-smokers.

3.8 Digestive and aerodigestive tract cancers - general

Tobacco use is known to cause cancers in the respiratory and upper digestive tracts. One of the abstracts in this section reports on a large case-control study, which found a significant dose-response between these cancers and tobacco use. Another summarizes a population-based case-control study to evaluate the risk of tobacco use, particularly bidi smoking and tobacco quid chewing, on the most common cancer sites among males in Bhopal. A third predicts the incidence of digestive tract cancers in India for 2001.

Aero-digC India (2003) Zna: Case-control study
Znaor A, Brennan P, Gajalakshmi V, Mathew A, Shanta V, Varghese C, Boffetta P. **Independent and combined effects of tobacco smoking, chewing and alcohol drinking on the risk of oral, pharyngeal and esophageal cancers in Indian men**. *Int J Cancer*. 2003 Jul 10;105(5):681-6.
(International Agency for Research on Cancer, Lyon, France.)

Oral, pharyngeal and esophageal cancers are 3 of the 5 most common cancer sites in Indian men. To assess the effect of different patterns of smoking, chewing and alcohol drinking in the development of the above 3 neoplasms and to determine the interaction among these habits, we conducted a case-control study in Chennai and Trivandrum, South India. The cases included 1,563 oral, 636 pharyngeal and 566 esophageal male cancer patients who were compared with 1,711 male disease controls from the 2 centers as well as 1,927 male healthy hospital visitors from Chennai. We observed a significant dose-response relationship for duration and amount of consumption of the 3 habits with the development of the 3 neoplasms. Tobacco chewing emerged as the strongest risk factor for oral cancer, with the highest odds ratio (OR) for chewing products containing tobacco of 5.05 [95% confidence internal (CI) 4.26-5.97]. The strongest risk factor for pharyngeal and esophageal cancers was tobacco smoking, with ORs of 4.00 (95% CI 3.07-5.22) and 2.83 (95% CI 2.18-3.66) in current smokers, respectively. An independent increase in risk was observed for each habit in the absence of the other 2. For example, the OR of oral cancers for alcohol drinking in never smokers and never chewers was 2.56 (95% CI 1.42-4.64) and that of esophageal cancers was 3.41 (95% CI 1.46-7.99). Furthermore, significant decreases in risks for all 3 cancer sites were observed in subjects who quit smoking even among those who had quit smoking 2-4 years before the interview.

Aero-digC OPhC / LC / India (2000) Dik: Case-control study.
Dikshit RP, Kanhere S. **Tobacco habits and risk of lung, oropharyngeal and oral cavity cancer: a population-based case-control study in Bhopal, India.** *Int J Epidemiol* 2000 Aug;29(4):609-14.
(Department of Pathology, Gandhi Medical College, Bhopal, India)

Background: Tobacco habits in India are unique and vary in different regions. Few studies, and none from central India, have reported on type of tobacco used and risk of

the most common cancer types in India. We conducted a population-based case-control study to evaluate the risk of tobacco particularly bidi smoking and tobacco quid chewing on the most common cancer sites among males in Bhopal. Methods: In all, 163 lung, 247 oropharyngeal and 148 oral cavity cancer cases from the Population-Based Cancer Registry records and 260 controls randomly selected from a tobacco survey conducted in the Bhopal population formed the study population. ResultS: A significant risk of bidi and cigarette smoking with a dose-response relationship was observed for lung and oropharyngeal cancer. Tobacco quid chewing showed no risk for lung, marginally increased risk for oropharyngeal and about a sixfold increased risk for oral cavity cancer. Population-attributable risk percent (PARP) was observed to be 82.7% and 71.6% for smokers for the development of lung and oropharyngeal cancer, while the same was found to be 66.1% for tobacco chewers for the development of oral cavity cancer. Conclusions: These data provide strong evidence that smoking bidi is even more hazardous than cigarette smoking in the development of lung and oropharyngeal cancer. An intervention study to prevent the use of tobacco will be useful in this population as it also underwent gas exposure due to a chemical accident in 1984.

DigC India (2000) Moh: Analytical report
Mohandas KM, Jagannath P. **Epidemiology of digestive tract cancers in India. VI. Projected burden in the new millennium and the need for primary prevention.** *Indian J Gastroenterol.* 2000 Apr-Jun;19(2):74-8.
(Division of Digestive Diseases and Clinical Nutrition, Tata Memorial Hospital, Mumbai. kmmohandas@vsnl.com)

The incidence rates of most digestive cancers in India are moderate or low. The highest rates are recorded in the urban population of Mumbai and the lowest in the rural population of Barshi in Maharashtra state. The rates will rise as the life expectancy of Indians increases along with urbanization and, within the next few decades, may reach those recorded in Indians living abroad. Based on available population data, the authors estimate that in the year 2001 there will be approximately 145,000 new cases of digestive cancers in India. In men, the esophagus would be the commonest site (n = 24,925), followed by the stomach (23,100), rectum (10,462), liver (8812), colon (8004), pancreas (5757) and gall bladder (3967). In women, the esophagus would be the commonest site (n = 18,608), followed by the stomach (11,890), gall bladder (7360), rectum (6983), colon (6115), liver (4227) and pancreas (3435). The incidence of cancers of the esophagus and stomach is declining spontaneously in India. It may be possible to accelerate this by reducing the use of tobacco and improving the diet. At the same time the incidence of cancers of the colon, pancreas, liver and gall bladder is rising, largely due to urbanization that leads to major changes in the diet and personal habits. A preventive approach is needed by public health education. Indians should be encouraged to retain their traditional protective diets, eat more fruits and vegetables, do more physical activity, and abstain from tobacco. Gastroenterologists can also help in secondary prevention by screening high-risk individuals, e.g., patients with chronic liver disease for liver cancer and relatives of patients with familial bowel cancer.

Aero-digC India (1992) Not: Review
Notani PN. **Role of diet and alcohol in tobacco-related cancer at sites in the upper aerodigestive tract in an Indian population**. In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 149-155.
(Epidemiology Unit, Cancer Research Institute, Tata Memorial Centre, Bombay, India)

Cancers of the upper alimentary and respiratory tracts, for which tobacco is the major cause, constitute about one-third of all cancers among Indians. Projected demographic tends suggest that the incidence of these cancers will increase. Since a large segment of tobacco users remain cancer free, however, other factors may have a modifying effect on the risk of developing the disease. The modifying effect of diet on the occurrence of oral cancer was observed in an exploratory study in India in early 1970s. Subsequently, the role of various dietary factors and of alcohol were studied for cancers of all sites in the upper aerodigestive tract. The results indicate that intake of vegetables, fish and buttermilk (liquefied yougurt) was associated with a lower risk for upper aerodigestive tract cancers and that use of red chillie powder, a common spice used in Indian food, was a risk factor in a dose-dependent manner. Alcohol intake had a limited but significant influence on the risk for these cancers.

3.9 Stomach cancer

Cancers of the stomach have been found to be partly tobacco related. This section contains two hospital-based case control studies on stomach cancer, one in Chennai and one in Mumbai. The Chennai study found a three-fold risk for bidi smokers and a two-fold risk for cigarette smokers.

StoC India (2002) Rao: Case-control study
Rao, D.N., Ganesh, B., Dinshaw, K.A., Mohandas M. **A case-control study of stomach cancer in Mumbai**, **India.** *International Journal of Cancer* 2002: 99(5), 727-731.
(Division of Epidemiology and Biostatistics, Tata Memorial Hospital, Parel, Mumbai, India; dnrao@hotmail.com)

Stomach cancer incidence rates are much lower in India than elsewhere, but the stomach remains one of the 10 leading sites of cancer in both sexes in most of the metropolitan registries. This is an unmatched case-control study of stomach cancer carried out at Tata Memorial Hospital (TMH), Mumbai. The purpose was to identify the association of tobacco and alcohol use, occupational hazards, diet, consumption of beverages like tea and coffee, the living environment, cooking media and literacy with stomach cancer. The study included 170 stomach cancer cases and 2,184 hospital controls interviewed during the period 1988-1992. Tobacco chewing, bidi or cigarette smoking and alcohol drinking did not emerge as high risk factors for stomach cancer. Consumption of dry fish at least

once a week compared to never or once a every 2 weeks showed a 12-fold excess risk (OR = 12.4, 95% CI 7.0-22.1, p < 0.0001) for stomach cancer among the nonvegetarian food items considered. A protective effect of tea consumption (OR = 0.4, 95% CI 0.2-0.9, p = 0.03), showing 59% reduction in risk, was identified, which could be of use for possible control and prevention of this cancer.

StoC India (1996) Gaj: Case-control study.
Gajalakshmi CK, Shanta V. **Lifestyle and risk of stomach cancer: a hospital-based case-control study.** *Int J Epidemiol* 1996 Dec;25(6):1146-53.
(Epidemiology Division and Cancer Registry, Cancer Institute (WIA), Madras, Tamilnadu, India)

Background: Stomach cancer (SC) is the most frequent cancer among males and third most common cancer among females in Madras, India. The incidence rate of SC is higher in Southern India compared to Northern India. Methods: A hospital-based case-control study on 388 incident cases of SC was carried out in Madras as part of a multicentre study in India to identify the risk factors for SC. Cases were matched to cancer controls based on age (+/- 5 years), sex, religion and mother tongue. Categorical variables for income group, level of education and area of residence were included in all models to control for confounding. Results: Smokers had a twofold risk of SC (95% confidence interval [CI] = 1.25-3.78) compared to non smokers and the risk seen among current smokers (odds ratio [OR] = 2.5; 95% CI: 1.36-4.44) was significantly different from that seen among exsmokers (OR = 1.5; 95% CI: 0.67-3.54). The risk among those who smoke bidi (OR = 3.2; 95% CI: 1.80-5.67) was higher than that seen among cigarette (OR = 2.0; 95% CI: 1.07-3.58) and chutta (OR = 2.4; 95% CI: 1.18-4.93) smokers. Significant dose response relationships were observed with age began smoking bidi (P < 0.001) and with lifetime exposure to bidi (P < 0.001), cigarette (P < 0.01) and chutta (P < 0.05) smoking. The habits of drinking alcohol and chewing did not emerge as risk factors. An interaction effect was not seen between the lifestyle habits. Attributable risk (AR) for smoking among exsmokers was 33% and current smokers 60%. Population AR for smoking was 31%. Conclusion: Smoking tobacco is an independent risk factor for SC. Comment in: *Int J Epidemiol.* 1998 Feb;27(1):153

StoC India (1995) Jos: Case series
Jose L, Nalappat S, Sasidharan VP. **A clinico-pathological study of carcinoma stomach.** *Indian J Pathol Microbiol.* 1995 Jan;38(1):73-9.
(Department of Pathology, Medical College Calicut, Kerala, India.)

North Kerala is a high risk area for carcinoma of the stomach. Therefore, 'intestinal type' carcinoma of Lauren is more prevalent here and the disease occurs even in people below the age of 40. An attempt is made to analyse various risk factors in 70 patients who had undergone gastrectomy for carcinoma of the stomach in the Medical College Hospital, Calicut. The population study revealed no relationship between the disease and religion. Diet is found to be the most important potential environmental influence. Even though

both males and females share the same type of diet, males are found to be more affected by the disease. The relatively much lower frequency of carcinoma stomach among females the area suggests the possible role of smoking and alcohol abuse in males. The blood group profile of healthy population in North Kerala and that of the patients show that people with blood group A have a differential susceptability to gastric carcinoma. Age and chewing of tobacco were the other factors involved. Erratum in: Indian J Pathol Microbiol 1995 Apr;38(2):138.

3.10 Other cancers

Two of the four articles included here find links between tobacco use and cervical cancer, a third finds that smoking is a risk factor for cancer of the gallbladder among patients with gallstones, and the fourth finds a link between smoking and cancer of the bladder among a sample of men in Bombay.

OthC (2003) Raj: Case control study
Rajkumar T, Franceschi S, Vaccarella S, Gajalakshmi V, Sharmila A, Snijders PJF, Muñoz N, Meijer JLM, Herrero R. **Role of paan chewing and dietary habits in cervical carcinoma in Chennai, India.** *British Journal of Cancer*, 6 May 2003, 88 (9):1388-1393. http://www.nature.com/[...]ptions=doi1051638094
(Dr S Franceschi, Unit of Field and Intervention Studies, International Agency for Research on Cancer, 150 cours Albert Thomas, F-69372 Lyon cédex 08, France. E-mail: franceschi@iarc.fr)

Non-viral factors contribute to human papillomavirus (HPV)-related cervical carcinogenesis. We investigated the role of paan chewing and dietary habits among 205 women with invasive cervical cancer (ICC) and 213 age-matched control women in Chennai, India. Odds ratios (OR) and 95% confidence intervals (CI) were computed by means of unconditional multiple regression, taking into account major correlates of ICC risk. Paan chewing showed a dose-dependent direct association with ICC (OR for 5 paan day-1=4.0; 95% CI 1.2-13.3). Among dietary habits, the highest vs lowest intake tertile for vegetables and fruit was associated with an OR of 0.5 (95% CI 0.2-1.0). Low education level and low body weight were also risk factors for ICC, but they did not account for the associations of paan chewing and low vegetable and fruit intake. In the analyses restricted to HPV-positive cases and controls, the inverse association with vegetable and fruit intake was confirmed. Conversely, the adverse influence of paan chewing on ICC risk seemed to be attributable to a higher prevalence of cervical HPV infection in women who chewed.

OthC India (2000) Dut: Case-control study
Dutta U, Garg PK, Kumar R, Tandon RK. **Typhoid carriers among patients with gallstones are at increased risk for carcinoma of the gallbladder.** *Am J Gastroenterol.* 2000 Mar;95(3):784-7.

(Department of Gastroenterology, All India Institute of Medical Sciences, New Delhi.)

Objective: The aim of this study was to identify risk factors for carcinoma of the gallbladder (CaGB) among patients with gallstones (GS) with special reference to role of chronic Salmonella typhi carrier state. Methods: A prospective case-control study was conducted in a tertiary care center in India. Cases were defined as consecutive patients with CaGB and GS, whereas controls were patients with GS alone. All were assessed clinically and their demographic data, diet, and smoking history recorded. Patients were detected to be typhoid carriers on the basis of Vi serology by enzyme linked immunosorbent assay. Cases (n = 37) and controls (n = 80) were compared by univariate and logistic regression analysis. Results: The mean age of the cases and the controls were 53.4 +/- 11 yr and 43.5 +/- 14 yr, respectively. Among the cases, six (16%) patients were detected to be typhoid carriers, in contrast to two (2.5%) among controls (p = 0.01). Compared to controls, cases were more often older (p = 0.0002), of a lower socioeconomic status (p = 0.0005), and smokers (p = 0.0002). Stepwise logistic regression analysis identified typhoid carrier state (OR = 14; CI 2-92), age > or =47 yr (OR = 5; CI 2-14) and smoking (OR = 11; CI 2-71) as the three independent risk factors for development of CaGB among patients with GS. Conclusion: Chronic typhoid carrier state was the most important risk factor among patients with CaGB and gallstones. Comment in: Am J Gastroenterol. 2003 Apr;98(4):936; author reply 936-7.

OthC India (2000) Sha: Descriptive report
Shanta V, Krishnamurthi S, Gajalakshmi CK, Swaminathan R, Ravichandran K.
Epidemiology of cancer of the cervix: global and national perspective. *J Indian Med Assoc.* 2000 Feb;98(2):49-52.
(Cancer Institute (WIA), Chennai.)

Cancer of the uterine cervix is one of the leading causes of cancer death among women worldwide. The estimated new cancer cervix cases per year is 500,000 of which 79% occur in the developing countries. Cancer cervix occupies either the top rank or second among cancers in women in the developing countries, whereas in the affluent countries cancer cervix does not even find a place in the top 5 leading cancers in women. The truncated rate (TR) in the age group 35-64 years in Chennai, India, is even higher (99.1/100,000; 1982-95) than rate reported from Cali, Colombia (77.4/100,000, 1987-91). The cervical cancer burden in India alone is estimated as 100,000 in 2001 AD. The differential pattern of cervical cancer and the wide variation in incidence are possibly related to environmental differences. Aetiologic association and possible risk factors for cervical carcinoma have been extensively studied. The factors are: Sexual and reproductive factors, socio-economic factors (education and income), viruses e.g., herpes simplex virus (HSV), human papillomavirus (HPV), human immunodeficiency virus (HIV) in cervical carcinogenesis and other factors like smoking, diet, oral contraceptives, hormones, etc. The accumulated evidence suggests that cervical cancer is preventable and is highly suitable for primary prevention. Sexual hygiene, use of barrier contraceptives and ritual circumcision can undoubtedly reduce cervical cancer incidence. Education,

cervical cancer screening of high risk groups and improvement in socio-economic status can reduce cervical cancer morbidity and mortality significantly.

OthC / LC / Occ India (1993) Not: Case-control-study
Notani PN, Shah P, Jayant K, Balakrishnan V. **Occupation and cancers of the lung and bladder: a case-control study in Bombay.** *Int J Epidemiol.* 1993 Apr;22(2):185-91. (Epidemiology Unit, Cancer Research Institute, Tata Memorial Centre, Parel, Bombay, India.)

Associations between occupation and cancers of the lung (n = 246) and bladder (n = 153) were examined in a case-control study. Controls (n = 212) comprised cases of oral (75%) and pharyngeal cancers (13%) and non-neoplastic oral diseases (12%) at the same hospital. Only males were studied. A personal interview was conducted and a lifetime occupational history and information on demographic and relevant confounding factors including tobacco use were obtained. For lung cases, comparing 'ever' employed with 'never' employed in a particular occupation, significantly elevated risks (adjusted for smoking) were found for textile workers (odds ratio [OR] = 1.99, 95% confidence interval [CI]: 1.3-3.6) and cooks (OR = 4.48, 95% CI: 1.2-16.9). High risks were also observed among ship and dockyard workers (OR = 2.87, 95% CI: 0.8-10.1) and wood workers (OR = 2.88, 95% CI: 0.9-9.6). For bladder cancers, significantly elevated risk was observed only for chemical/pharmaceutical plant workers (OR = 4.48; 95% CI: 1.2-16.5). Two other sets of risk estimates were obtained: one by comparison with a second unexposed group made up of occupations where there was little likelihood of exposure to any cancer-causing occupational agent, and the other by fitting logistic regression models to the data. All methods yielded similar risk estimates. Tobacco smoking but not tobacco chewing was a risk factor for both sites. Comment in: Int J Epidemiol. 1993, Dec, 22(6):1205-6.

4. Non-Cancerous Diseases and Adverse Impacts on Health

Tobacco use affects the respiratory system, the digestive system, the circulatory system, the immune system, the endocrine system, the nervous system and behaviour, as well as the reproductive system. Separate sections are devoted to studies in India of the association of tobacco use with diseases of each of these body systems.

4.1 Respiratory system

Smoking has been associated with non-cancerous chronic respiratory conditions, such as chronic obstructive lung disease (COPD, e.g. chronic bronchitis, emphysema, and asthma) and recently a strong association has been found with tuberculosis. This section contains abstracts of epidemiological studies and reviews that present evidence that

smoking is responsible for a sizeable proportion of these diseases. One subsection focuses on non-infectious diseases and the other on tuberculosis.

4.1.1 Chronic respiratory symptoms and diseases

Tobacco chronically harms the cardio-respiratory system. Chronic bronchitis and emphysema are the most common non-neoplastic, non-infectious respiratory diseases associated with all the major types of smoking in India. Articles dealing exclusively with these diseases are coded CResp.

CResp India (2002) Dix: News Article
Dixit R. **Respiratory diseases will be third-most serious ailment.** The Times of India, Mumbai. November 20, 2002

Smoking leads to the gradual blockage of the finer air passages. The changes take place so slowly that they remain undetected for years. Symptoms are often dismissed as a persistent cough, to be relieved by popping a lozenge. Sometimes, when it gets more severe, a bout of antibiotics is recommended. It is only when, after a couple of years, the patient complains of shortness of breath, does the doctor realize that the regular attacks have left the patient with permanently blocked air passages. The World Health Organization (WHO) prediction that respiratory diseases will take over as the third most serious ailment (after cancer and cardiovascular problems) in terms of morbidity and mortality, has the medical fraternity worldwide sitting up. Experts say that early detection is the key, since very often, the damage is irreversible. "Unfortunately, these symptoms often go undetected at the primary health care level till it is too late", says chest specialist Dr. Sanjeev Mehta. Sidney Braman, president of the American College of Chest Physicians, notes that globally, the major respiratory diseases include COPD (Chronic Obstructive Pulmonary Disease) and occupational respiratory ailments. But in India, pulmonary tuberculosis is another major factor. "Chronic suffering ultimately reduces lung function and reduce the body's access to oxygen, which lead to related problems like fatigue and breathlessness. It could hasten the journey to the grave," says Dr. Braman. Dr. Braman points out that smoking is the number one cause for COPD worldwide. "Smoking leads to the gradual blockage of the finer air passages. The changes take place so slowly that they remain undetected for years." In India, traditional 'choolahs' or firewood stoves used in villages is another main factor. "Here we have women in their late 20s already complaining of breathlessness and fatigue," the expert notes. So what is the solution? Dr. Braman feels that medical practitioners should be trained to recognize symptoms much before the damage starts. He notes that the most people do not report to doctors for minor attacks. "So when a patient goes to the primary health practitioner with a severe attack, the doctor should immediately note down the patient's medical history and perform a lung function test. Doctors should be trained to the extent that at any patient-doctor encounter, the disease could be detected." This he says, is all the more important because blockages of air passages is an irreversible process. "There is no cure. The line of treatment followed today only alleviates symptoms, nothing more". The expert feels that lung function tests should become part of

standard medical investigations. “The machine is not too costly. The prices range from Rs. 30,000 for a simple one to Rs. 1.2 lakh for the more sophisticated ones. The cost of a test should not be more than Rs. 250,” says Dr.Mehta. Not too expensive in comparison with say an ECG. “At a discussion with some surgeons, they told me that often, they lose patients after surgery to infections like pneumonia or emphysema, although the surgeries go off without hitches. I told them this usually happens because the patient’s lungs have been weakened over time. But this remains undetected because even in the pre-op tests, doctors check almost all vital signs except lung function,” Dr. Braman recounted.

CResp India (2002) Kha: Comparative study
Khan MM, Tandon SN, Khan MT, Pandey US, Idris MZ. **A comparative study of effects of cigarette and bidi smoking on respiratory function tests.** *J Environ Biol.* 2002 Jan;23(1):89-93.
(Department of Physiology, King George's Medical College, Lucknow-226 003,India.)

The effects of cigarette and bidi smoking on pulmonary function tests were studied in 90 healthy males from North India. Forced vital capacity (FVC), peak expiratory flow rate (PEFR), forced expiratory volume in 1 sec (FEV) were determined in 30 nonsmokers (as control group), 30 cigarette smokers and 30 bidi smokers. All the above pulmonary function parameters were found to be lower among smokers than in nonsmokers. The decrease in the pulmonary function tests was greater in cigarette smokers compared to bidi smokers.

CResp India (2001) Chh: Cross-sectional study
Chhabra SK, Chhabra P, Rajpal S, Gupta RK. **Ambient air pollution and chronic respiratory morbidity in Delhi.** *Arch Environ Health.* 2001 Jan-Feb;56(1):58-64.
(Department of Cardiorespiratory Physiology, Vallabhbhai Patel Chest Institute, University of Delhi, India.)

The authors conducted a cross-sectional study among residents of Delhi to determine the role of ambient air pollution in chronic respiratory morbidity in Delhi. The authors selected a random, stratified sample (N = 4,171) of permanent residents who were 18 years of age or older and who lived near 1 of the 9 permanent air quality monitoring stations in the city. Air-quality data for the past 10 years were obtained; data were based on the differences in total suspended particulates, and the study areas were categorized into lower- and higher-pollution zones. A standardized questionnaire was administered, clinical examination was carried out, and spirometry followed. The authors assessed chronic respiratory morbidity by (a) prevalence of chronic respiratory symptoms (i.e., chronic cough, phlegm, breathlessness, and wheezing) and airway diseases (i.e., chronic obstructive pulmonary disease/chronic bronchitis and bronchial asthma); and (b) lung function results in asymptomatic nonsmoking subjects in the two pollution zones. A multiple logistic regression identified the determinants of chronic symptoms. Smoking, male sex, increasing age, and lower socioeconomic status were strong independent risk factors for occurrence of chronic respiratory symptoms. In the comparison of

nonsmoking residents of lower- and higher-pollution zones--stratified according to socioeconomic levels and sex--chronic cough, chronic phlegm, and dyspnea (but not wheezing) were significantly more common in the higher-pollution zone in only some of the strata. Furthermore, prevalence rates of bronchial asthma, chronic obstructive pulmonary disease, and chronic bronchitis among residents in the two pollution zones were not significantly different. Nonetheless, lung function of asymptomatic nonsmokers was consistently and significantly better among both male and female residents of the lower-pollution zone.

CResp India (2001) Chh: Cross-sectional survey
Chhabra SK, Rajpal S, Gupta R. **Patterns of smoking in Delhi and comparison of chronic respiratory morbidity among beedi and cigarette smokers.** *Indian J Chest Dis Allied Sci* 2001 Jan-Mar;43(1):19-26.
(Department of Cardiorespiratory Physiology, V. P. Chest Institute, University of Delhi, Delhi-110 007. skchhabra@mailcity.com)

Tobacco smoking is common in developing countries including India with beedi and cigarette smoking being the main types. A community-based study of chronic respiratory morbidity in urban Delhi was analyzed to determine patterns of tobacco smoking and compare chronic respiratory morbidity among beedi and cigarette smokers. A random, stratified sample was selected of permanent residents aged above 18 years, from nine clusters in Delhi. A standardized respiratory symptoms questionnaire was administered and clinical examination carried out followed by spirometry. The questionnaire included a detailed smoking history including type of smoking, number of cigarettes smoked per day and number of years the person had been smoking. Chronic respiratory morbidity in beedi and cigarette smokers was measured in terms of prevalence of chronic respiratory symptoms (chronic cough, phlegm, breathlessness and wheezing) and by lung function results. Nearly 40% of adult males were current smokers. Beedi smoking was overall the commonest type of smoking in the community. Cigarette smoking was more common in the higher income groups and among graduates and postgraduates. Beedi smoking was the main form of smoking among the lower and middle-income groups and among the illiterates and the less educated people. Very few females admitted to smoking. The prevalence of symptomatics (those having one or more chronic chest symptoms) was significantly higher in beedi smokers than cigarette smokers in those with more than 2.5 pack years of smoking. Prevalence of wheezing was not significantly different. Multiple logistic regression analysis revealed type of smoking to be a significant independent determinant of respiratory symptoms with the odds for occurrence of symptoms being 1.67 times greater in beedi smokers than cigarette smokers. Lung function (FEV1/FVC and FEV1% predicted) showed significantly greater airways obstruction in beedi smokers compared to cigarette smokers. It was concluded that beedi smoking was as or more likely to cause clinical and functional impairment of lungs than cigarette smoking.

CResp India (2001) Jin: Review
Jindal SK, Aggarwal AN, Gupta D. **A review of population studies from India to estimate national burden of chronic obstructive pulmonary disease and its association with smoking.** *Indian J Chest Dis Allied Sci* 2001 Jul-Sep;43(3):139-47.
(Department of Pulmonary Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh. skjindal@cha.i91.net)

An attempt was made to estimate the gross burden of chronic obstructive pulmonary disease (COPD) and its smoking association by reviewing population studies available from India. Of the 14 studies which were reviewed, 11 were conducted in general populations. The median values of different COPD prevalence rates (i.e. 5 percent in male and 2.7 percent in female population) were accepted as the most appropriate figures to calculate the overall estimates. The overall M:F ratio was 1.6:1, i.e. 61.6 percent males. The estimated total number of adult patients aged 30 years and above in 1996 were 8.15 million males and 4.21 million females. Of the males, 82.3 percent were smokers, an estimated 6.7 million men. When the prevalence rates of COPD and its smoking associations were assessed in three different time periods (before 1970; between 1971-1990; after 1990), the median rates in 1971-1990, when most of the studies were conducted, were nearly the same as the rates found during earlier and later periods. However, the total COPD burden as well as smoking associated COPD increased with time due to an increase in the eligible base population. In conclusion, these figures can be used to estimate the burden of COPD and its smoking association in India for different statistical analyses.

CResp / TUS / Circ India (2001) Kho: Cross-sectional survey
Khokhar A, Mehra M. **Life style and morbidity profile of geriatric population in an urban community of Delhi.** *Indian J Med Sci.* 2001 Nov;55(11):609-15.
(Department of Community Medicine, Maulana Azad Medical College, Delhi-110002.)

(for abstract, see TUS / CResp / Circ India (2001) Kho: Cross-sectional survey)

CResp India (1999) Akh: Population-based survey
Akhtar MA and Latif PA. **Prevalence of Chronic Bronchitis in Urban Population of Kashmir**: *J of Ind. Medical Assoc.* September l999: 97(9):365-366, 369.
(Department of General Medicine, Sher-I-Kashmir Institute of Medical Sciences, Srinagar, 190011.)

A population-based survey was conducted in an urban area of Kashmir comprising 629 males and 511 females. Information was collected in house-to-house visits, on family, socio-economic status, occupation, smoking habits, houseing conditions, and history of cough or phlegm. People who reported cough or phlegm for at least 3 months during past 2 years were given a detailed chest examination and lung function tests including peak expiratory flow rate and forced vital capacity. Most (28%) of the people studies were under 40 years of age. The prevalence of chronic bronchitis was highest in the group aged

70 years or older (14.12%), smokers (7.55%, compared to 3.68% among non-smokers) and people living in poorly ventilated dwellings (10.56%).

CResp / ETS India (1999) Pat: Descriptive report
Patel DR. **Smoking and children.** *Indian J Pediatr*. 1999 Nov-Dec;66(6):817-24.
(Department of Pediatrics, Michigan State University, Kalamazoo Center for Medical Studies 49008, USA. patel@KCMS.MSU.EDU)

Tobacco use by children and adolescents is a major health threat. A number of carcinogens and other harmful compounds have been identified in tobacco smoke. The major component, nicotine, is highly addictive. In India, approximately 5500 children and adolescents start using tobacco products daily, some as young as 10 years old. The majority of users have first tried tobacco prior to age 18. Children and adolescents are exposed to the harmful effects of nicotine from smoking or second hand smoke from others; and from use of smokeless tobacco. There is increased prevalence of respiratory disease, ear and sinus infections, asthma, oral disease, and many long-term complications such as cardiovascular disease and cancers due to tobacco use. Prevention and treatment strategies include behavioural approaches and pharmacotherapy. There is an increased urgency especially, for countries like India to address the problem of tobacco use by children and adolescents as the tobacco industry faces legal and public opinion obstacles in Western countries like United States. The medical practitioner can play an important role by implementing the preventive and treatment strategies in his or her practice.

CResp India (1998) Roy: Cross-sectional survey
Roy SK. **Smoking status and its effect on cardiorespiratory system, body dimension and plucking performance of Oraon tea garden labourers.** *Anthropol Anz* 1998 Jun;56(2):151-62.
(Anthropometry and Human Genetics Unit, Indian Statistical Institute, Calcutta.)

Oraon tea leaf pluckers were examined in terms of their cardiorespiratory functions using blood pressure measurements and a number of lung function tests. Anthropometric measurements and information on smoking history were obtained. It is known from earlier studies that the individuals studied have similar economic and nutritional backgrounds. The results suggest that smoking has an effect on cardiorespiratory functions, and may have an indirect effect on anthropometric traits, but no effect of smoking on work performance could be established from the study.

CResp India (1998) Swa: Cross-sectional survey
Swaroop V, Agnihotri MS. **Smoking habits, its forms and impact on pulmonary health in planes of Uttar Pradesh.** *J Indian Med Assoc* 1998 Mar;96(3):80-1.
(Department of Tuberculosis and Chest Diseases, KG's Medical College, Lucknow)

A total of 611 rural and 164 urban subjects were studied. Smoking was more prevalent in urban areas than rural areas, and by gender, more prevalent among urban males and rural females. Bidi was the commonest mode of smoking among rurals, and cigarettes in the urban population. Pulmonary function test (PFT) analysis proved that smoking causes definite pulmonary functional impairments among smokers. Its aetiology in producing restrictive impairment remains doubtful and may be additive only but its role in precipitating obstructive impairment is definite in urban smokers. On the contrary rural non-smokers suffer more from obstructive impairment. Environmental pollution, exposure to toxic fumes and industrial gases in urban areas and organic and inorganic dust exposure in rural areas may be responsible for precipitation of pulmonary function impairments among non-smokers.

CResp India (1997) Dey: Case series (prospective)
Dey AB, Nagarkar KM, Kumar V. **Clinical presentation and predictors of outcome in adult patients with community-acquired pneumonia.** *Natl Med J India.* 1997 Jul-Aug;10(4):169-72.
(Department of Medicine, All India Institute of Medical Sciences, Ansari Nagar, New Delhi, India.)

Background: Community-acquired pneumonia in adults has a morbidity and mortality ranging between 10% and 25%. Increasing age is associated with a higher mortality. The factors influencing the outcome in elderly patients are thought to be different from those in young adults. We therefore, studied the clinical profile and predictors of outcome in adults with community-acquired pneumonias. Methods: Seventy-two consecutive patients with community-acquired pneumonia were included in the study over a period of 18 months. A detailed history was obtained and physical examination done. A chest X-ray was done to establish the diagnosis and haematological, biochemical and arterial blood gas estimations were carried out. The data from survivors and non-survivors as well as those > or = 50 years of age and < 50 years were analysed to determine the clinical profile and outcome in these groups. Results: The clinical features, laboratory parameters and complications from pneumonia were similar in 43 elderly (group I, age > or = 50 years) and 29 young (group II, age < 50 years) subjects. Thirty-five per cent of elderly patients and 14% of young patients succumbed to fulminant sepsis or respiratory failure ($p < 0.05$). Old age, history of smoking, presence of chronic obstructive airways disease, late presentation to hospital, systolic and diastolic hypotension, high blood urea, low serum albumin and development of septic shock were associated with a higher incidence of complications and a poorer prognosis. In addition, older patients with a poor outcome also had symptoms for a longer duration and a poor neutrophilic response to infection. Conclusions: The presence of certain factors leads to a higher incidence of complications and a poorer prognosis. These factors are good predictors of outcome in adults of all age groups.

CResp India (1996) Gho: Cross-sectional survey
Ghosal AG, Ghosh A, Debnath NB, Saha AK. **Smoking habits and respiratory symptoms: observations among college students and professionals.** *J Indian Med Assoc* 1996 Feb;94(2):55-7.
(NB Medical College, Sushrutanagar)

A study of smoking habits, impact on respiratory system and response to a questionnaire was undertaken among a random sample of 1,188 educationally and socially forward subjects consisting of students and professionals aged between 15 and 65 years. Results showed that smoking habit was alarmingly high (48.8%) among the students and even higher (53%) among the professionals. The exact nature and extent of the dangers of smoking were not known by all the subjects. Among those who responded in the first round of data collection, 26% (90 out of 340) male professionals who smoked claimed to have respiratory symptoms: of these, 60 had consulted doctors and 32 had been diagnosed with bronchitis, 26 with bronchial asthma, and 2 with pulmonary tuberculosis. All had been advised to stop smoking; 15% (30 out of 200) male students had respiratory symptoms, like dry cough, episodic breathlessness and wheezing, of whom about two thirds had seen a doctor and been diagnosed with bronchitis or asthma and had been advised to stop smoking.

CResp India (1995) Cha: Case-control study
Chatterjee S, Chattopadhyay BP, Saha D. **Pulmonary function of different categories of chronic obstructive pulmonary diseases in railway workers of eastern India.** *J UOEH* 1995, Sep 1;17(3):173-89.
(Department of Physiology, University College of Science and Technology, Calcutta, India)

Pulmonary function tests were done on 146 established chronic obstructive pulmonary disease (COPD) patients and 151 normal non-smoker and smoker subjects. These patients were assembled from Garden Reach Railway Hospital (Calcutta), West Bengal, India, 79 suffering from chronic bronchitis, 8 from chronic bronchitis with mild emphysema (they were included in the chronic bronchitis group), 38 from emphysema and 21 from asthma. In the normal subjects 75 were non-smokers and 76 smokers. All the subjects were aged 16-60 years. The mean values obtained in COPD patients were compared with those of normal non-smokers and smokers in each group and amongst the different categories of COPD patients. All the pulmonary function tests (PFT) were measured by the standard spirometric technique, and the Peak Expiratory Flow Rate (PEFR) was studied using Wright's Peak Flow Meter. The values were expressed in body temperature at ambient pressure saturated with Water Vapour Pressure (BTPS). The PFT values significantly deteriorated in all categories of COPD patients as compared to normal non-smokers and smokers, but a few parameters showed exceptions. Significant deterioration was observed in emphysematous patients when compared to other categories of COPD patients. No definite trend of reduction of pulmonary function test values were found according to the years of suffering from the disease. A product moment correlation matrix showed a highly significant positive correlation between FVC

and FEV1, in all four groups of patients. These two parameters also showed a strong positive relationship with FEF25-75%, FEF200-1200ml, FEF75-85%, MVVF and PEFR. The regression equations for some of the closely related variables of high correlation coefficient were calculated in COPD patients and presented in the study.

CResp India (1995) Ray: Cohort study
Ray D, Abel R, Selvaraj KG. **A 5-yr prospective epidemiological study of chronic obstructive pulmonary disease in rural south India.** *Indian J Med Res* 1995 Jun;101:238-44.
(Department of Chest Diseases, Christian Medical College, Vellore)

In a prospective epidemiological study from 1981 to 1986 in four villages in the KV Kuppam block of North Arcot Ambedkar district in Tamil Nadu, we detected 328 patients with chronic obstructive pulmonary disease (COPD) amongst the 9,946 inhabitants who were aged 30 years or more. The majority of the population was from the lower income group, working as agricultural workers and residing in these villages which were generally free from atmospheric pollution. Of the 328 patients with COPD, 198 were males and 130 were females showing an overall age specific prevalence of 33/1,000 with a prevalence of 40.8/1,000 for males and 25.5/1,000 for females, respectively. In nearly half of the patients who had chest radiography, changes consistent with COPD were observed; only one patient had clinical, radiological and electrocardiographic evidence of cor-pulmonale. Peak expiratory flow rate (PEFR) along with height (cm) were measured in 258 patients and compared to the predicted normal values. Most of those tested showed evidence of airways obstruction; severe defect was observed in 106 patients. Among the males, 122 gave a history of smoking; majority of the heavy smokers amongst them had severe impairment of PEFR. Females from these villages denied any history of smoking. Cooking for long hours using firewood and cowdung cakes could have contributed to development of COPD in these village women.

CResp India (1992) Jin: clinical and biophysical study
Jindal SK and Gupta D. **Tobacco smoking, exposure to environmental tobacco smoke and respiratory disease.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 187-190.
(Department of Pulmonary Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh, India)

The association between cigarette smoking and chronic obstructive airway diseases is well established. There is adequate evidence linking exposure to environmental tobacco smoke, or passive smoking, with respiratory disease and impairment of lung function, especially among children. Smoking and exposure to environmental tobacco smoke worsen bronchial asthma. A study of morbidity indices and lung function in three groups of asthmatics – nonsmokers, nonsmokers exposed to environmental tobacco smoke and

smokers, each group comprising 50 patients – showed significant differences among the groups.

CResp India (1989) Jay: Review
Jayant K and Mahashur AA. **Chronic Obstructive Lung Disease in India – Morbidity and Mortality due to Smoking**. In: Sanghvi LD and Perin Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 37-47.

It has been established that cigarette smoking is the major cause of COLD in U.S. In India, bidi, which is different from cigarettes in several ways, is the most prevalent form of smoking. Hence, there is a need to assess the proportion of COLD cases in the country that are attributable to smoking. With the limited data available, morbidity due to COLD in the country for the 1986 population (760 million), has been estimated to be in the range of 15 to 29 million and mortality between 0.25 to 0.46 million. Furthermore, it has been shown that between 7 and 13 million prevalent COLD cases and 0.11 to 0.21 million COLD deaths are attributable to smoking.

CResp India (1989) Jin: Review
Jindal SK, Malik SK. **Tobacco Smoking and Non-neoplastic Respiratory Disease**. In: Sanghvi LD and Perin Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 30-36.
Chronic bronchitis and emphysema are the most common non-neoplastic respiratory diseases associated with all the major types of smoking in India (bidi, cigarette, chutta and others). This is the result of structural and functional change produced by tobacco smoking in both the conducting airways and the pulmonary parenchyma. Surveys have been carried out by PGI in Chandigarh city and a neighboring rural area using a standardized questionnaire along with ventilatory function measurements. It was found that smoking was more prevalent in males than females and in rural than in urban area. Furthermore, the prevalence of chronic bronchitis was higher in rural male smokers (16.4%) than urban male smokers (9.9%). Similar studies in Shimla Hills and South-East Orissa revealed that smoking in adult females was also high. In fact 85% of females in the Orissa survey smoked chutta compared to 30% of males, and chronic bronchitis was equally prevalent (33%) in smokers of both the sexes. Female smokers in rural Shimla exhibited the highest prevalence (52%) of the diseases. The effects of smoking on other conditions, like tuberculosis of lung, and non-neoplastic respiratory problems of passive smokers are also discussed.

CResp India (1975) Jos: Cross-sectional
Joshi RC, Madan RN, Brash AA. **Prevalence of chronic bronchitis in an industrial population in North India.** *Thorax* 1975 Feb;30(1):61-7.

This study conducted in North India reported that the prevalence of chronic bronchitis in smokers was five times the prevalence in non-smokers.

4.1.2 Tuberculosis

Determining a causal link between smoking and tuberculosis is important from a public health perspective. It used to be thought that smoking has little role either in the occurrence of TB or in mortality from TB. New evidence presented at an international meeting suggests causal relationships between persistent smoking and tuberculosis prevalence and mortality. The evidence is summarized here.

TB India (2002) Dhi: Proceedings
Dhillon, I, Gupta P and Asma S, eds. (2002) **Evidence for a Causal Link between Smoking and Tuberculosis - Proceedings of the International Scientific Expert Meeting on the Possible Causality between Smoking and Tuberculosis**, November 17-18, 2000, Thiruvananthapuram, Kerala, India.

An international meeting on the "Evidence for Causality between Smoking and Tuberculosis" was convened on November 17th and 18th, 2000. A considerable amount of new, unpublished data from India and other countries was presented and older data reviewed. Data from India included results of mortality studies conducted in Chennai, Thiruvananthapuram (Trivandrum), Mumbai and Kolkata and prevalence studies conducted in Chennai, Mumbai, Chandigarh and rural Kolappan in Tamil Nadu. Results of studies conducted in China, South Africa, Siberia and the United Kingdom were also presented. The overall consensus was that the data presented provided preliminary evidence to suggest a causal relationship between persistent smoking and prevalence of tuberculosis and also between smoking and mortality from tuberculosis. The epidemiological evidence seems to suggest that the risk is about 2 to 3 fold higher for smokers, based on deaths coded as being from tuberculosis. The evidence also suggested a 2 to 3 fold higher risk for smokers, with regard to the presence of active tuberculosis. A consistency of association was observed across different types of studies and different populations. Whenever examined, a strong dose response relationship was found. It was concluded that the data presented significantly strengthens the hypothesis of causality between smoking and tuberculosis, even though some of the studies had limitations.

TB India (2002) Kol: Case-control study
Kolappan C and Gopi PG. **Tobacco smoking and pulmonary tuberculosis**. *Thorax* 2002;57:964-966.
(Epidemiology Unit, Tuberculosis Research Centre, Mayor V R Ramanathan Road, Chetput, Chennai 600 031, Tamil Nadu, India; kola15@sify.com)

Background: The prevalence of tuberculosis in adult men in India is 2–4 times higher than in women. Tobacco smoking is much more prevalent among men, so it is possible that tobacco smoking may be a risk factor for developing pulmonary tuberculosis. A

nested case control study was carried out to assess the association between tobacco smoking and pulmonary tuberculosis. Methods: A tuberculosis disease survey was carried out in two Panchayat unions in the Tiruvallur district of Tamil Nadu in India. Eighty five men aged 20–50 years with bacteriological tuberculosis (smear and/or culture positive) were selected as cases and 459 age matched men without tuberculosis were selected randomly as controls. Information on smoking status, type of tobacco smoked, quantity of tobacco smoked, and duration of tobacco smoking was collected from cases and controls using a questionnaire. Results: The estimated crude odds ratio (OR) of the association between tobacco smoking and bacillary tuberculosis was 2.48 (95% confidence interval (CI) 1.42 to 4.37), p<0.001.The age adjusted OR (Mantel-Hanszel estimate) was 2.24.(95% CI 1.27 to 3.94), p<0.05. The ORs for mild (1–10 cigarettes/day), moderate (11–20/day), and heavy (>20/day) smokers were 1.75, 3.17, and 3.68, respectively (p<0.0001 test for linear trend). The ORs for smokers with <10 years, 11–20 years, and >20 years of smoking were 1.72, 2.45, and 3.23, respectively (p<0.0001 test for linear trend). Conclusion: There is a positive association between tobacco smoking and pulmonary (bacillary) tuberculosis (OR 2.5). The association also shows a strong dose-response relationship.

TB India (2002) Mau: Review
Maurya V., Vijayan V. K., Shah A. **Smoking and tuberculosis: an association overlooked.** *The International Journal of Tuberculosis and Lung Disease*, 2002, 6(11), 942-951(10).
(Department of Respiratory Medicine, Vallabhbhai Patel Chest Institute, University of Delhi, Delhi, India)

Objectives: This article discusses the role of smoking as a risk factor for tuberculosis. A review of the evidence that has been documented is presented. Data sources: Relevant articles in the medical literature derived from searching the Medline database (1966 to present) with key terms ‘smoking’ and ‘tuberculosis’. The bibliographies of all papers located were searched for further relevant articles. Results: The database search found 12 relevant studies. The bibliographies yielded four more articles. Sixteen studies published between 1956 and 2002 were included in this review. The evidence suggests that smoking could be an important risk factor for the development of tuberculosis. Not only does active smoking appear to heighten the chances of contracting pulmonary tuberculosis, smokers also seem to be at an increased risk for extra-pulmonary tuberculosis. Exposure to environmental tobacco smoke in children seems to enhance the hazards of acquiring tuberculosis. Increased tuberculin reactivity, in a dose-dependent manner, was recorded in smokers as compared to non-smokers. Conclusions: An association between smoking and tuberculosis appears evident. Prospective studies would help to confirm the evidence. Smoking should be considered an important risk factor for tuberculosis.

4.2 Digestive system

Non-cancerous digestive system health problems associated with tobacco use include dyspepsia and duodenal ulcer.

Dig India (2001) Sha: Cross-sectional
Shah SS, Bhatia SJ, Mistry FP. **Epidemiology of dyspepsia in the general population in Mumbai.** *Indian J Gastroenterol* 2001 May-Jun;20(3):103-6.
(Department of Gastroenterology, T N Medical College and B Y L Nair Hospital, Mumbai)

Background and aims: Dyspepsia is a common complaint in the general population. The prevalence, demography and economic implications of dyspepsia in India are not known; we studied these using a detailed symptom questionnaire. Methods: 2,549 presumably healthy adults (mean age 37.2 [14.1] years; 1441 men) were interviewed. Gastrointestinal symptoms, their investigation and treatment, dietary history and history of addictions were noted. Dyspepsia was defined as abdominal fullness or upper abdominal pain present for at least one month; irritable bowel syndrome (IBS) was defined by Manning's criteria. Based on the symptom profile, subjects were divided into three broad groups: no dyspepsia (n=1695; 945 men), dyspepsia with (110; 63 men) or without (664; 382 men) IBS, and IBS alone (80; 51 men). Results: 774 subjects (30.4%) had dyspepsia; the median (range) duration of symptoms was 24 (1-360) months. Abdominal fullness (n=614), abdominal pain (374), heartburn (272) and belching (271) were the most common symptoms; significant symptoms (present at least once a week) occurred in 306 subjects (12.0% of the population). More than half the subjects had symptoms suggestive of mixed type of dyspepsia; dysmotility-like dyspepsia was the next most common (n=257; 33.2%). The frequency of dyspepsia was not related to type of diet or consumption of spices. Dyspepsia was more prevalent in subjects who used tobacco or alcohol. Three hundred and twenty-one subjects with dyspepsia (41.4%) had visited a physician for their complaints and had received treatment with antacids, acid suppressors or prokinetic drugs; 4.5% and 7.2% had undergone previous endoscopy and ultrasonography, respectively; dyspeptic subjects underwent more investigations (p™0.001) than those with IBS. Conclusions: Dyspepsia is reported by almost one-third of the population in Mumbai; significant symptoms occur in 12%. Tobacco use is associated with higher risk. Forty percent of these subjects receive treatment and only a small number undergo endoscopy or ultrasonography.

Dig India (1999) Jai: Case-control study
Jain A, Buddhiraja S, Khurana B, Singhal R, Nair D, Arora P, Gangwal P, Mishra SK, Uppal B, Gondal R, Kar P. **Risk factors for duodenal ulcer in north India.** *Trop Gastroenterol.* 1999 Jan-Mar;20(1):36-9.
(Maulana Azad Medical College, New Delhi.)

Objectives: The present study was designed to evalutate the association of various risk factors such as smoking, alcohol, NSAIDs, inadequate dietary intake of fibres and consumption of spicy foods with chronic duodenal ulcer using a case-control design and to establish the association of Helicobacter pylori and duodenal ulcer using different diagnostic techniques in Indian subjects. Materials: A total of 16 consecutive patients with endoscopically proven duodenal ulcer (DU) constituted the test group while 160 subjects with non-ulcer dyspepsia (NUD) were recruited as controls. Methods: All subjects were interviewed based on a standard questionnaire and underwent an upper gastrointestinal endsocopy wherein multiple biopsies were taken for rapid urease test (RUT), histology and culture for detection of H. pylori. The serum samples of all the subjects were tested for the presence of antibodies against H. pylori using ELISA. Results: There were significantly greater number of smokers (80%) and alcoholics (58%) in the male population of DU group as compared to the controls (49% smokers & 15% alcoholics). Similar trend was seen in relation to history of chronic exposure to NSAIDs (29% in DU & 11% in NUD) and inadequate intake of fibre in diet (66% and 39% respectively). The overall prevalence of H. pylori was 82.5% in DU and 50.6% in NUD [$p < 0.001$]. Conclusions: In North Indian subjects, alcohol consumption, smoking, inadequate intake of fibre in diet and use of NSAIDs are the risk factors associated with doudenal ulcer disease. Further, infection with H. pylori is strongly associated with DU in the North Indian population.

Dig India (1999) Mor: Case-control study
Mori M, Hariharan M, Anandakumar M, Tsutsumi M, Ishikawa O, Konishi Y, Chellam VG, John M, Praseeda I, Priya R, Narendranathan M. **A case-control study on risk factors for pancreatic diseases in Kerala, India.** *Hepatogastroenterology.* 1999 Jan-Feb;46(25):25-30.
(Department of Community Health Science, Saga Medical School, Japan.)

Background/aims: We simultaneously conducted case-control studies, in Kerala of South India, on chronic calcific pancreatitis of the tropics (CCPT), pancreatic ductal adenocarcinoma (PDA) with CCPT, and PDA alone to assess similarity of and difference between their risk factors. Methodology: Cases with one of these diseases were identified at the Trivandrum Medical College (TMC) Hospital, in Kerala, from 1994 to 1996. Controls were selected from healthy hospital visitors of the TMC Hospital by individual age (within +/- 3 years) and sex-matched with the index case. Odds ratios and their 95% confidence intervals for potential risk factors were calculated. Results: Frequent consumption of cassava was positively associated with the risk of PDA with CCPT. Heavy cigarette smoking and drinking large amounts of coffee and/or tea everyday were positively related to the risk of PDA alone. Frequent consumption of vegetables and/or fruits was correlated to the decreased risk of PDA alone. Conclusions: Risk factors as well as preventive factors seem to be different between PDA with CCPT and PDA alone. Further study is necessary, especially to clarify the prognostic factors which would induce pancreatic malignancy in patients with CCPT.

4.3 Circulatory system

This section includes summaries of research conducted on cardio vascular disease, hypertension and stroke, peripheral vascular disease and haematology. In each of these areas, tobacco plays a role, among other factors.

4.3.1 Circulatory system diseases and stroke

The many articles in this sub-section conclude that prevention of cardiovascular disease and stroke in Indians requires smoking cessation, increased physical activity, weight regulation, blood pressure control, regulation of dietary fats and diabetes management. One article discusses a type of peripheral vascular disease caused by smoking. Several articles are on high blood pressure. Tobacco smoking and pan masala use increase blood pressure and heart rate. Smoking also promotes blood clotting. Obesity, sedentary lifestyles, smoking and salt intake are risk factors for hypertension.

Circ India (2002) Ahl: Cross-sectional survey
Ahlawat SK, Singh MM, Kumar R, Kumari S, Sharma BK. **Time trends in the prevalence of hypertension and associated risk factors in Chandigarh**. *J Indian Med Assoc.* 2002 Sep;100(9):547-52, 554-5, 572.
(Postgraduate Institute of Medical Education and Research, Chandigarh.)

To estimate the changes in the prevalence of hypertension and associated risk factors over a 30 years period, a cross-sectional population survey in three randomly selected sectors of Chandigarh city was carried out. Study population consisted of 1181 individuals (570 males and 611 females) aged 35 years and above. A total of 1049 subjects were interviewed using a structured interview schedule, and 937 were examined by a physician. Blood pressure and anthropometric measurements were recorded. Physical activity was graded according to the job performed by the individual. Guidelines of the Fifth Joint National Committee (JNC-V) of USA were used for diagnosis of hypertension. Estimation of body fat from skin fold thickness was done by applying Grande's formula and the method of Pascale et al. Data were compared to that of year 1968 when a similar cross-sectional survey had been carried out in Chandigarh. Age and sex standardised prevalence of hypertension according to JNC-V criteria increased from 26.9 per cent in 1968 to 44.9 per cent in 1996-97. In 1968, 70% of the male population were engaged in sedentary and light physical activity compared to 73.7 per cent in 1996-97. Total body fat has increased in both men and women. High and high middle income groups in males were 61.2% in 1996-97 compared to 37.4% in 1968. Smoking rates, however, remained unchanged, 25.4 per cent men smoked in 1968 compared to 24.6 per cent in 1996-97. The prevalence of hypertension has almost doubled over 30 years in Chandigarh. Unfavourable change in prevalence of hypertension, physical activity and body fat makes this population highly vulnerable to cardiovascular morbidity and mortality. Comment in: J Indian Med Assoc. 2002 Sep;100(9):546.

Circ India (2002) Gup: Cross-sectional follow-up survey
Gupta R, Gupta VP, Sarna M, Bhatnagar S, Thanvi J, Sharma V, Singh AK, Gupta JB, Kaul V. **Prevalence of coronary heart disease and risk factors in an urban Indian population: Jaipur Heart Watch-2.** *Indian Heart J* 2002 Jan-Feb;54(1):59-66.
(Department of Medicine, Monilek Hospital and Research Centre, Jaipur. rajeevg@satyam.net.in)

Background: The prevalence of risk factors for coronary heart disease has been inadequately studied in India. A repeat cross-sectional survey was carried out to evaluate the changes in the major coronary risk factors in the urban population of Jaipur previously studied in the early 1990s. Methods and results: Stratified sampling was used to randomly select adults aged 20 years or older. The target study sample was 1800 with a population proportionate gender distribution (males 960, females 840). Coronary risk factors, anthropometric variables, blood pressure, ECG, fasting blood glucose and lipids were evaluated. A total of 1123 subjects (62.4%) (males 550, females 573) were examined. Fasting blood samples were available in 523 males and 559 females. Overall coronary heart disease prevalence, diagnosed by history or ECG changes, was found in 34 males (6.18%) and 58 females (10.12%). Risk factor prevalence showed that smoking/tobacco use was present in 201 males (36.5%) and 67 females (11.7%). Physical inactivity, either work-related or leisure time, was seen in 157 males (28.5%) and 130 females (22.7%). Hypertension (> or =140 and/or 90 mmHg) was present in 200 males (36.4%) and 215 females (37.5%). Diabetes diagnosed by history or fasting glucose > or =126 mg/dl was found in 72 males (13.1%) and 65 females (11.3%). Obesity, body mass index > or =27 kg/m2 was present in 135 males (24.5%) and 173 females (30.2%), while truncal obesity (waist:hip >0.9 males, >0.8 females) was found in 316 males (57.4%) and 392 females (68.4%). The most common dyslipidemia in both males and females was low HDL-cholesterol (<40 mg/dl: males 54.9%, females 54.2%). High total cholesterol levels of > or =200 mg/dl (males 37.4%, females 4.1%), high LDL-cholesterol levels of > or =130 mg/dl (males 37.0%, females 45.8%) and high levels of triglycerides > or = 150 mg/dl (males 32.3%, females 28.6%) were also seen in a significant number. Hypertension, obesity, truncal obesity, diabetes and dyslipidemias increased significantly with age in both males and females (Mantel-Haenzel chi2 for trend, $p<0.05$). Conclusions: There is a high prevalence of standard coronary risk factors--smoking, physical inactivity, hypertension, hypercholesterolemia, diabetes and obesity--as well as factors peculiar to south Asians--truncal obesity, low HDL-cholesterol and high triglycerides--in this urban Indian population. As compared to a previous study in the early 1900s in a similar population, there is a significant increase in the number of people with obesity, diabetes and dyslipidemias.

Circ India (2002) Kut: Cross-sectional survey
Kutty VR, Soman CR, Joseph A, Kumar KV, Pisharody R. **Random capillary blood sugar and coronary risk factors in a south Kerala population.** *J Cardiovasc Risk.* 2002 Dec;9(6):361-7.
(Health Action by People, Trivandrum 695024, India. crsoman@vsnl.com)

Background: High prevalence of type 2 diabetes in one subdivision of a district in south India prompted us to look at the prevalence of other major coronary risk factors, and relate these to random blood sugar values. Design: Cross-sectional survey of all adult residents of four wards (clusters of households) of a subdivision. Detailed investigation for diabetes and blood lipids in a selected subsample with random blood sugar (RBS) >109 mg/dl by glucometer. Methods: From the selected wards, we conducted a standard oral glucose tolerance test and serum lipids in all those who had RBS above 109 mg/dl by glucometer. Risk factors such as smoking, obesity (body mass index > 29.9), high blood pressure (systolic pressure > 139; diastolic pressure > 89 mmHg) and sedentary habits were assessed in all irrespective of RBS. Results: Prevalence of all risk factors increases with age. Mean RBS ranges from 92.9 +/- 15.7 to 108.8 +/- 35.7 mg/dl in males and 88.6 +/- 16.0 to 117.3 +/- 61.6 mg/dl in females, between the age groups 20-29 to > 69. Risk factor prevalence varied with area of residence, with urban population reporting highest prevalence for type 2 diabetes and obesity, and coastal population for hypertension. For increasing levels of fasting plasma glucose (FPG < 100, 100-124 and > 125 mg/dl), serum total cholesterol values were 5.21 +/- 1.08 mM/l, 5.38 +/- 0.86 mM/l and 5.63 +/- 1.37 mM/l for males. For females, corresponding values were 5.23 +/- 1.11 mM/l, 5.54 +/- 1.15 mM/l, and 5.49 +/- 1.10 mM/l respectively. Conclusions: Risk factor prevalence varies with area of residence within the study population. Mean plasma lipid levels are high among both sexes, tending to rise with increasing mean fasting plasma glucose levels. (http://www.jcardiovascularrisk.com/article.asp?ISSN=1350-6277&VOL=9&ISS=6&PAGE=361)

Circ India (2002) Kau: Case series
Kaul S, Sunitha P, Suvarna A, Meena AK, Uma M, Reddy JM. **Subtypes of Ischemic Stroke in a Metropolitan City of South India** (One year data from a hospital based stroke registry). *Neurol India.* 2002 Dec;50 Suppl:S8-S14.
(Department of Neurology, Nizam Institute of Medical Sciences, Hyderabad, 500082, India.)

Limited data exist on the subtypes of ischemic stroke from the Indian subcontinent. The present study was aimed to investigate the frequency, spectrum and risk factors of various subtypes of ischemic stroke in a south Indian referral center. The study was conducted on consecutive patients of ischemic stroke, fully investigated to determine the underlying mechanism and enrolled in the stroke registry of Nizam's Institute of Medical Sciences between 1st February 2000 and 31st January 2001. There were 282 men and 110 women (mean age 54 years; range 2-97 years). Of all ischemic stroke patients, 41%, 18%, 10%, 4%, and 27% were classified as large-artery atherosclerosis, lacunae, cardioembolism, other determined etiology and undetermined etiology respectively. The most notable difference between this registry and western registries was the predominance of intracranial rather than extracranial location of the large artery atherosclerosis. Hypertension, diabetes and smoking were the common risk factors among all the subtypes. Coronary artery disease and rheumatic heart disease were responsible for most of the cardioembolic strokes.

Circ India (2002) Red: Cross-sectional study
Reddy NK, Kumar DN, Rayudu NV, Sastry BK, Raju BS. **Prevalence of risk factors for coronary atherosclerosis in a cross-sectional population of Andhra Pradesh.** *Indian Heart J. 2002* Nov-Dec;54(6):697-701.
(Department of Medicine, CARE Hospitals, Hyderabad, AP. nkreddy@carehospitals.com)

Background: The prevalence of risk factors for atherosclerosis is increasing in India due to changing socioeconomic factors and lifestyles. Data for the state of Andhra Pradesh are scanty in this regard. Methods and results: The prevalence of conventional risk factors for atherosclerosis was prospectively assessed in a unique sample of 3307 workers of a political party drawn from all over the state of Andhra Pradesh. Demographic, anthropometric, clinical and laboratory data were collected prospectively over a period of 6 months. The mean age of the subjects was 43.12+/-9.5 years, 2955 (88%) were males and 385 (12%) females. The prevalence of risk factors was as follows: diabetes in 810 (24%); hypertension in 924 (28%); lipid abnormality in 1908 (58%); smoking in 805 (24%) and positive family history in 555 (17%). Obesity was prevalent in 1178 (36%) of the population. All coronary risk factors, excepting family history, were significantly more prevalent in males [diabetes: 777 (26%) v. 34 (9%), p<0.001; hypertension: 833 (28%) v. 72 (19%), p<0.001; lipid abnormality: 1729 (59%) v. 172 (45%), p<0.001; smoking: 801 (27%) v. 7 (2%), p<0.001; and family history: 497 (17%) v. 60 (16%), p=0.54]. Region-wise analysis showed a high prevalence of diabetes in the Andhra and Rayalaseema regions, hypertension in the Andhra region, and smoking in the Rayalaseema region. Lipid disorders were equally prevalent in all the regions. Conclusions: The present report shows a disturbing burden of coronary risk factors in the study population. There is an urgent need to undertake population-based measures to reverse the trend.

Circ India / TUS India (2001) Gup: Survey
Gupta A, Gupta R, Lal B, Singh AK, Kothari K. **Prevalence of coronary risk factors among Indian physicians**. *J Assoc Physicians India.* 2001 Dec;49:1148-52.
(Government ESI Hospital, Jaipur.)

Background and objectives: Prevalence of coronary risk factors has not been well studied in Indian physicians, therefore, to determine prevalence of selected lifestyle and biochemical coronary risk factors we performed this study. Methods: Physicians attending a national conference were invited to participate. Of the 1000 questionnaires circulated 256 physicians (221 males, 35 females) responded and were examined for presence of smoking, obesity, truncal obesity, hypertension and ECG abnormalities. Two hundred and thirty four physicians (91.4%, 203 males, 31 females) underwent a fasting blood examination for determination of glucose and lipid profile. Subjects were divided into three age groups: Group I aged < 40 years; Group II 40-49 years; and Group III > or = 50 years. Results: Mean age of the study population was 41.7 +/- 9.3 years (range 26-70). There was no significant difference in the distribution of height, weight, body-mass

index (BMI), waist and hip circumference and waist-hip ratio (WHR) in different age-groups. Systolic blood pressure (BP) and fasting glucose and triglyceride levels increased with age in both males and females, while diastolic BP, total - LDL and HDL cholesterol levels did not change. Smoking or tobacco use was seen in five males (2.3%). Prevalence of obesity (BMI > or = 25.0 kg/m2) was in 104 (48.6%) males and 18 (51.4%) females. Truncal obesity diagnosed by WHR > 0.9 in males and > 0.8 in females was in 160 (72.4%) males and 23 (65.7%) females and a large waist circumference, > or = 100 cm in males and > or = 90 cm in females, was in 58 (26.2%) males and 7 (20.0%) females. Hypertension (> or = 140/90) was in 74 (33.5%) males and 7 (20%) females. A high prevalence of diabetes diagnosed using fasting blood glucose > or = 126 mg/dl or previous history was noted in males 19 (9.4%), females 4 (12.9%). Prevalence of high total cholesterol levels > or = 200 mg/dl was in 91 (44.8%) males and 10 (32.3%) females. High LDL cholesterol level (> or = 100 mg/dl) was in 144 (70.9%) males and 22 (70.9%) females and LDL levels > or = 130 mg/dl in 70 (34.5%) males and 9 (29.0%) female physicians. High triglyceride levels (> or = 200 mg/dl) were in 38 (18.7%) males and 4 (12.9%) females. Electrocardiographic abnormalities were present in seven subjects: Q-waves in two males and one female and ST-T changes in three males and one female. BMI correlated significantly ($p < 0.05$) with systolic BP, fasting glucose, and triglycerides and WHR with systolic BP, diastolic BP, fasting glucose, cholesterol and triglyceride levels. Conclusions: There is a high prevalence of obesity, truncal obesity, hypertension and hypercholesterolaemia in Indian physicians while smoking, low HDL cholesterol and hypertriglyceridemia is low. The overall coronary risk is lower among Indian physicians as compared to previous Indian population studies.

Circ India (2001) Gup: Summary review
Gupta R. **Hypertension in the Indian scenario**. In: Panja M, Editor. Medicine Update 14. Association of Physicians of India 2001; 525-531. Mumbai.

(no abstract available)

Circ / TUS / Cresp India (2001) Kho: Cross-sectional survey
Khokhar A, Mehra M. **Life style and morbidity profile of geriatric population in an urban community of Delhi.** *Indian J Med Sci.* 2001 Nov;55(11):609-15.
(Department of Community Medicine, Maulana Azad Medical College, Delhi-110002.)

(for abstract, see TUS / CResp / Circ India (2001) Kho: Cross-sectional survey)

Circ India (2001) Pai: Case-control study
Pais P, Fay MP, Yusuf S. **Increased risk of acute myocardial infarction associated with beedi and cigarette smoking in Indians: final report on tobacco risks from a case-control study**. *Indian Heart J* 2001 Nov-Dec;53(6):731-5.
(St John's Medical College, Bangalore)

Background: Tobacco smoking is an important risk factor for ischemic heart disease. In India, tobacco is smoked both as cigarettes and beedis. The present study explores the importance of smoking cigarettes or beedis as risk factors for acute myocardial infarction. Methods and results: The study had a case-control design and was conducted in a tertiary teaching hospital in Bangalore. Three hundred subjects aged 30-60 years with a first acute myocardial infarction and 300 age- and sex-matched controls were recruited prospectively. Smoking, dietary and social history were recorded, body mass index and waist-hip ratio measured, and blood glucose, lipids, fasting plasma and insulin levels estimated. Cases and controls had a mean age of 47.2 years and 46.8 years, respectively. There were 279 (93%) males in each group. Diabetes mellitus (odds ratio 2.69, $p<0.0009$). hypertension (odds ratio 2.36, $p=0.0009$), fasting and post-load blood glucose ($p<0.0001$) and waist-hip ratio ($p<0.0001$) were found to be important risk factors for acute myocardial infarction. Smoking was an independent risk factor with a clear dose effect. Adjusted odds ratio for smoking 10 or more cigarettes/day was 3.58 ($p<0.0001$) and was 4.36 ($p<0.0001$) for smoking 10 or more beedis/day. Conclusions: Smoking 10 or more cigarettes or beedis/day carries an independent four-fold increased risk of acute myocardial infarction. This reiterates the need for urgent tobacco control measures in India. Comment in: Indian Heart J. 2002 Jan-Feb, 54(1):111.

Circ India (2000) Gup: Descriptive report

Gupta R. **Prevention of coronary heart disease among Indians: focus on primary prevention.** *J Indian Med Assoc* 2000 Nov;98(11):703-4, 706-9.
(Department of Medicine and Cardiology, Monilek Hospital and Research Centre, Jaipur)

Epidemiological transition with increasing life expectancy and demographic shifts in population age-profile combined with lifestyle related increases in the levels of cardiovascular risk factors is accelerating coronary heart disease (CHD) epidemic in India. As prospective cohort studies for evaluation of coronary risk factors do not exist, urban-rural differences in prevalence of coronary risk factors and case-control studies provide important information regarding coronary risk factors that need prevention to control the CHD epidemic. The risk factors more in urban Indians or associated with increased risk in case-control studies are: sedentary lifestyle, smoking, truncal obesity, hypertension, hypercholesterolaemia, impaired glucose tolerance, insulin resistance and diabetes. Primary prevention ie, reducing risk factors can be achieved by encouraging positive health behaviour and promoting the concept of health as a social value. Special target groups are children, adolescents, family unit, under-privileged and high-risk groups. Behavioural and environmental changes relevant to primary prevention are changes in eating patterns, drinking, smoking, physical activity and stress management. Primary prevention focuses on population and on high-risk groups. Specific high-risk subjects are those with family history of CHD, hypertension or diabetes or those having sedentary lifestyle, obesity, truncal obesity and biochemical coronary risk factors. The interventions are smoking cessation, increased physical activity, weight regulation, blood pressure control, lipid regulation and diabetes management.

Circ / Haem India (2000) Khu: Comparative study
Khurana M, Sharma D, Khandelwal PD. **Lipid profile in smokers and tobacco chewers--a comparative study**. *J Assoc Physicians India* 2000 Sep;48(9):895-7.
(Department of Medicine, SMS Medical College and Hospital, Jaipur)

Objective: The study was undertaken to evaluate lipid profile in cigarette smokers and tobacco chewers and to see whether tobacco chewing causes the same degree of alteration in lipid profile as smoking. Methods: Serum lipid profile was studied in 30 smokers (Group A), 30 tobacco chewers (Group B) and 30 controls i.e., non-smokers and non-tobacco chewers (Group C). Results: High density lipoprotein-cholesterol was lower both in smokers ($P < 0.01$) and tobacco chewers ($P < 0.001$) than in the controls. Both smokers and tobacco chewers had higher values of total cholesterol, low density lipoprotein cholesterol, very low density lipoprotein-cholesterol and, triglycerides as compared to non-smoker, non-tobacco chewer group whereas the differences in levels of lipids in smokers and tobacco chewers were not statistically significant. Conclusion: Though different mode of addictions, smoking and tobacco chewing have equal and comparable adverse effects on lipid profile and therefore raise cardiovascular risk in same proportion.

Circ India (2000) Sha: Trial
Sharma AK, Gupta R, Gupta HP, Singh AK. **Haemodynamic effects of pan masala in healthy volunteers.** *J Assoc Physicians India* 2000 Apr;48(4):400-1.
(Department of Nephrology, Monilek Hospital and Research Center, Jawahar Nagar, Jaipur-302 004)

Objectives: We studied acute haemodynamic effects of pan masala (powdered mixture of areca nut, slaked lime, catechu, and condiments) in healthy volunteers. Methods: Fifty one males (mean age 28.6 +/- 10 years) were evaluated. One pouch (4 g) of pan masala without tobacco was given to each subject under fasting state and effects on pulse and blood pressure (BP) recorded. Results: At baseline the pulse rate was 75.1 +/- 9.0 per minute, systolic BP was 119.1 +/- 10.8 mm Hg, and diastolic BP was 78.0 +/- 7.5. The pulse rate increased to 87.5 +/- 11.4 at ten minutes (+16.9 +/- 12.6%, $p < 0.001$) and fell to 76.7 +/- 9.1 at 30 minutes (p = ns). Systolic BP increased to 122.3 +/- 11.7 mm Hg at 10 minutes (+2.73 +/- 5.1%, $p < 0.001$) and was 120.8 +/- 10.8 at 30 minutes; while diastolic BP was 80.8 +/- 7.3 at 10 minutes (+3.83 +/- 6.1%, $p < 0.001$) and 79.4 +/- 7.6 at 30 minutes. Conclusions: Pan masala intake causes acute increase in pulse and BP.

Circ India (1999) Aga: Descriptive report
Agarwal VK. **Buerger's disease.** *J Indian Med Assoc* 1999 Jul;97(7):291.
(MGM Medical College, Indore)

Buerger's disease is a generalized vascular disease, also called thrombo-angitis obliterans (TAO), which means an inflammation of the arterial wall with involvement of the neighbouring vein and nerve, leading to thrombosis and obliteration of the artery. Unlike

atherosclerosis, TAO usually involves smaller and more peripheral arteries, especially of the fingers and toes, hands and feet, leading to pain, gangrene and the need to amputate. The disease is more common that atherosclerosis in Madhya Pradesh. It is typically found in young men (20-40 years) of lower socioeconomic status who have been heavy bidi smokers from childhood. The first part of standard treatment is to persuade the patient to give up smoking in any form. Early cases can improve with this alone. In intermediate cases with evidence of vasospasm, sympathectomy may be done and in late cases, surgeons try different ways of by pass surgery to restore blood supply to the affected parts, not always with good results. The most promising method for advanced cases is to transplant vessels from the greater omentum of the patient, which have a natural tendency to connect to the remaining viable capillaries of the affected area, forming effective revascularisation.

Circ India (1999) Jha: Hospital survey
Jhala CI, Shah VA, Shah UV, Dafda JD. **Patterns of cardiac disorders and epidemiology of coronary artery disease in urban population of Ahmedabad**. *J Indian Med Assoc.* 1999 Jun;97(6):237-40.
(Dr Jivraj Mehta Smarak Health Foundation, Ahmedabad.)

A hospital based study of coronary artery disease (CAD) was carried out in Gujaratis, admitted to Dr Jivraj Mehta Smarak Health Foundation, Ahmedabad. Total 276 subjects were surveyed. CAD was diagnosed by ECG criteria. Prevalence of CAD in hospital admission was 29.6%. Highest incidence of CAD was seen in the age group of 51 to 60 years. Male/female ratio was 1.6:1. As a single risk factor hypertension was ranked first, next was obesity followed by hyperlipidaemia, diabetes, tobacco habits, and family history of CAD. Overall mortality of CAD was 3.99%, being 1.83% for angina pectoris (AP) and 5.39% for myocardial infarction (MI). Mortality rate was higher in subjects having 2 or more risk factors. Incidence of CAD in young (age < 40 years) was very low (1.09%).

Circ India (1999) Pan: Descriptive report
Pandey MR. **Tobacco smoking and hypertension.** *J Indian Med Assoc* 1999 Sep;97(9):367-9.
(Mrigendra Samjhana Medical Trust)

Coronary artery disease is rapidly increasing in South Asia. South Asian ethnic groups are especially vulnerable to coronary artery disease. The two most striking features of coronary artery disease in the South Asian population are extreme prematurity and severity of the disease, both resulting from the malignant atherosclerosis that begins at an earlier age than in other populations. Triple vessel disease and complicated lesions are not uncommon even in young people and follow a malignant course. The most important aspect of prevention is to identify individuals with high risk of coronary artery disease at an early age and aggressive modification of risk factors. Tobacco smoking and hypertension are the two most important risk factors for coronary heart disease and

stroke. Both of these risk factors have very high prevalence in India, Nepal and other countries of this region. There is a synergistic interaction of tobacco smoking with hypertension and high blood cholesterol which greatly increases coronary heart disease risk as well as that of sudden death and stroke.

Circ India (1999) Siw: Case series
Siwach SB, Singh H, Sharma D, Katyal VK. **Profile of young acute myocardial infarction in Haryana**. *J Assoc Physicians India* 1999 Jun;47(6):654.
(Dept of Medicine, Pt. BDS PGIMS, Rohtak-124001)

Profile of acute myocardial infarction (AMI) in young patients (below 40 years) was studied in a rural/semi-urban population. Of the 338 patients who were admitted to ICCU over one year, 65 (19.2%) were aged 40 years or below (Range 14-40 years). Male:female ratio was 20:1. Majority of these young patients were thinly built, engaged in heavy physical work and belonged to lower socio-economic group. Smoking was the most common risk factor (87%); other risk factors were few. Majority of these young patients ignored chest pain and delayed seeking care. However, despite this, incidence of complications/mortality was lower than among their older counterparts. The overall mortality was only 6% as compared to 21% in older age group. The study focuses our attention to the rising incidence of AMI in young individuals even in populations least prone to ischaemic heart disease. Smoking was the only modifiable risk factor, which needs to be curbed with full force.

Circ India (1998) Gup: Cross-sectional survey
Gupta R. **Lifestyle risk factors and coronary heart disease prevalence in Indian men**. *J Assoc Physicians India* 1998 May;46(5).
(Department of Medicine, Monilek Hospital and Research Centre, Jawahar Nagar, Jaipur, India)

To determine prevalence of various lifestyle coronary risk factors and their association with coronary heart disease (CHD) prevalence we studied 3,397 Indian men (1,982 rural, 1,415 urban). A doctor-administered questionnaire, physical examination and electrocardiography were used. CHD was diagnosed by clinical history and electrocardiographic criteria. Lifestyle risk factor prevalence was: illiteracy 1238 (36%), nuclear family 575 (17%), crowded housing (> or = 3 persons/room) 837 (25%), > or = 4 children 881 (26%), smoking 1554 (46%), alcohol intake 592 (17%), non-vegeterian diet intake 835 (25%), high fat intake 1196 (35%), absence of prayer habit 2276 (67%), absent leisure-time physical activity 2832 (83%) and obesity (body-mass index > or = 27 Kg/M2) 265 (8%). In rural men had a significantly higher prevalence of illiteracy (39% vs 33%), crowded housing (30% vs 17%), smoking (51% vs 39%), alcohol intake (19% vs 15%) and high fat than urban men.

Circ India (1997) Cha: Cross-sectional survey
Chadha SL, Gopinath N, Shekhawat S. **Urban-rural differences in the prevalence of coronary heart disease and its risk factors in Delhi**. *Bull World Health Organ* 1997;75(1):31-8.
(Sitaram Bhartia Institute of Science and Research, Mehrauli Institutional Area, New Delhi, India)

A community-based epidemiological survey of coronary heart disease and its risk factors was carried out over the period 1984-87 on a random sample of adults aged 25-64 years: 13,723 adults living in Delhi and 3,375 in adjoining rural areas. ECG examination and analysis of fasting blood samples for lipids were performed on subjects with the disease and asymptomatic adults free of clinical manifestations. The overall prevalence of coronary heart disease among adults based on clinical and ECG criteria was estimated at 96.7 per 1000 and 27.1 per 1000 in the urban and rural populations, respectively. Prevalences of a family history of coronary heart disease, hypertension, obesity and diabetes mellitus were significantly higher in the urban than in the rural population, and smoking was more common among rural men and women. Mean levels of total serum cholesterol and low density lipoprotein cholesterol were higher among urban subjects; the mean level of triglycerides was higher in rural subjects. The proportions with total cholesterol levels > 190 mg/dl were 44.1% and 23.0% in urban and rural men, respectively, and 50.1% and 23.9% among urban and rural women, respectively. High density lipoprotein cholesterol levels < 35 mg/dl were found in 2.2% of urban men and 8.0% of rural men compared with 1.6% and 3.5% among urban and rural women, respectively. An abnormal ECG pattern (Q wave or ST-T changes) in asymptomatic individuals is also considered to be a risk factor for coronary heart disease. In asymptomatic adults, 1.7% of urban men and 1.2% of urban women showed abnormal Q waves compared with 0.3% of rural men and 0.4% of rural women. A higher proportion of asymptomatic women showed ST-T changes in both populations. Rural men and women had higher total calorie and saturated fat intakes than urban subjects. Differences in dietary cholesterol intake were marginal. Sodium intake was greater in urban adults. Average daily consumption of alcohol by urban men was 12.7 ml ethanol compared with 2.4 ml in rural men.

Circ India (1997) Dal: Descriptive report
Dalal PM. **Strokes in the elderly: prevalence, risk factors & the strategies for prevention.** *Indian J Med Res* 1997 Oct;106:325-32.
(Department of Neuroscience, Medical Research Centre Lilavati Hospital, Mumbai)

Current demographic trends suggest that a large proportion of the Indian population will survive the peak years of occurrence of stroke (55-65 years) and that elderly stroke-survivors with varying degrees of residual disability, will be a major medical problem. The available data from community surveys in different regions of India for 'hemiplegia' presumed to be of vascular origin indicate a crude prevalence rate in the range of 200 per 100,000 persons. Thus, the anticipated costs of rehabilitation of stroke-victims will pose an enormous socio-economic burden on our meagre health-care resources, similar to what

is now faced by industrialised nations in the West. Therefore, prevention of strokes at any age should be our main strategy in national health planning. Among all risk factors for strokes, hypertension is one of the most important and treatable factor. Community screening surveys, by well defined WHO protocol, have shown that nearly 15 per cent of the urban population is 'hypertensive' (160/95 mm Hg or more). Though high blood pressure has the highest attributable risk for stroke, there are many reasons such as patient's compliance in taking medicines and poor follow up in clinical practice that may lead to failure in reducing stroke mortality. In subjects who have transient ischaemic attacks (TIAs), regular use of antiplatelet agents like aspirin in prevention of stroke is well established. It is also mandatory to prohibit tobacco use and adjust dietary habits to control body weight, and associated conditions like diabetes mellitus etc., should be treated. It is advisable to initiate community screening surveys on well defined populations for early detection of hypertension and TIAs. Primary health care centres should be the base-stations for these surveys because data gathered from urban hospitals will not truly reflect the crude prevalence rates for the community to design practical prevention programmes.

Circ India (1997) Gup: Meta-analysis

Gupta R. **Meta-analysis of prevalence of hypertension in India**. *Indian Heart J*. 1997 Jan-Feb;49(1):43-8.

(Department of Medicine, Monilek Hospital & Research Centre, Jaipur.)

To determine the changing trends in prevalence of hypertension and mean blood pressure (BP) levels in India and to study the urban and rural differences, a meta-analysis of all available epidemiological studies was performed. The first such study was reported by Chopra in 1942. Since then many studies (n = 34) in urban and rural areas of India have been carried out. The earlier studies of Dotto (1949), Dubey (1954) and Sathe (1959) showed hypertension prevalence of 1.24 +/- 0.2, 4.24 +/- 0.4 and 3.03 +/- 0.3 percent in urban populations of Calcutta, Kanpur and Mumbai, respectively. Studies since 1959 used the World Health Organization's guidelines and have shown an increasing trend in the prevalence of hypertension. Studies from Ludhiana (1985) and Jaipur (1995) have shown the prevalence to be 14.08 +/- 1.1 and 10.99 +/- 0.7 percent, respectively. Trend analysis comparable studies among urban areas (n = 10) shows a significant increase in the prevalence of hypertension (Mantel-Haenszel chi 2 = 5.99, p = 0.014). Studies in rural areas (n = 14) also show an increase in prevalence of hypertension although the rise is not as steep as in urban populations (Mantel-Haenszel chi 2 = 2.75, p = 0.097). Changes in mean BP levels were analysed using the data on mean systolic and diastolic BP in urban men aged 40-49 years from 1959 to 1995. There was a significant increase in systolic BP (r = 0.95, p < 0.001) and not in diastolic BP (r = 0.43, p = 0.2). In India, hypertension is emerging as a major health problem and is more in urban than in rural subjects. Comment in: Indian Heart J. 1997 May-Jun;49(3):337-8.

Circ India (1997) Gup:
Gupta R, Agarwal VS, Gupta VP, Soangra MR. **Correlation of smoking, blood pressure levels and hypertension prevalence in urban and rural subjects**. *J Assoc Physicians India*. 1997; 45:919-922.

(no abstract available)

Circ India (1997) Gup: Cross-sectional survey
Gupta R, Prakash H, Gupta VP, Gupta KD. **Prevalence and determinants of coronary heart disease in a rural population of India**. *J Clin Epidemiol* 1997 Feb;50(2):203-9. (Department of Medicine, Monilek Hospital and Research Centre, Jawahar Nagar, Jaipur, India)

Background: The prevalence and determinants of coronary heart disease (CHD) have been inadequately studied in rural areas of developing countries. Methods: Entire communities were surveyed in randomly selected villages in Rajasthan, India. A physician-administered questionnaire, physical examination, and electrocardiogram (ECG) were performed on 3,148 adults > or = 20 years of age (1982 males, 1166 females). Fasting blood samples for determination of lipids were obtained from 202 males and 98 females. Prevalence of coronary risk factors--smoking, hypertension, sedentary life-style, obesity, and hypercholesterolemia--was determined. CHD was diagnosed on basis of past documentation, response to WHO-Rose questionnaire, or changes in ECG. Three methods were used: (a) documentation, history, and ECG criteria, (b) ECG-Q, ST, or T changes, and (c) presence of Q waves. Results: Coronary risk factors: smoking was present in 51% males and 5% females, hypertension (> or = 140/90 mmHg) in 24% males and 17% females, hypercholesterolemia (> 200 mg/dl) in 22%, diabetes history in 0.2%, and irregular physical activity or sedentary habits in 85%. Other risk factors were lack of formal education in 44%, obesity (body-mass index > or = 27 kg/m2) in 6% and truncal obesity (waist-hip ratio > or = 0.95) in 5%. Prevalence of CHD (clinical + ECG criteria) was 3.4% in males and 3.7% in females. According to ECG criteria only, it was 2.8% in males and 3.3% in females and according to Q-waves only, it was 1.6% in males and 0.9% in females. Multivariate logistic regression analysis showed that age and smoking in males and age and systolic blood pressure in females were associated with higher prevalence of Q-wave CHD. In males, higher educational level and prayer habit were associated with lower prevalence. Conclusions: Prevalence of CHD in this rural community is higher than reported in previous Indian studies. Smoking, hypertension, and sedentary lifestyle have high prevalence. Significant determinants of CHD are increasing age and smoking while education and prayer-habit are protective.

Circ India (1997) Sin: Recommendations for guidelines
Singh RB, Rastogi SS, Rao PV, Das S, Madhu SV, Das AK, Sahay BK, Fuse SM, Beegom R, Sainani GS, Shah NA. **Diet and lifestyle guidelines and desirable levels of risk factors for the prevention of diabetes and its vascular complications in Indians: a scientific statement of The International College of Nutrition.** Indian Consensus Group for the Prevention of Diabetes. *J Cardiovasc Risk* 1997 Jun;4(3):201-8.

(Centre of Nutrition, Medical Hospital and Research Centre, Moradabad, India)

Background: There has been a rapid increase in the prevalence of diabetes and cardiovascular disease in India, in association with rapid changes in diet and lifestyle. In adults, the prevalence of diabetes, hypertension and coronary artery disease is two- to threefold greater in the urban population than in rural populations; it is associated with modest insulin resistance in urban groups. Methods: In response to a proposal by the International College of Nutrition that specialist experts should develop consensus recommendations for the prevention of chronic diseases, Indian specialists in diabetes and vascular disease have collaborated to produce guidelines relevant to the population of India. Recommendations: Because Indian urban populations have a modest increase in overweight and low rates of obesity in association with the rapid emergence of diabetes and cardiovascular risk, a body mass index of 21 kg/m2 should be considered safe, with a range of 19-23 kg/m2 acceptable; > 23 kg/m2 should be considered overweight, and > 25 kg/m2 should be taken to indicate obesity. A waist:hip ratio > 0.88 in males and > 0.85 in females should be considered to indicate central obesity, because the prevalence of coronary disease, hypertension and associated disturbances of insulin resistance are more common above these limits. For the prevention of vascular disease, there is general international consensus that the desirable serum concentration of cholesterol should be < 170 mg/dl (> 4.42 mmol/l), which may also be optimal for Indians; values between 170 and 200 mg/dl (4.42-5.2 mmol/l) should be considered borderline. The critical values for low density lipoprotein cholesterol may be < 90 mg/dl (ideal), 90-110 mg/dl (borderline high) and > 110 mg/dl (high) (< 2.32, 2.32-2.84 and > 2.84 mmol/l, respectively). Fasting triglycerides should be < 150 mg/dl (< 1.69 mmol/l) and high-density lipoprotein cholesterol > 35 mg/dl (> 0.9 mmol/l). The limit for the total energy derived from fat intake should be < 21%/day (7% each for saturated, polyunsaturated and mono-unsaturated fatty acids). The carbohydrate intake should provide more than 65% of daily energy, mainly from complex carbohydrates. A daily dietary intake of 400 g fruits, vegetables and legumes, 400 g cereals, in conjunction with 25 g soya bean or mustard or canola oils (rich in n-3 fatty acids) in place of fats rich in saturated fat, may be protective against diabetes and vascular disease. Moderate physical activity with the aim of burning 300 Kcal/day (> 1255 KJ/day), and cessation of tobacco and alcohol consumption, may provide an effective programme for prevention of diabetes and its vascular complications in Indians. The recommendations outlined here should be considered tentative until further data become available from longitudinal studies and intervention trials.

Circ India (1996) Gup: Meta-analysis
Gupta R, Al-Odat NA, Gupta VP. **Hypertension epidemiology in India. Meta-analysis of fifty-year prevalence rates and blood pressure trends**. *J Human Hypertension* 1996; 10:465-472.
(Department of Medicine, Monilek Hospital and Research Centre, Jawahar Nagar, Jaipur, India.)

Recent studies among Indians have shown a high prevalence of hypertension. To determine changing trends in hypertension prevalence, in mean blood pressure (BP)

levels and to study urban and rural differences we performed meta-analysis of all available Indian studies. The first such study was reported by Chopra in 1942. Since then many studies (n = 33) in urban and rural areas of India have been performed. In urban populations earlier studies of Dotto (1949), Dubey (1954) and Sathe (1959) showed prevalence of hypertension of 1.24 +/- 0.2, 4.24 +/- 0.4 and 3.03 +/- 0.3% in populations of Calcutta, Kanpur and Bombay respectively. Studies since 1959 used World Health Organisation (WHO) guidelines and have shown increasing trend in hypertension prevalence. Recent studies from Ludhiana (1985) and Jaipur (1995) show that prevalence is 14.08 +/- 1.1 and 10.99 +/- 0.7% respectively. Trend analysis in studies among urban areas (n = 10) shows a significant increase in hypertension prevalence (Mantel-Haenzel chi 2 = 5.99, P = 0.014). Studies in rural areas (n = 14) also show a significant increase in hypertension prevalence (Mantel-Haenzel chi 2 = 5.93, P = 0.014) although the rise is not as sharp as in urban populations (r value, urban = 0.70, rural = 0.67). Changes in mean BP levels were analysed by using mean systolic (S) and diastolic (D) BP in urban men aged 40-49 years from 1959-1995. For SBP there was a significant increase ($r = 0.95$, $P < 0.001$) and not with DBP ($r = 0.43$, $P > 0.2$). It is concluded that in India hypertension is emerging as a major health problem more so in urban than in rural subjects. The increasing prevalence is related to a rising mean SBP.

Circ India (1996) Pai: Case-control study

Pais P, Pogue J, Gerstein H, Zachariah E, Savitha D, Jayprakash S, Nayak PR, Yusuf S. **Risk factors for acute myocardial infarction in Indians: a case-control study.** *Lancet* 1996 Aug 10;348(9024):358-63.

(Department of Medicine, St John's Medical College, Bangalore, India)

Background: South Asians who have settled overseas and those in urban India have an increased risk of ischaemic heart disease (IHD). Reasons for this increased risk are unclear. Most studies have been based on migrants to western nations, so their findings may not apply to most south Asians, who live in their own countries. Therefore, we assessed the relative importance of risk factors for IHD among South Asians in Bangalore, India. Methods: We conducted a prospective hospital-based case-control study of 200 Indian patients with a first acute myocardial infarction (AMI) and 200 age and sex matched controls. We recorded prevalence of the following risk factors for IHD: diet, smoking, alcohol use, socioeconomic status, waist to hip ratio (WHR), blood glucose, serum insulin, oral glucose tolerance test, and lipid profile. Findings: The most important predictor of AMI was current smoking (odds ratio [OR] 3.6, $p < 0.001$) of cigarettes or beedis (a local form of tobacco), with individuals who currently smoked 10 or more per day having an OR of 6.7 ($p < 0.001$). History of hypertension and of overt diabetes mellitus were also independent risk factors (OR 2.69 [$p = 0.001$] and 2.64 [$p = 0.004$], respectively). Among all individuals, fasting blood glucose was a strong predictor of risk over the entire range, including at values usually regarded as normal (OR adjusted for smoking, hypertension, and WHR 1.62 for 1 SD increase, $p < 0.001$). Abdominal obesity (as measured by WHR) was also a strong independent predictor across the entire range of measures (OR adjusted for smoking, hypertension, and blood glucose 2.24 for 1 SD increase; $p < 0.001$). Compared with individuals with no risk

factors, individuals with multiple risk factors had greatly increased risk of AMI (eg, OR of 10.6 for the group with smoking and elevated glucose). Lipid profile was not associated with AMI. In univariate analyses, higher socioeconomic (income) status (OR 0.32, p = 0.005 highest vs lowest; OR 0.75 middle vs lowest) and vegetarianism (OR = 0.55, p = 0.006), seemed to be protective. The impact of vegetarianism was closely correlated with blood glucose and WHR. Interpretation: Smoking cessation, treatment of hypertension, and reduction in blood glucose and central obesity (perhaps through dietary modification) may be important in preventing IHD in Asian Indians.

Circ India (1997) Sin: Cross-sectional survey
Singh RB, Sharma JP, Rastogi V, Niaz MA, Singh NK. **Prevalence and determinants of hypertension in the Indian social class and heart survey**. *J Hum Hypertens* 1997 Jan;11(1):51-6.
(Heart Research Laboratory, Medical Hospital and Research Centre, Moradabad, India)

To determine the association of socio-economic status (SES) and prevalence of hypertension and its risk factors in a rural population, a cross sectional survey was conducted in two randomly selected villages in the Moradabad district in North India. There were 1935 residents aged over 25 (984 men and 951 women) who were randomly selected and categorised into social classes 1-4 depending upon SES based on occupation, housing conditions, land holding, total per capita income, ownership of consumer durables and education. The prevalence of hypertension diagnosed by JNC V criteria (>140/90 mm Hg) was significantly higher among social class 1 and 2 and showed a positive relationship with SES in both sexes. Among social class 1 and 2 subjects, there was a higher prevalence of overweight, obesity and sedentary lifestyle. Logistic regression analysis with adjustment of age showed that SES had a positive relation with hypertension (odds ratio: men 1.09, 95% CI 1.05-1.14; women 1.08, 95% CI 1.05-1.13), body mass index (odds ratio: men 1.12, 1.08-1.18; women 1.11, 1.06-1.16) and sedentary lifestyle (odds ratio: men 1.45, 1.32-1.58; women 1.38, 1.26-1.49). Only weak but significant associations were observed with smoking, alcohol and salt intake. The association of hypertension with social class was reduced after adjustment of body mass index, sedentary lifestyle, smoking and salt intake (odds ratio: men 0.96, 0.81-1.14; women 0.73, 0.54-1.04). There was an increase in the prevalence of hypertension and age-specific blood pressure (BP) with increasing age in both sexes. The overall prevalence of hypertension by WHO criteria (>160/95) was 4.6% and by JNC V criteria 20.8%, and the rates were comparable in both sexes. Social class 1 and 2 subjects in rural North India have a higher prevalence of hypertension and its risk factors of overweight and sedentary lifestyle.

Circ India (1996) Sin: Cross sectional studies
Singh RB, Niaz MA, Ghosh S, Beegom R, Rastogi V, Sharma JP, Dube GK.
Association of trans fatty acids (vegetable ghee) and clarified butter (Indian ghee) intake with higher risk of coronary artery disease in rural and urban populations with low fat consumption. *Int J Cardiol* 1996 Oct 25;56(3):289-98.

(Heart Research Laboratory, Medical Hospital and Research Centre, Moradabad, India)

These cross-sectional surveys included 1769 rural (894 men and 875 women) and 1806 urban (904 men and 902 women) randomly selected subjects between 25-64 years of age from Moradabad in North India. The total prevalence of coronary artery disease based on clinical history and electrocardiogram was significantly higher in urban compared to rural men (11.0 vs. 3.9%) and women (6.9 vs. 2.6%), respectively. Important differences in food consumption patterns related to coronary artery disease were: higher intake of total visible fat, milk and milk products, meat, eggs, sugar and jaggery in urban compared to rural subjects. Prevalence of coronary artery disease in relation to visible fat intake showed a higher prevalence rate with higher visible fat intake in both sexes and the trend was significant for total prevalence rates for rural and urban men and women. Subgroup analysis among urban (694 men and 694 women) and rural (442 men and 435 women) subjects consuming moderate to high fat diets showed that subjects eating trans fatty acids plus clarified butter or those consuming clarified butter as total visible fat had a significantly higher prevalence of coronary artery disease than those consuming clarified butter as total visible fat plus vegetable oils in both rural (9.8, 7.1 vs. 3.0%) and urban (16.2, 13.5 vs. 11.0%) men as well as in rural (9.2, 4.5 vs. 1.5%) and urban (10.7, 8.8 vs. 6.4%) women. Univariate and multivariate regression analysis with adjustment for age showed that sedentariness in women, body mass index in urban men and women, milk and clarified butter plus trans fatty acids in both rural and urban in both sexes were significantly associated with coronary artery disease. It is possible that lower intake of total visible fat (20 g/day), decreased intake of milk, increased physical activity and cessation of smoking may preventing coronary artery disease in some populations.

Circ India (1996) Tri: Cohort study
Trivedi DH, Sharma V, Pandya H, Arya RK, Mehta R, Bansal RK, Sharma A, Gandhi SP. **Longitudinal epidemiological study of coronary heart disease in a rural population of Kheda district, Gujarat, India.** *Soz Praventivmed* 1996;41(6):373-9.
(Department of Community Medicine, Pramukhswami Medical College & S.K. Hospital, Karamsad/Gujarat)

The study was undertaken to determine the incidence and related risk factors for coronary heart diseases and hypertension in the rural population of Kheda district, Gujarat (India). Observations from the first five years of the project (May 1987-May 1992) are described in this paper. Of an initial sample of 750 individuals in the age group 30-62 years, who were selected by stratified random sampling, 714 persons (males = 429; females = 285) were actually studied, after excluding those suffering from coronary heart diseases (CHD). Initially, all the included subjects were examined clinically and appropriate laboratory investigations were done. A detailed socio-economic history was also obtained. Subsequently all were followed up and biannual clinical and laboratory investigations were performed. Cases of CHD were diagnosed according to the recommendations of the New York Heart Association. The overall five-year incidence of CHD was 25.17 per thousand persons. The incidence in males was 3 times higher than in females. More males suffered from myocardial infarction (MI), while in the females the

incidence of sudden death was higher (33.3%). The average yearly mortality rate due to CHD was 2.46 per thousand persons. CHD was significantly associated with increased blood pressure (both diastolic and systolic), smoking, and family history of heart disease, and was weakly associated with body weight ($p = 0.06$).

Circ India (1995) Beg: Cross-sectional
Begom R, Singh RB. **Prevalence of coronary artery disease and its risk factors in the urban population of South and North India.** *Acta Cardiol* 1995;50(3):227-40.
(Department of Home Science, College for Women, Medical Hospital and Research Centre, Moradabad, India)

There is scant evidence on prevalence of coronary artery disease (CAD) in the urban population of India and it is not clear why South Indians have higher prevalence than North Indians. This study selected 506 subjects between 25-65 years of age from 234 randomly selected households from 2 randomly selected streets, 46 (9.0%) were non-responders and 460 (response rate 91%) volunteered to participate in the study. Dietary intakes, anthropometric and laboratory data, prevalence of risk factors and CAD were obtained and compared with 152 North Indian subjects reported earlier. In comparison with North Indians, the prevalence of CAD was 61.6% higher in South Indians (13.9 vs 8.6%). The prevalence of possible evidence of CAD in South Indians was 139 per 1000 (95% confidence limits 112 to 178). While prevalence of diabetes mellitus, glucose intolerance, hypertension, hypercholesterolemia, hypertriglyceri-demia were comparable between North and South Indians in both sexes, the prevalence of smoking in South Indians males (44.6%) was significantly higher than among North Indians. The prevalence of passive smoking in females (45.3%) was significantly higher in South Indian females which may be the cause of higher CAD among them. While total fat intake in North and South Indians were comparable, the intake of saturated fat and cholesterol were higher and and P/S ratio was lower than North Indians, although these levels of fat intake are considered safe in British who have 26.4% less prevalence of CAD than South Indians. Among smokers, those subjects eating low saturated fat diet had less CAD compared to those smokers eating higher fat diet. It is clear that smoking, saturated fat, cholesterol, hypertension, diabetes, central obesity and glucose intolerance alone can not explain the cause of all of the higher CAD among South Indians. Study of other risk factors such as insulin resistance and antioxidant vitamins may be necessary.

Circ India (1995) Bis: Biophysical and biochemical study of a case series
Biswas PK, Dasbiswas A, Roy S, Roy D, Biswas A, Chatterjee SS, Maity AK. **Risk factors and angiographic profile of coronary artery disease in young**. *J Indian Med Assoc* 1995 Mar;93(3):90-2.
(Department of Cardiology, IPGME & R and SSKM Hospital, Calcutta)

A total of 124 patients of ischaemic heart disease under 40 years of age (96 with myocardial infarction and 28 with angina) were studied for risk factors of coronary artery disease. Electrocardiogram, treadmill test, lipid profile and coronary arteriography were

done in all cases. Smoking (56.4%) and hyperlipidaemia (30.6%) emerged as the major risk factors. Further stratification of lipid profile revealed that predictive value of hypercholesterolaemia could be enhanced by considering the different ratios of lipoproteins and indices of atherogenicity. Coronary arteriography revealed a preponderance of single vessel disease (48.4%)-left anterior descending being most commonly involved (71.8%). Increase in low density lipoprotein fraction was related to multivessel involvement.

Circ India (1995) Gup: Cross-sectional
Gupta R, Prakash H, Majumdar S, Sharma S, Gupta VP. **Prevalence of coronary heart disease and coronary risk factors in an urban population of Rajasthan.** *Indian Heart J* 1995 Jul-Aug;47(4):331-8.
(Department of Medicine, Monilek Hospital and Research Centre, Jaipur, India)

To determine the prevalence of coronary heart disease (CHD) and coronary risk factors in an urban Indian population, we studied a random sample of population of Jaipur. A physician-administered questionnaire, physical examination and a 12-lead electrocardiogram was performed on 2,212 adults of > or = 20 years of age (males 1,415, females 797). CHD was diagnosed on the basis of past documentation, response to WHO-Rose questionnaire or changes in the electrocardiogram. The overall prevalence of CHD was 7.6 percent (168 cases). The prevalence rate was 6.0 percent (84) in males and 10.4 percent (84) in females with an age-related increase in prevalence ('p' for trend < 0.001). When diagnosed on the basis of electrocardiographic changes alone (Q, ST or T wave), the prevalence was 5.2 percent (116), with 3.5 percent in males and 8.4 percent in females. CHD was silent in 57 percent males and 79 percent females. Coronary risk factors were observed in a significant proportion: smoking in 32 percent (males 39 percent, females 19 percent), hypertension (> or = 140/90 mm Hg) in 31 percent (males 30 percent, females 34 percent-JNC-V) and > or = 160/95 mm Hg in 11 percent (males 10 percent, females 12 percent; WHO classification), diabetes in 1 percent and sedentary habits in 71 percent. Additional risk factors were generalised obesity (body-mass index > or = 27 Kg/m2) in 11 percent and truncal obesity (waist-hip ratio > 0.95) in 17 percent males and 13 percent females. Significant association of CHD prevalence were seen with age, sedentary habits and presence of hypertension in both males and females, and in addition with smoking in males.

Circ India (1995) Gup: Cross-sectional
Gupta R, Sharma S, Gupta VP, Gupta KD. **Smoking and alcohol intake in a rural Indian population and correlation with hypertension and coronary heart disease prevalence.** *J Assoc Physicians India* 1995 Apr;43(4):253-8J.
(Dept of Medicine, Monilek Hospital and Research Centre, Jaipur, India)

The study examined 3,148 persons (1982 males and 1166 females) aged more than 20 years in a cluster of three villages. The overall prevalence of smoking was 51% in males (n = 1006) and 5% in females (n = 54). Among male smokers there were 26% light

smokers (< or = 5 bidis/day), 51% moderate smokers (6-20/day) and 17% heavy smokers (> 20 day) and in females there were 54% light smokers, 41% moderate smokers and 5% heavy smokers. Smokers were less educated and had higher prevalence of work-related physical activity and alcohol intake. There was a higher prevalence of hypertension and of ECG Q-waves in male smokers. Regular alcohol intake was seen in 19% males (n = 377) and in 2% females (n = 26). Among males there were 43% light drinkers (< or = 28 gm ethanol/day), 32% moderate drinkers (28-56 gm ethanol/day) and 5% heavy drinkers (> 56 gm ethanol/day). Although this group had a higher prevalence of hypertension there was an insignificant difference in CHD prevalence and a significantly lower prevalence of ECG Q-waves. Subgroup analysis has also been performed taking non-smoker-non-alcohol consuming group as controls. It was found that group which comprised of smokers-non-alcohol consumers had a significantly higher prevalence of hypertension and of ECG Q-waves. Alcohol intake-smoker group had a significantly higher prevalence of hypertension. The habits of smoking and alcohol consumption are widely prevalent among males in this rural community. Smoking and alcohol-intake, both individually and collectively, are related to higher prevalence of hypertension as well as CHD. While the prevalence of hypertension is more among the alcohol consumers, smokers have a higher prevalence of CHD.

Circ India (1995) Var: Recommendations for prevention
Vardan S, Mookherjee S, Vardan S, Sinha AK. **Special features of coronary heart disease in people of the Indian sub-continent.** *Indian Heart J* 1995 Jul-Aug;47(4):399-407.
(V.A. Medical Center, Syracuse, New York, USA)

Contrary to the popular belief, coronary heart disease (CHD) is common in the Indian sub-continent. Expatriate Indians in their newly adopted countries have 3 to 5 times more chance of developing CHD than the native population or the other immigrant groups. The well-known risk factors such as hypercholesterolemia, hypertension and smoking do not appear to play a major role, while the syndrome of insulin resistance seems to be an important risk factor for CHD in people of this sub-continent. Abdominal obesity, hypertriglyceridemia, and low plasma HDL cholesterol are the markers of this syndrome. Increased plasma insulin levels or even better, the C-peptide measurement may help in identifying the abnormality early. As CHD among Indians has been found to be severe and more diffuse with serious complications and increased mortality at a younger age, preventive measures need to be instituted early. Low fat and complex carbohydrate diet along with regular aerobic exercise may help reduce abdominal obesity, improve insulin sensitivity and HDL cholesterol levels. Hypertriglyceridemia uncontrolled by above measures may require pharmacotherapy with agents such as gemfibrozil. Smoking must be stopped to help reduce insulin resistance and improve HDL levels and endothelial function**.** Those with hypertension should be considered for therapy with ACE inhibitors, which may improve insulin sensitivity. In patients with insulin resistance, therapy with metformin or troglitazone may be helpful.

Circ India (1994) Gup: Cross-sectional
Gupta R, Gupta VP, Ahluwalia NS. **Educational status, coronary heart disease, and coronary risk factor prevalence in a rural population of India.** *BMJ* 1994 Nov 19;309(6965):1332-6.
(Department of Medicine, Monilek Hospital and Research Centre, Jaipur, India)

Objective: To define the association between educational level and prevalence of coronary heart disease and coronary risk factors in India. Design: Total community cross sectional survey with a doctor administered questionnaire, physical examination, and electrocardiography. Setting: A cluster of three villages in rural Rajasthan, western India. Subjects: 3148 residents aged over 20 (1982 men, 1166 women) divided into various groups according to years of formal schooling. Results: Illiteracy and low educational levels were associated with less prestigious occupations (agricultural and farm labouring) and inferior housing. There was an inverse correlation of educational level with age (rank correlation: mean -0.45, women -0.49). The prevalence of coronary heart disease (diagnosed by electrocardiography) was significantly higher among uneducated and less educated people and showed an inverse relation with education in both sexes. Among uneducated and less educated people there was a higher prevalence of the coronary risk factors smoking and hypertension. Educational level showed a significant inverse correlation with systolic and diastolic blood pressure. Logistic regression analysis with adjustment for age showed that educational level had an inverse relation with prevalence of electrocardiographically diagnosed coronary heart disease (odds ratio: men 0.82, women 0.53), hypertension (men 0.88, women 0.56), and smoking (men 0.73, women 0.65) but not with hypercholesterolaemia and obesity. The inverse relation of coronary heart disease with educational level abated after adjustment for smoking, physical activity, body mass index, and blood pressure (odds ratio: men 0.98, women 0.78). Conclusion: Uneducated and less educated people in rural India have a higher prevalence of coronary heart disease and of the coronary risk factors smoking and hypertension.
(Comment in: BMJ. 1995 Feb 18;310(6977):466-7.)

Circ India (1994) Wan: Cross-sectional
Wander GS, Khurana SB, Gulati R, Sachar RK, Gupta RK, Khurana S, Anand IS. **Epidemiology of coronary heart disease in a rural Punjab population--prevalence and correlation with various risk factors.** *Indian Heart J* 1994 Nov-Dec;46(6):319-23.
(Department of Medicine, Preventive Medicine and Biochemistry, Dayanand Medical College, Ludhiana, Chandigarh)

An epidemiological study of the prevalence of coronary heart disease (CHD) and the influence of risk factors on the prevalence of CHD in a rural community of Punjab was conducted in Pohir, near Ludhiana. A total of 1100 individuals (623 males and 477 females) out of a possible 1617 individuals (> 30 yrs) living in 3 villages were studied. In each case a detailed history, physical examination and a 12 lead electrocardiogram (ECG) were recorded. Samples for blood sugar and serum cholesterol were taken. By Epstein's criteria of ECG (using the Minnesota coding), the prevalence of CHD was 30.8/1000, being higher in women (37.7/1000) than in men (25.6/1000). By a clinical

judgment method considering history, ECG and treadmill testing (TMT) collectively, prevalence was 31.8/1000, still higher in women (33.5/1000) than in men (30.5/1000). The prevalence of various risk factors like hypertension, smoking, hypercholesterolemia and diabetes was found to be 14.5%, 8.9%, 7.0% and 4.6% respectively. Of the various risk factors tested, hypertension, hypercholesterolemia and a positive family history showed an association with CHD. Only 38% of patients with CHD, 37% of the hypertensives and 52% of the diabetics were aware of its presence. The knowledge in the general population about risk factors causing CHD is poor.

Circ India (1993) Jha: Review
Jha P, Enas E, Yusuf S. **Coronary Artery Disease in Asian Indians: Prevalence and Risk Factors.** *Asian Am Pac Isl J Health* 1993 Autumn;1(2):163-175.
(Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, Ontario, Canada)

Purpose: To describe the prevalence of coronary artery disease (CAD) and review risk factors associated with CAD in Asian Indians. Methods: The authors reviewed numerous British and international studies and the limited number of studies in India and the US. Findings: Asian Indians have one of the highest rates of CAD. Conventional risk factors such as high blood pressure, high serum total cholesterol level, cigarette smoking, high fat diet, and obesity consistently fail to explain fully these high rates. There appears to be a strong role of insulin resistance and abdominal obesity, both of which have a high prevalence in Asian Indians. Various dyslipidemic disorders in Asian Indians such as low levels of HDL cholesterol, elevation of triglyceride, elevation of LDL cholesterol and elevation of lipoprotein (a) may also have a role.

Circ India (1993) Kut: Cross-sectional survey
Kutty VR, Balakrishnan KG, Jayasree AK, Thomas J. **Prevalence of coronary heart disease in the rural population of Thiruvananthapuram district, Kerala, India**. *Int J Cardiol* 1993 Apr;39(1):59-70.
(Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram, India)

To establish the prevalence, with 95% confidence limits, of some of the indicators of coronary heart disease in the rural population of Thiruvananthapuram district, Kerala state, India, we did a field survey on a cluster sample with probability proportionate to size (PPS sample) of 500 households from five villages. Altogether the sample consisted of 1253 individuals who were more than 25 years of age, of which 1130 responded (90%). The survey instruments included the Malayalam translation of the Rose questionnaire, a standard 12-lead electrocardiogram with a battery operated portable electrocardiograph machine, blood pressure measurements using a mercury sphygmomanometer, and routine anthropometric measurements. The prevalence rates estimated were: (a) ECG changes suggestive of coronary heart disease, 36/1000 (95% C.L., 18, 55), (b) Rose questionnaire angina, 48/1000 (95% C.L. 35, 62), (c) definitive

evidence of coronary heart disease, 14/1000 (95% C.L., 7, 21), (d) possible evidence of coronary heart disease, 74/1000 (95% C.L., 55, 93). Prevalence of major risk factors were, (a) hypertension by the WHO criteria, 179/1000 (95% C.L., 137, 221), (b) smoking, 219/1000 (95% C.L., 151, 287), (c) diabetes, 40/1000 (95% C.L., 17, 63), (d) obesity, 55/1000 (95% C.L., 6, 104). We have found that objective criteria indicate a lower prevalence of coronary heart disease in rural Thiruvananthapuram district when compared to studies from urban centres in India, but the prevalence of angina by Rose questionnaire is greater.

Circ India (1992) Cha: Community-based study
Chadha SL, Gopinath N, Ramachandran K. **Epidemiological study of coronary heart disease in Gujaratis in Delhi (India).** *Indian J Med Res* 1992 Apr;96:115-21.
(Sitaram Bhartia Institute of Science & Research, New Delhi)

A community based survey of coronary heart disease (CHD) was carried out in Gujarati families settled in Delhi; 1317 adults aged 25-64 years were surveyed. CHD was diagnosed either on the basis of clinical history supported by documentary evidence of treatment in the hospital or at home or on ECG evidence in accordance with the Minnesota Code. The prevalence rate of CHD on clinical history was 25.1 (28.2 in males and 22.4 in females) per 1000 adults (25-64 yr). The prevalence rates were slightly lower in Gujaratis than the general Delhi urban population. The prevalence rate based on both clinical history and ECG criteria was estimated at 66.8 as compared to 96.8/1000 in general urban Delhi population. The risk factors for CHD such as socio-economic status, family history, obesity, smoking, physical activity and hypertension were studied. The mean and 5th, 50th and 95th percentile values of blood lipids were also estimated in CHD patients and compared with the control group. Hypertension ranked the leading risk factor. Prevalence rate of CHD was higher in the upper socioeconomic group. The positive correlation of higher levels of serum lipids e.g., total cholesterol, low density lipoprotein cholesterol (LDL-C) and triglyceride with CHD was confirmed.

Circ India (1992) Raj: Case series study
Rajadurai J, Arokiasamy J, Pasamanickam K, Shatar A, Mei Lin O.
Coronary artery disease in Asians. *Aust N Z J Med* 1992 Aug;22(4):345-8.
(Department of Medicine, University Hospital, Kuala Lumpur, Malaysia)

Available studies suggest a racial preponderance of coronary artery disease (CAD) among Indians compared to other ethnic groups. We found that this racial difference exists even in a young Asian population with premature atherosclerosis. In this small series, these racial differences could not be explained by the commonly known risk factors for coronary artery disease--smoking, hypertension, diabetes and hypercholesterolaemia, similar to findings for older patients elsewhere. Only fasting triglyceride levels were significantly higher among young Indians compared to non Indians (p less than 0.02) although the importance of this finding as a risk factor for CAD

remains controversial. The majority of these young patients were treated medically and their one year survival was good.

Circ India (1991) Ana: Case series study
Anand MP, Bakhle DS, Ajay S. **Smoking and hypertension: Indian scenario.**
J Assoc Physicians India 1990 Apr;38(4):283-4
Comment in:*J Assoc Physicians India* 1991 Apr;39(4):360-1.
(Dept. of Clinical Pharmacology & Clinical Research Glaxo India Limited, Worli, Bombay)

In a large multicentre study of 918 hypertensive patients, 28% of subjects were found to be smokers. Smokers had a higher average weight and associated diseases like coronary artery disease and diabetes. It is suggested that higher incidence of coronary artery disease and diabetes in the hypertensive smokers carries a higher risk of further cardiovascular events.

Circ India (1991) Kri: Biophysical and clinical study of a patient series
Krishnaswami S, Richard J, Prasad NK, Alexander T, Thomas CS. **Association between cigarette smoking and coronary arterial disease in patients in India: how quantitative is it? An assessment by selective coronary arteriography.** *Int J Cardiol* 1991 Jun;31(3):305-11.
(Department of Cardiology, Christian Medical College Hospital, Vellore, India)

To study the association between smoking and coronary arterial disease, and to identify any quantitative relationship, the study looked at a cross sectional analysis of 1,105 consecutive male patients investigated by selective coronary arteriography to confirm or exclude coronary arterial disease. Pattern and distribution of disease were evaluated in 3 groups of patients who never smoked; who smoked less than 5 cigarettes per day; and who smoked 6 to 60 or more cigarettes per day. Suitable statistical tests, including adjusting for confounders, were carried out. The prevalence of disease was higher amongst smokers even after adjustment for confounders. The number of cigarettes smoked, and whether the smokers had quit, made no difference to the angiographic appearance or extent of disease. There was no difference in the distribution and severity of disease amongst smokers and non-smokers. Rate ratio of disease amongst smokers in India was higher in those patients between 26 and 45 years of age than in other age groups. Smoking could be identified as a risk marker/risk factor that accelerated the disease process in those prone to develop the disease. It may be advantageous to initiate public health and preventive measures directed specifically at the group aged between 26 to 45 years, and later to address all others who smoke.

Circ (1990) See: Descriptive report
Seedat YK. **Hypertension and vascular disease in India and migrant Indian populations in the world**. *J Hum Hypertens* 1990 Aug;4(4):421-4.

(Department of Medicine, University of Natal, Medical School, Durban, Republic of South Africa)

The association of hypertension, diabetes mellitus and abnormal lipoprotein patterns suggests that this combination has a lethal effect with regard to vascular disease. It is therefore necessary to do something about the known lifestyle factors such as cigarette smoking, obesity and possibly a low fibre diet. The high incidence of ischaemic heart disease among emigrant Indians in South Africa and Trinidad, and the low incidence in blacks of South Africa and the West Indies, suggests that there may be different thresholds for susceptibility to disease in various ethnic groups, beyond which the risk factors begin to operate.

Circ India (1989) Gup: Descriptive report
Gupta SP. **Smoking and Cardiovascular Disease (With special reference to Cigarette vs Bidi Smoking)** In: Sanghvi LD and Perin Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 16-21.

Cigarette smoking has come to be universally recognized as a formidable factor in the morbidity and mortality of coronary heart disease (CHD). The few epidemiological studies available from India reveal that both its prevalence and incidence may not be too different from that in Western countries, at any rate, in large cities. The pattern of smoking in India is quite different from that prevalent in the West, but precise data is meagre on the type and extent of smoking in different age-groups, in men and women and in various communities, urban and rural. Further, only preliminary information is available regarding differences in biological effects of cigarette and bidi tobacco. Our studies so far indicate that cigarette and bidi smoke have similar effect on platelet aggregation and blood sugar. Alterations of a somewhat lesser magnitude have been observed in both free fatty acid and left ventricular performance following smoking of bidis as compared to cigarettes. Obviously there are wide gaps in our knowledge, and more work is needed to resolve the various issues in the association of indigenous tobacco habits and CHD.

Circ India (1989) Not: Cohort study
Notani PN. **Studies on Coronary Heart Disease in Relation to Smoking.**
In: Sanghvi LD and Perin Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 22-29.

Cigarette smoking as a major risk factor for coronary heart disease (CHD) has been well documented in several studies undertaken in the western countries. In India, the predominant form of smoking is bidis. Bidi smoke has been demonstrated to deliver higher levels of tar, nicotine and carbon monoxide than western cigarettes. In view of these observations, it becomes very pertinent to study the health hazards from bidi

smoking. A cohort study undertaken in two socioeconomic groups showed that bidi smokers belonging to the blue collar group carried more than 3-fold risk of developing CHD and in particular myocardial infarct, as compared to the group without any tobacco habit. Similar, but slightly lower, risks for cigarette smokers were observed in this group. Besides the epidemiological observations, there is also experimental evidence, reported in the literature, to show that bidi smoke has equally deleterious effects as cigarette smoke on some of the parameters (pulse rate, blood pressure, platelet aggregation time and serum free-fatty acid levels) known to be related to the pathogenesis of this disease. In addition to smoking, hypertension and elevated serum cholesterol levels are established risk factors. But, in view of the reported low cholesterol levels in the Indian population, smoking assumes the status of being the most important modifiable risk factor, which if eliminated from the population can result in prevention of almost 30% - 50% of the new cases of coronary heart disease from occurring (in males in the age group 40 to 59 years).

Circ India (1989) Pah: Case series
Pahlajani DB, Chawla MH, Kapashi KA. **Coronary artery disease pattern in the young**. *J Assoc Physicians India* 1989 May; 37(5):312-4.

Ninety-two patients aged 40 years or less with documented coronary artery disease were studied with special emphasis on risk factors, coronary angiographic patterns and left ventricular function. Tobacco consumption was the most common risk factor (54%) followed by family history of coronary artery disease (40%). Hyperlipidaemia was not a frequent risk factor. Significant single vessel disease was present in 29% of patients. The incidence of double vessel and triple vessel disease was much higher. The left anterior descending artery was the most commonly involved vessel followed by right and circumflex coronary arteries. Left ventricular function as determined by ejection fraction was abnormal in 51% of patients; left ventricular end diastolic pressure was abnormal in 28% of patients. Sixty-eight percent of patients with no risk factors had either zero vessel or single vessel disease indicating a positive relationship between occurrence of risk factors and significant coronary artery disease in the young.

Circ India (1986) Kau: Case series with biophysical study
Kaul U, Dogra B, Manchanda SC, Wasir HS, Rajani M, Bhatia ML. **Myocardial infarction in young Indian patients: risk factors and coronary arteriographic profile.** *Am Heart J* 1986 Jul;112(1):71-5.

One hundred four patients (101 men, three women), under 40 years of age, with myocardial infarction (MI), underwent coronary arteriography. Eighty patients had significant obstructive coronary artery disease (CAD) (group 1), 23 had normal coronary arteries (group 2), and one patient had coronary ostial stenosis as a result of nonspecific aortoarteritis (group 3). Coronary risk factors in group 1 included smoking (76.2%), hypercholesterolemia (36.3%), hypertension (32.5%), positive family history (28.7%), and diabetes mellitus (5%). Multiple risk factors were frequent (56.2%). Smoking was common (p less than 0.01) and diabetes mellitus less frequent (p less than 0.05) as

compared to older (greater than 40 years) patients with MI and arteriographically proved CAD. The frequency of one-, two-, and three-vessel disease was 33.7%, 26.2%, and 40%, respectively, in group 1. Group 2 patients were almost devoid of coronary risk factors. The only group 3 patients had left coronary ostial stenosis with no risk factors. Similar to their counterparts in developed countries, young Indian patients with MI and obstructive CAD have a high frequency of coronary risk factors, especially smoking and severe multiple-vessel disease. Since normal coronary arteriograms are also frequent in this setting, a detailed evaluation is recommended for purposes of prognosis and management.

4.3.2 Haematology

This section covers research on the changes in blood due to tobacco use. As explained in the following eight reports, smoking introduces carbon monoxide into the body, which binds to the haemoglobin in red blood cells, reducing their capacity to carry the carbon dioxide normally produced in the body for elimination through the lungs. One study found that harmful fats (cholesterols) in the blood are increased by smoking and by smokeless tobacco use. Carbon monoxide and cholesterol in the blood due to tobacco use both increase the risk of heart attack.

Haem / Circ India (2000) Khu: Comparative study
Khurana M, Sharma D, Khandelwal PD. **Lipid profile in smokers and tobacco chewers--a comparative study.** *J Assoc Physicians India* 2000 Sep;48(9):895-7.
(Department of Medicine, SMS Medical College and Hospital, Jaipur)

Objective: The present study was undertaken to evaluate lipid profile in cigarette smokers and tobacco chewers and to see whether tobacco chewing causes the same degree of alteration in lipid profile as smoking. Methods: Serum lipid profile was studied in 30 smokers (Group A), 30 tobacco chewers (Group B) and 30 controls i.e., non-smokers and non-tobacco chewers (Group C). Results: High density lipoprotein-cholesterol was lower both in smokers ($P < 0.01$) and tobacco chewers ($P < 0.001$) than in controls. Both smokers and tobacco chewers had higher values of total cholesterol, low density lipoprotein cholesterol, very low density lipoprotein-cholesterol and, triglycerides as compared to the non-smoker, non-tobacco chewer group whereas the differences in levels of lipids in smokers and tobacco chewers were not statistically significant. Conclusion: Smoking and tobacco chewing have an equal and comparable adverse effects on lipid profile and therefore raise cardiovascular risk in same proportion.

Haem India (1997) Sre: Case-control study
Sreerama KK, Venkatramana P, Chengal PR. **Beedi smoking and hematological variation.** *Arch Environ Health* 1997 Mar-Apr;52(2):150.
(Department of Physical Anthropology, Sri Venkateswara University, Tirupati, India)

In this study in Andhra Pradesh, the effects of bidi smoking on hemoglobin (HB), hematocrit (HCT), Carboxyhemoglobin (CoHb) and erythrocyte count (RBC) were determined in 126 males, 20-50 years of age, and compared with 149 control males of the same age range with normal blood values. Values for bidi smokers were higher by 8.3%, 5.8%, 239% and 4.9% respectively. A clear dose response effect existed for bidi smoking; Hb, HCT and RBC values behaved linearly in regression models. The carbon monoxide in the tobacco smoke forms CoHB – which decreases the oxygen carrying capacity of Hb, increases oxygen–hemoglobin affinity, and facilitates tissue hypoxia – this results in erythropoieses and increased cardiac output. Bidi smoking also increases myocardial oxygen demand and hypoxia impairs myocardial performance when arteriosclerosis restricts the coronary flow, carbon monoxide induced may be critical.

Haem India (1994) Beh: Comparative study
Behera D, Dash S, Sen S. **Neutrophil count and myeloperoxidase activity in Indian bidi smokers.** *Respiration* 1994;61(5):269-73.
(Department of Pulmonary Medicine, Post-Graduate Institute of Medical Education & Research, Chandigarh, India)

Myeloperoxidase (MPO) level and MPO scoring were estimated in Indian bidi smokers and compared with those in cigarette smokers and non-smokers. The values were higher in the neutrophils of 20 bidi smokers compared to 20 age-matched non-smokers ($p < 0.001$). However, they were similar to those in 20 cigarette smokers. No correlation of MPO activity was observed with blood carboxyhaemoglobin levels and smoking indices except in bidi smokers. Total leucocyte count and total neutrophil counts were also higher in bidi and cigarette smokers. This increased MPO activity in the neutrophils of bidi and cigarette smokers may contribute to the greater risk of obstructive pulmonary disease.

Haem India (1991) Beh: Comparative study
Behera D, Dash S, Dinakar M. **Blood carboxyhaemoglobin levels in Indian bidi and cigarette smokers.** *Respiration* 1991;58(1):26-8.
(Department of Pulmonary Medicine and Haematology, Postgraduate Institute of Medical Education and Research, Chandigarh, India)

Blood carboxyhaemoglobin (COHb) was estimated by double wave-length spectrophotometry in 58 healthy non-smokers, 27 bidi smokers, 25 cigarette smokers, 25 mixed smokers (all asymptomatic) and 20 symptomatic cigarette smokers. The blood COHb levels were significantly higher among all smoking groups compared to the normal healthy controls (p less than 0.001). Among the various smoking groups, the symptomatic cigarette smokers had marginally higher COHb levels compared to the other groups. There was no correlation between the smoking indices and COHb levels and COHb and the packed cell volume of red cells.

Haem India (1991) Beh: Comparative study
Behera D, Dash S, Dinakar M. **Correlation of smoking behaviour and blood carboxyhaemoglobin in bidi and cigarette smokers.** *Indian J Chest Dis Allied Sci* 1991 Jan-Mar;33(1):43-6.
(Department of Pulmonary Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh)

Effects of different variables of smoking (amount, number of puffs, depth of inhalation, length and timing of sampling) on blood carboxyhaemoglobin (COHb) levels were studied. There were 27 bidi smokers, 25 cigarette smokers, 25 mixed smokers (all asymptomatic) and 20 symptomatic cigarette smokers. Fifty-eight healthy non-smokers served as controls. The mean COHb levels in all the smokers were nearly 5-7 times higher than in non-smokers. The blood COHb levels correlated well with the self assessed degree of inhalation by the individual smokers in each of the groups. There was no significant correlation between the COHb levels and number smoked on the test day, number of puffs per cigarette or bidi, and the length of smoking material. There was a good inverse correlation between the time interval and COHb level. The smoking index (amount smoked) did not bear any relationship with blood COHb levels.

Haem India (1991) Din: Comparative study
Dinakar M, Behera D, Dash S. **Blood carboxyhaemoglobin levels in smokers of Indian cigarettes with and without filters.** *J Assoc Physicians India* 1991 Jun;39(6):456-7.
(Department of Pulmonary Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh.)

Blood carboxyhaemoglobin levels showed no significant difference between smokers of Indian cigarettes with and without filters (14.66 +/- 1.85 vs 16.07 +/- 1.92%; p greater than 0.05), although the value was slightly lower in the former. This may be because filters do not provide protection against absorption of carbon monoxide in the smoke. Further study with large numbers is required.

Haem India (1989) Ras: Comparative study
Rastogi R, Shrivastava SSL, Mehotra TN, Singh VS, Gupta MK. **Lipid profile in smokers.** *JAPI* 1989, 37, 12, 754-756.

The lipid profile of 152 healthy male smokers and 51 healthy male nonsmokers of middle socioeconomic class aged 20-60 years was studied. It was observed that all the lipids except HDL cholesterol were higher in heavy smokers (N=50, subjects smoking > 20 cigarettes or bidis per day) and those who had smoked for a longer duration. HDL cholesterol was lower in smokers than nonsmokers. The changes in lipid profile were similar in cigarette and bidi smokers.

Haem India (1985) Gup: Comparative study
Gupta SG, Gupta MS, Moga RL, Saini AS. **Carboxy-haemoglobin levels following cigarette and bidi tobacco smoking — a comparative study.** *J Assoc Physicians India*, 1985 Jun;33(6):404-6.

The effect of smoking cigarette and bidi tobacco on the carboxy-haemoglobin (COHb) level was studied in 20 adult males, 10 with old myocardial infarction and 10 normal subjects. The quantity of tobacco (1 g) in both bidis (Bidi no. 6) and cigarettes was the same. The peak values of COHb obtained after 15 minutes of smoking were significantly higher compared to basal levels in all the cases in both groups. Further, it was observed that the peak COHb was significantly higher ($p<0.001$) following bidi smoking compared to cigarette smoking in both normal and coronary patients. At 45 minutes after bidi or cigarette smoking, comparatively higher levels of COHb were present in patients of myocardial infarction compared to normal subjects.

4.4 Immune system

Considerable existing evidence suggests that the immune response plays a role in regulating the development and growth of oral precancers and immune depression is recognised as a consistent metabolic defect in oral cancer patients. The fact that tobacco use is the major cause of oral cancer in India suggests that tobacco has an adverse effect on the immune system. The following reports present current knowledge of the immune status of patients with oral precancers and cancers and discuss how monitoring of their status can help in managing their treatment.

Im India (1996) Bal: Descriptive report
Balaram P, Meenattoor G. **Immunology of oral cancer--a review**. *Singapore Dent J* 1996 Jul;21(1):36-41.
(Regional Cancer Centre, Thiruvananthapuram, Kerala, India)

Cancer of the oral cavity forms the major cancer in India constituting about 20% of all cancers. In spite of the advances made in diagnostic and therapeutic modalities, the morbidity and mortality due to this disease remains high. The overall five year survival rate is only 34%. The reason for this is mainly lack of markers for early detection, prognosis and identification of the high risk group. Immune depression is recognised as a consistent metabolic defect in oral cancer patients and our study shows that this precedes the development of the malignancy. The cancer probably enhances the depression. Monitoring of the immunoregulatory status has shown to correlate well with the prognosis of the patient in our study. Hence the monitoring of the various immune parameters would probably be a reliable marker to identify a high risk group in precancerous lesions, a prognostic indicator in oral cancer patients and an intermediate marker in intervention studies.

Im India (1993) Pil: Descriptive report
Pillai MR, Nair MK, Kannan S, Chandran GJ, Balaram P. **Immuno-pathological and immunological features of oral precancers.** *Singapore Dent J* 1993 Jun;18(1):28-38. (Regional Cancer Centre, Trivandrum, Kerala State, India)

Cancer of the oral cavity and oropharyngeal regions constitute about 30% of all cancers seen in India, with Trivandrum District in southern India having one of the highest incidence. Despite easy accessibility for examination and diagnosis, these tumours still cause high mortality, emphasizing the need for better methods of diagnosis and more importantly prognosis. Most oral carcinomas initially present as premalignant lesions and hence understanding their biology and behaviour is vital to the management and control of the disease. This review presents some of the clinico-pathological, immuno-pathological and immunological aspects of oral precancers.

Im India (1991) Pil: Descriptive report
Pillai R, Balaram P, Reddiar KS. **Immunological abnormalities in oral precancers.** *Cancer Lett* 1991 Apr;57(1):1-6.
(Dept. of Family and Community Medicine, University of Arizona Health Sciences Center, Tucson 85724)

Cancer of the oral cavity constitute approximately 30% of all malignancies in India today. Many oral cancers first present as a precancerous lesion and hence it is important to understand the biological factors associated with such lesions. The immune system and its functioning is a significant element in the development of cancer. Considerable evidence exists suggesting that the immune response plays a role in regulating the development and growth of oral precancers. This paper reviews the various immunological abnormalities associated with oral precancers including cell surface changes, alterations in cell mediated immune reactions and humoral immune abnormalities.

4.5 Endocrine system and metabolism

4.5.1 Thyroid

One report was found describing the adverse impact of tobacco smoke on thyroid hormones. Studies to determine whether tobacco use (in any form) poses a risk for other abnormalities in the endocrine system would help to expand current knowledge on the mechanisms through which tobacco adds to the disease burden in India.

Thy India (1995) Beh: Comparative study
Behera D, Dash RJ, Suman A. **Alterations in circulating thyroid hormones in Indian smokers (bidi and cigarette).** *J Assoc Physicians India* 1995 Feb;43(2):96-7.

(Department of Pulmonary Medicine and Endocrinology, Postgraduate Institute of Medical Education and Research, Chandigarh)

T4, T3 and TSH were estimated in 56 bidi and 50 cigarette smokers and their mean estimates were compared with the corresponding values in 25 healthy non-smokers. T4, T3 and their ratios were significantly lower in both bidi and cigarette smokers ($p < 0.001$). Circulating TSH in both groups of smokers was similar to that in nonsmokers. T4 and T4/T3 were lower in bidi smokers compared to those in cigarette smokers ($p < 0.05$ and < 0.01, respectively). Severity of smoking affected T4/T3, and TSH in bidi smokers and T4 in cigarette smokers. Normal TSH excluded any significant decrease in thyroid function in smokers. The alterations in circulating T4 and T3 might have been influenced by thyroid hormone production, protein binding as well as peripheral metabolism of T4 by adverse constituents of bidi/cigarette smoke.

4.5.2 Diabetes

Tobacco use is one of the factors associated with greater prevalence of diabetes, and cessation reduces the risk of morbidity and mortality.

Dia India (2002) Sah: Descriptive report
Sahay BK, Sahay RK. **Lifestyle modification in management of diabetes mellitus.** *J Indian Med Assoc.* 2002 Mar; 100(3):178-80.
(Department of Medicine, Osmania Medical College, Hyderabad.)

India has the largest diabetic population in the world. Changes in eating habits, increasing weight and decreased physical activity are major factors leading to increased incidence of type 2 diabetes. Obesity is the most important modifiable risk factor. Smoking is an independent risk factor for type 2 diabetes mellitus. Diet and exercise are primary therapeutic options for its management. Dietary management should aim to achieve glycaemic control and to normalise dyslipidaemia. Smoking cessation reduces the risk of morbidity and mortality in CAD. Exercise improves the condition of a diabetic patient, including yoga practices, which have a role to play in the prevention of type 2 diabetes.

Dia India (1999) Jos: Cross-sectional study
Raman Kutty V, Joseph A, Soman CR. **High prevalence of type 2 diabetes in an urban settlement in Kerala, India.** *Ethn Health.* 1999 Nov; 4(4):231-9.
(Health Action by People, Trivandrum.)

Background: Prevalence of type 2 or non insulin dependent diabetes mellitus is high among Indians in India and abroad. The Indian state of Kerala has a high level of achievement in the health sector, characterised by both lower mortality rates and greater density of health care institutions that ensure access to most people. These attributes make the prevalence of diabetes and the pattern of its management in Kerala worth studying. Objective: To estimate the prevalence of diabetes among persons 20 years or

older in an urban housing settlement in Trivandrum city, the capital of Kerala, as well as study the management of the disease in subjects affected. Design: Cross sectional survey for detecting diabetes and other chronic diseases in all willing residents of an urban housing settlement in Trivandrum, as part of a preventive campaign against lifestyle diseases. Fasting plasma glucose, serum triglycerides, cholesterol, height, weight and blood pressure were measured, and a detailed questionnaire administered to ascertain previous diabetic status and management. Results: Overall prevalence of type 2 diabetes is 16.3%. In the 30-64 age group, age standardised prevalence is 13.7%. Gender differences in prevalence are negligible. Greater prevalence is associated with advancing age, body mass index above 24.99, sedentary habits, serum total cholesterol > 239, serum triglycerides > 149, hypertension and smoking. Compared to non-diabetics, diabetics have greater mean and range of fasting plasma glucose values (8.87 +/- 3.6 mM/l as against 4.34 +/- 0.53 mM/l). 32 out of 38 diabetics among the subjects (82.4%) were already diagnosed even before the survey; of them, 89% were on medication. 3% of subjects had impaired fasting glucose, or FPG level between 110-125 mg/dl. Conclusion: Prevalence of type 2 diabetes among a group of urban residents in Trivandrum, Kerala is very high. This is associated also with a high detection rate and compliance to treatment.

4.6 Nervous system and behavioral problems

This section deals with research on the influence of tobacco on the nervous system and behaviour as well as with tobacco use as a behaviour that is reinforced by addiction.

4.6.1 Psychology, including addiction

Several abstracts on articles about purely psychological aspects of tobacco use are presented here. Also see the sections on Tobacco use surveys for abstracts on some studies reporting some psychological aspects of tobacco use.

Psy India (2002) Sri: Case series
Srinivasan TN, Thara R. **Smoking in schizophrenia -- all is not biological.** *Schizophr Res.* 2002 Jul 1;56(1-2):67-74.
(Sundaram Medical Foundation, 4th Avenue, Shanthi Colony, Anna Nagar West, Chennai 600 040, India. tnsn@md3.vsnl.net.in)

High rate of tobacco smoking reported in schizophrenia has been related to the effect of nicotine on the neurobiology of schizophrenia. Nicotine is said to alleviate psychotic symptoms in some patients. The relationship between smoking and psychiatric status may not be simply a biological one as several sociocultural and economic factors could influence smoking behaviour. In this study in India on 286 urban male outpatients with schizophrenia, 38% were found to be current smokers. This was significantly more than in other psychiatric patients studied (major affective disorders and non-psychotic disorders) but not higher than in medically ill controls and not higher than the rates for the general male population in India. Smokeless use of tobacco was infrequent in the

study population. More than half of the patients did not experience any positive effects due to smoking. Lack of economic independence and restrictions imposed by the family appeared to be crucial factors that controlled the prevalence of smoking among schizophrenia patients. As smoking is a leading cause of preventable morbidity and mortality, there is a serious need to review the neurobiological issue of smoking in schizophrenia considering the influence culture and social practices could have upon the behaviour.

Psy India (2000) Sen: Cross-sectional survey
Sen U, Basu A. **Factors Influencing Smoking Behavior Among Adolescents.** *Asian Pac J Cancer Prev.* 2000;1(4):305-309.
(Department of Epidemiology and Biostatistics, Chittaranjan National Cancer, Calcutta 700026, India urmisen@hotmail.com)

Objective: To study the impact of tobacco advertisements and other social factors on the smoking habits of adolescents in Calcutta, India. Design: Cross sectional, school based survey of students in the IXth and XIth grades. The responses were analyzed by binary logistic regression. Participants: High School students in Calcutta aged 14 to 18 years. Main Outcome Measure: Smoking Status as defined by ever smokers of tobacco products. Results: 1973 students were interviewed (males-73.79% and females-26.21%). Increased tobacco use was associated with older age-groups, male gender, government-run schools, having parents or peers who were smokers, and if the respondent was also a chewer. The likelihood of a respondent being a smoker was 8.5 times greater (95% CI: 5.05-14.43) if he or she had a smoker friend, and about 4.5 times (95% CI: 2.7-7.4) if he or she had a smoker sibling. In the multivariate model, the parents' smoking status did not have a statistically significant association with respondent's smoking status. Television advertisements of tobacco products had no statistically significant association with respondents' smoking status. Conclusions: The finding of tobacco advertisements not having a significant association with smoking habits among adolescents could be due to the fact that, at the time of this survey, tobacco advertisements were not frequent in the prime channels due to Government regulations. Peer influence had the strongest association with adolescent smoking. It is therefore suggested that the peer influence factor should be considered for anti-tobacco regulatory activities that target adolescent smoking in India.

Psy India (1999) Vai: Behavioural study
Vaidya SG, Vaidya JS, Naik UD. **Sports sponsorship by cigarette companies influences the adolescent children's mind and helps initiate smoking: results of a national study in India.** *J Indian Med Assoc* 1999 Sep;97(9):354-6, 359.
(National Organisation for Tobacco Eradication (NOTE), India)

To estimate the effect of large scale tobacco sponsorship of cricket, a study was conducted on children's knowledge and perceptions about smoking and their impact on subsequent smoking uptake. Twelve nations played 36 matched in the Wills World Cup-

1996 cricket series over one month during which Wills (a cigarette brand) was extensively advertised by live broadcast to a 2-billion viewers with WILLS logo on the players' T-shirts and playground, newspapers, magazines, and hoardings. An anonymous structured questionnaire including 4 knowledge based questions about tobacco, 4 about perceptions directly promoted by Wills and 10 questions related to wrong perceptions about smoking was administered by class teachers six months after the series. A total of 5822 children (65% boys and 35% girls) in Grade 10, aged 13-17 years (median 14) were selected. Smokers increased from 137 (2.4%) before the series to 649 (11.1%) after the series. The smoking initiation rate was 2.04% (13/636) in children with full knowledge and no wrong perceptions, 7.8% (48/618) among those with less knowledge and no wrong perceptions. Among those with less knowledge but believing in at least 2 of Wills related perceptions and 3 of the smoking related perceptions the rate for smoking initiation was 20.55% (127/618). The sponsorship appeared to have a similar effect on initiation rates in both sexes despite the strong social taboo against girls smoking in India. Wrong perceptions about smoking promoted by tobacco sponsorship increases smoking initiation amongst both boys and girls even when they are aware of the risks involved. The study suggests that education, without bans on advertisements is unlikely to stop initiation of smoking among children.

Psy India (1998) Bha: Descriptive report
Bhatt RV. **Domestic violence and substance abuse.** *Int J Gynaecol Obstet* 1998 Dec; 63 Suppl 1:S25-31.
(Department of Obstetrics and Gynecology, B.D. Amin Hospital, Baroda, India)

Women and children are victims of family violence in most societies and cultures. Use of tobacco, alcohol and narcotic drugs aggravate the violence. The incidence of domestic violence is significantly higher in substance abusers than others. It is also present in countries where the status of women is high. Education level and economic status do not fully protect against domestic violence. Therefore we must look at other factors which perpetuate domestic violence. It is time for governments, societies and thinking people to give serious thought on how to reduce domestic violence and bring sanity into the community. Tobacco, alcohol and narcotic drugs are part of the 'road of destruction' and fragmentation of social fabric. The conscience of the world needs to be roused to prevent the march of substance abuse. In the words of the Nobel laureate poet Tagore, 'into that heaven of freedom my father, let my country awake'.

Psy Indi (1996) Vai: Behavioural study
Vaidya SG, Naik UD, Vaidya JS. **Effect of sports sponsorship by tobacco companies on children's experimentation with tobacco.** *BMJ* 1996 Aug 17;313(7054):400.
(Goa Cancer Society, Lake View Colony, Miramar, Panaji, India)

A study on the effect of sports sponsorship on the experimentation of children with tobacco was carried out in urban Goa after the India-New Zealand cricket series, which was televised live during October-November 1995. The logo of the Wills tobacco

company (a subsidiary of British America Tobacco Company) was displayed prominently on the outfits of the players. Four Square cigarettes and Manikchand Gutkha were also advertised. In Goa, almost 100% of the population has access to television. In January, a random sample of one class of year IX from all 53 high schools in urban Goa was taken. All the students responded. In this sample there were 1013 boys and 935 girls, all with median age of 14 years. As many as 76% of the students knew that tobacco was highly addictive, caused cancer and heart disease and that smoking reduced life span. Despite this knowledge, watching matches sponsored by Wills significantly increased the likelyhood of children buying and using Wills cigarettes (P=0.01). The perception that smoking improves performance in sports was the most significant factor influencing experimentation, followed by the perception that players smoked, watching the series and not knowing that smoking reduces life span. Thus, knowledge about the adverse effects of smoking was overshadowed by false perceptions created by tobacco sponsorship. (Comment in BMJ 1996 Aug 17;313(7054):375.)

Psy India (1995) Kan: Descriptive report
Kannan AT. **Adolescent health: issues and concerns in India.** *Health Millions.* 1995 May-Jun;21(3):29-30.

Adolescence is a sensitive and important phase in an individual's life during which a multidisciplinary approach must be taken to both understanding and solving his/her problems. An estimated 25% of India's population of 138 million is aged 15-25 years. Girls aged 10-19 years comprise about 22% of the female population. A wide range of issues and concerns face adolescents in India, including nutritional deficiencies, reproductive health problems, sexually transmitted diseases, and mental and physical stress-related problems. Stress often results in the abuse of tobacco and other habit-forming drugs. The author discusses nutrition, reproductive health, pregnancy, sexuality, and mental and social concerns as they are related to adolescents.

Psy / Int India (1987) Agh: Descriptive report
Aghi MB. **Psychological aspects of acquisition and cessation of tobacco habits in India.** *World Smoking and health*, 1987,12(2).
(Tata Institute of Fundamental Research)

This report describes tobacco consumption dynamics in urban and rural areas. Smoking is mostly a habit found in males. Cigarettes are a symbol of modernity and a luxury of the wealthy. Traditional values in the middle classes and inability to afford cigarettes are disincentives to smoking, but some youth use tobacco. The major problem of tobacco addiction is among poorer people, where youth are influenced by peer pressure, adult examples, advertisements and the media. In rural areas, many villagers believe tobacco has medicinal and magical properties. Bidi smoking is a common pastime to relieve boredom and promotes group feeling during leisure. In urban and rural areas, youths emulate the smoking habits of movie stars. This information could be used to design campaigns to warn people not to start using tobacco, and to design programmes to help

people quit. A realistic approach to breaking the tobacco habit involves eliminating the old response. A therapist in the primary health structure should help tobacco users develop a tobacco free life, remembering that:

- Patients are not to be looked down on because of their bad habit, the habit must be regarded as a health problem, not a moral one.
- Medication should be administered to relieve discomfort or pain from minor tobacco-related complaints.
- Tools of understanding, encouragement and support should be used.
- Planned activities should involve users completely.

An educational intervention programme to reduce oral cancer was conducted in 3 rural areas. The link between tobacco use and oral cancer was explained. Benefits and ways of giving up tobacco were discussed. A dual approach of personal communication (in a group situation, annually) and mass media (films, radiobroadcasts and newspaper articles) was used. Examination was performed by dentists and counselling was given by trained social scientists. As an incentive and aid to intervention, medicines for common ailments were distributed to participants. Dental extraction was performed in field clinics. The intervention message was reinforced at the clinic visit. The intervention programme was evaluated through feedback, and restructured every year before renewed follow-up. The village cessation camps were very promising: 70 to 80% (18 out of 23) of participants were able to give up tobacco. The first few days were the most crucial - if they could stay away from tobacco at that time they could really do without it.

4.6.2 Neurological diseases

The following report shows that chewing betel nut with tobacco was a significant predictor for Meige's syndrome, a neurodegenerative disease.

Neuro India (2000) Beh: Case-control study
Behari M, Sharma AK, Changkakoti S, Sharma N, Pandey RM. **Case-control study of Meige's syndrome. Result of a pilot study.** *Neuroepidemiology* 2000 Sep-Oct;19(5):275-80.
(Department of Neurology, All India Institute of Medical Sciences, New Delhi, India. madhuribehari@hotmail.com)

A pilot case-control study was conducted to identify possible risk factors for Meige's syndrome. Patients with Meige's syndrome and age- and sex-matched controls suffering from other neurological diseases were recruited from the Movement Disorders Clinic and Neurology Outpatient Department of the All India Institute of Medical Sciences. All participants were interviewed and information regarding psychiatric and medical illnesses, use of medications, exposure to fumes, dust and pets, characteristics such as marital status, socio-economic status, alcohol, tea/coffee use, tobacco use, betel nut chewing and family history of neurodegenerative diseases among first-degree relatives was ascertained. We found that betel nut with tobacco chewing was a significant predictor for Meige's syndrome (adjusted odds ratio 7.4, 95% confidence interval = 1.0-

59. 82). The role of local irritation or the effect of some chemicals in tobacco and betel nuts needs further evaluation of the pathogenesis of Meige's syndrome.

4.7 Reproductive system

Adverse effects of tobacco use on fertility and pregnancy outcomes are reported.

4.7.1 Fertility and virility

One article found averse effects on sperm of men who use tobacco. This might motivate young Indian men to stop their tobacco habits.

Fertil India (1993) Ban: Comparative study
Banerjee A, Pakrashi A, Chatterjee S, Ghosh S, Dutta SK. **Semen characteristics of tobacco users in India.** *Arch Androl* 1993 Jan-Feb;30(1):35-40.
(Reproductive Biology Research Division, Indian Institute of Chemical Biology, Calcutta)

Qualitative analysis of semen samples were compared between 79 tobacco addicts of different types (smokers, chewers, and multiple addicts) with 21 nonaddicts (never consumed any form of tobacco). The percentage of motile sperm and total sperm count were significantly lower ($p < .05$) for tobacco chewers. The frequency of abnormal sperm is also significantly higher ($p < .001$) in smoking and multiple addict groups. Differential effects of smoking and chewing tobacco on sperm characteristics are discussed.

4.7.2 Adverse pregnancy outcomes

This section deals with the effects of maternal tobacco use and passive exposure to tobacco smoke. Like studies of maternal smoking conducted elsewhere, studies in India have shown that maternal tobacco use (mostly smokeless tobacco in India) contributes significantly toward higher rates of stillbirth, low birthweight, perinatal mortality and foetal wastage, all outcomes that are already elevated due to poverty, lack of health awareness and poor access to health care. In addition, maternal tobacco use leads to a low male/female ratio of newborns. Public education about the harmfulness of maternal tobacco use on the newborn should be a part of maternal and child health programmes because it would contribute toward achieving the nation’s goals in this area of health.

Preg-Outcome India (1998) Des: Cohort Study
Deshmukh JS, Motghare DD, Zodpey SP, Wadhva SK. 1998. **Low birth weight and associated maternal factors in an urban area.** *Indian Pediatr* 35(I):33-36.
(Department of Preventive and Social Medicine, Government Medical College, Nagpur.)

Objective: To study the prevalence of low birth weight (LBW) and its association with maternal factors. Design: Cohort study. Setting: Urban community. Subjects: Cohort of 210 pregnant women. Results: The LBW prevalence was 30.3%. On multivariate analyses the maternal factors significantly associated with LBW were anemia (OR-4.81), low socioeconomic status (OR-3.96), short birth interval (OR-3.84), tobacco exposure (OR-3.14), height (OR-2.78), maternal age (OR-2.68), body mass index (OR-2.02), and primiparity (OR 1.58). Conclusions: Anemia, low socioeconomic status, short stature, short birth interval. Tobacco exposure, low maternal age, low body mass index, and primiparity are significant risk factors for LBW.

Preg-Outcome India (1997) Kri: Descriptive report
Krishnamurty S. **Maternal tobacco use and adverse reproductive outcome.** *The National Medical Journal of India*. 1997 Jan-Feb;10(1):2-4.
(Department of Community Oncology. SSB Cancer Hospital and Kasturba Hospital. Manipal, Karnataka)

Poverty, maternal malnutrition, underweight, unavailable or poor antenatal care, and problems in ensuring a safe delivery are some of the important factors causing LBW, intrauterine growth retardation (IUGR) or prematurity. Maternal tobacco use may also contribute to foetal growth retardation and still-birth. Studies from South Asia show that tobacco, if chewed, applied orally, actively smoked or passively smoked:
i) Increases still-birth by nearly 3 fold
ii) Reduces birth weight by 100-400g, with females at greater risk for LBW than males (7 fold and 2 fold, respectively)
iii) Significantly increases the placental weight (66 g)
iv) Is associated with up to 30% male foetal wastage and
v) Is associated with 2 fold higher perinatal mortality.
The impact of tobacco use on reproductive outcome can be direct or indirect. Direct effect manifests as IUGR. The degree of impact depends greatly on the prevalence of maternal tobacco use and the relative risks of adverse reproductive outcome. It has been suggested that 16.7% of the total prematurity and still-births in the population may be related to smokeless and 48% to smoked tobacco. In other words, if all forms of maternal tobacco use are eliminated, about 20% each of still-births and LBW may not occur. Apart from increased mortality, LBW predisposes to increased morbidity from major infectious diseases such as measles, pneumonia and T.B.

Preg-Outcome India (1993) Kri: Case-control study
Krishnamurthy S, Joshi S. **Gender differences and low birth weight with maternal smokeless tobacco use in pregnancy.** *J Trop Pediatr* 1993 Aug;39(4):253-4.
(National Cancer Registry Project (ICMR), Tata Memorial Hospital Annexe, Bombay, India)

A preliminary study of maternal smokeless tobacco use, mostly oral applications of burnt tobacco or 'mishri', in pregnancy included 65 of 178 singleton liveborns to users and 113

to non-users in Bombay, India. Eighty-three newborns, 42 to maternal tobacco users and 41 to non-users were < 2.5 kg birth weight, i.e. low birth weight (LBW; odds ratio 3.2; confidence interval 1.5-6.9; P < 0.001). Stratifying by gender yielded odds ratios of 1.6 (P > 0.1, NS) for male and 6.96 (confidence interval 2.5-19.4, P < 0.0005), for female newborns compared to normal birthweight boys and girls, respectively. Male:female newborns were 80.6:100 in maternal tobacco users compared to 105.5:100 in non-users. Defining LBW as < 2.0 kg yielded an odds ratio of 5.4 (confidence interval 1.8-15.2, P < 0.005) in maternal tobacco users' offspring. For babies weighing 2-2.5 kg at birth it was 2.76 (confidence interval 1.4-5.5, P < 0.01). Maternal use of 'mishri' tobacco in pregnancy may be associated with (1) low birth weight of offspring, (2) low birth weights in girls more than in boys; (3) decreased male:female ratio of live newborns, and (4) low birth weight of < 2.0 kg more than of 2-2.5 kg. Studies are needed to substantiate these findings. Gender differences in outcome suggest that the in utero effect of maternal smokeless tobacco use on male and female fetuses may differ.

Preg-Outcome India (1992) Kri: Review
Krishnamurthy S. (1992) **Population impact of adverse reproductive outcome attributable to maternal tobacco use in India.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 167-170.
(National Cancer Registry Project (ICMR), Tata Memorial Hospital, Bombay, India)

The prevalence of tobacco use among women in India ranges from 10 to 62%. Tobacco is used by women predominantly in smokeless forms, but also smoked as bidis. The potential health hazards of maternal tobacco use to reproductive outcome are not well documented. Preliminary estimates showed a three-fold risk of stillbirths among women in India who chewed tobacco during pregnancy and a two-fold increase in perinatal mortality for babies born to bidi smokers in Bangladesh. The odds ratio for low birthweight (2.5 kg or less) associated with mishri use during pregnancy was 3.2 for all babies in Bombay, 6.96 for girls and 1.6 for boys. From these estimates, about 17% of stillbirths, 9% of perinatal mortality and 17% of birthweights of 2.5 kg or less are attributable to maternal tobacco use during pregnancy. Estimates for 1986 showed that nearly 457,000 deaths among infants and children under five years could be attributed to maternal tobacco use. Additional indirect effects may be increased infant mortality due to premature birth and diversion of income from nutritional needs to tobacco. These estimates emphasize the necessity for stopping tobacco use during pregnancy and the need for appropriate antenatal efforts.

Preg-Outcome / ETS India (1992) Mat: Cohort study
Mathai M, Vijayasri R, Babu S, Jeyaseelan L. **Passive maternal smoking and birth-weight in a south Indian population.** *Br J Obstet Gynaecol.* 1992 Apr;99(4):342-3.
(Christian Medical College & Hospital, Vellore, India.)

Objective: To determine the effects of passive maternal smoking on birthweight. Design: Cohort of consecutive singleton live births. Setting: Teaching hospital in South India. Subjects: 994 infants and their mothers. Results: All the women were themselves non-smokers; 520 (52%) were passive smokers while the remainder were not exposed to tobacco smoke. Infants born to passive smokers were on the average 55 g lighter than those born to non-smokers. Passive smoking was associated with a decrease in birthweight of 63 g (95% CI 12-114 g) even after adjusting for other variables known to affect birthweight.

Preg-Outcome India (1991) Kri: Reanalysis of Case-control study
Krishnamurthy S. **Strength of Association of Increased Placental Weight and Smokeless Tobacco Use in Pregnancy.** *Indian J Pediatr* 1991;58:863-876

(no abstract available)

Preg-Outcome / TUS India (1990) Meh: Comparative study
Mehta AC and Shukla S. **Tobacco and pregnancy.** *Journal of Obstetrics and Gynecology of India* 1990; 40(2):156-160.

A preliminary survey on tobacco use during pregnancy was conducted at N. Wadia Maternity Hospital, Mumbai in April 1987, and 500 women were interviewed. The main objective was to determine the incidence of Low Birth Weight (LBW) babies amongst tobacco users and nonusers. All the respondents were treated in free wards. Of the women interviewed, 322 (64.4%) were attending antenatal clinics and 178 (35.6%) were delivered cases. Of the 500 women, 167 (33.4%) consumed tobacco during their pregnancy. Among users, 158 used it by applying to teeth and gums, 8 chewed tobacco and only one smoked. As many as 195 (39%) husbands of these 500 women consumed tobacco while their wives were pregnant: 41 applied it to teeth and gums, 86 chewed it, and 68 smoked tobacco, 98 men took more than one mode. The LBW incidence for the hospital was 46.63%. In women who used no tobacco, the proportion of LBW was 36.28%, and amongst those who consumed tobacco in pregnancy the incidence was 64.62%. Krishna (1978) reported that his study had shown a 15.8% incidence of tobacco use in pregnancy and all were chewing it. His study was conducted in Pune region. Verma et al. (1983) studied a population in Jabalpur, and a large majority of pregnant women ingested tobacco, rather than applying on gums or keeping in mouth. Both authors reported significantly lower birth weights in offspring of tobacco users as compared to those in nonusers. References: Krishna Kewal; *British Journal of Obstetrics and Gynecology,* 85, 726, 1978; Verma, R.C., Chansoriya M, Kaul K.K. *Indian Pediatrics,* 20, 105, 1983 (see below).

Preg-Outcome India (1989) Kri: Review
Krishnamurthy S. **Tobacco Use in Pregnancy and Reproductive Outcome.** In: Sanghvi LD and Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of

the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 48-56.

Studies of maternal use of tobacco during pregnancy and associated reproductive outcome are reviewed. Maternal tobacco use impacts directly and indirectly on the developing foetus, newborn, infant and child. Direct effects relate to tobacco use during pregnancy. Indirect effects relate to maternal tobacco use in general. Western data strongly implicate maternal smoking during pregnancy with increased risks of low birthweight, spontaneous abortion, stillbirths, foetal deaths, and neonatal deaths. Women in India mainly chew or apply powdered tobacco. Indian data show a three-fold increase in stillbirths and a 100-400g decrease in birthweights associated with maternal smokeless tobacco use during pregnancy. Other associations are: an average increase in placental weight of 66g, and increased male foetus wastage. A two-fold increase in perinatal mortality was observed in bidi smokers' newborns in Bangladesh. Maternal tobacco use has reportedly synergistic effect along with maternal and neonatal anaemia, vitamin and nutritional deficiencies and inadequate antenatal and paediatric health care, on perinatal morbidity. Population surveys from four different places in India have shown that 10-60% of 15-44 year old women chew tobacco. Estimates derived from tobacco consumption in India suggest that about 10% adult women chew tobacco, and 2.5% smoke bidi. The population impact of such tobacco use and therefore of potentially preventable adverse reproductive outcome is estimated to be approximately 17% of stillbirths, and about 11-12% of perinatal mortality. Impact on low birthweight is not estimable from the published material. Besides these direct effects of maternal tobacco use in pregnancy, indirect effects include infantile and childhood morbidity and mortality due to low birthweight and prematurity. Malnutrition due to diversion of scanty purchasing power from nutrition to tobacco has been documented. Finally other associations with maternal or parental cigarette smoking are reviewed. They include sudden infant death syndrome, nicotine and cotinine transfer via breast milk and excretion by the neonate in saliva and urine, infantile bronchitis and pneumonia, persistent middle-ear effusions, and impaired physical, mental, and emotional development. Although these associations have so far been documented only with parental cigarette smoking one could expect similar associations with parental bidi smoking and even smokeless tobacco use.

Four reports (two with abstracts) from **before 1985** were located, and are included for the reader's convenience:

Preg-Outcome India (1983)Agr: Medical study
Agrawal P, Chansoriya M, Kaul KK. 1983. **Effect of tobacco chewing by mother on placental morphology.** Indian Pediatr 20:561-565

(no abstract available)

Preg-Outcome India (1983) Kul: Biological study
Kulkarni J. 1987. **Mutagenicity, Teratogenicity and Carcinogenecity studies of masheri, a pyrolysed tobacco product**. Ph.D. Thesis, University of Mumbai, Mumbai. (Unpublished).

(no abstract available)

Preg-Outcome India (1983) Ver: Case-control study
Verma RC, Chansoriya M, Kaul KK. **Effect of Tobacco Chewing by Mothers on Fetal Outcome.** Indian Pediatr. 1983 Feb;20(2):105-11.

While the adverse effect of tobacco smoking by mothers on fetal outcome has been extensively documented in the literature, effect of consumption of tobacco in other forms, such as eating, chewing etc. as a traditional practice in some communities in India and its neighbouring countries has received scant attention. In the present study 70 mother-newborn pairs, where mothers consumed tobacco, were compared with an equal number of pairs serving as controls, precisely matched for socio-economic status, maternal literacy, parity of the mother, birth interval, age, height and weight of mother, gestational age and sex of the baby. The birth weight, length and circumference of skull were studied. A statistically significant lower birth weight by an average of 395.3 g. and lower birth length by 0.518 cm. was observed in the tobacco consumer group. Tobacco consumption exceeding 200 mg/day during pregnancy distinctly influenced birth weight particularly in the forms that were more likely to be ingested than merely chewed. In qualitative terms, tobacco consumption during pregnancy significantly diminished birth weight and length. What remains to be studied is the quantitative correlation between toxic metabolites of tobacco and fetal outcome.

Preg-Outcome India (1978) Kri: Case-control Study
Krishna K. 1978. **Tobacco chewing in pregnancy**. *Br J Obstet Gynecol* 85:725-728.

The effects of tobacco chewing by pregnant women were investigated. When compared with those who did not do so, tobacco-chewing mothers had a greatly increased stillbirth rate, a low male:female infant sex ratio and a major reduction in birth weight which was due in large part to early delivery.

4.8 Nutritional Status

It is well known that tobacco is often used to relieve hunger, thus it may sometimes substitute for food, to the detriment of health. Tobacco use may also affect nutritional status in other ways. This section contains abstracts of four studies showing that tobacco use tends to have an adverse impact on nutritional status.

Nut / OSF India (2002) Has: Case-control study
Hashibe M, Sankaranarayanan R, Thomas G, Kuruvilla B, Mathew B, Somanathan T, Parkin DM, Zhang ZF. **Body mass index, tobacco chewing, alcohol drinking and the risk of oral submucous fibrosis in Kerala, India.** *Cancer Causes Control.* 2002 Feb;13(1):55-64.
Department of Epidemiology, UCLA School of Public Health and Jonsson Comprehensive Cancer Center, Los Angeles, CA 90095-1772, USA

For abstract, see OSF/Nut India (2002) Has: Case-control study.

Nut India (2002) Shu: Descriptive epidemiological study
Shukla HC, Gupta PC, Mehta HC, Hebert JR. **Descriptive epidemiology of body mass index of an urban adult population in western India.** *J Epidemiol Community Health.* 2002 Nov;56(11):876-80.
Biomedical Sciences, University of Westminster, London, UK. shuklah@wmin.ac.uk

Study objective: To describe height, weight, and body mass index (BMI) of the adult urban population in Mumbai, western India and to estimate the prevalence and severity of thinness and overweight in this population. To describe the association of BMI with education, age, and tobacco habits in an urban Indian population. Design: Cross sectional representative survey of 99,598 adults (40,071 men and 59,527 women). Setting: The survey was carried out in the city of Mumbai (formerly known as Bombay) in western India. Participants: Men and women aged > or =35 years who were residents of the main city of Mumbai. Main results: The mean height, weight, and BMI were 161.0 (SD 6.7) cm, 56.7 (SD 11.0) kg, and 21.8 (SD 3.8) kg/m(2) for men and 148.0 (SD 6.2) cm, 49.8 (SD 11.2) kg, and 22.7 (SD 4.7) kg/m(2) for women, respectively. Some 19% of men and women were thin (BMI<18.5 kg/m(2)), while 19% of men and 30% of women were overweight (BMI> or =25kg/m(2)). Multivariable logistic regression analyses showed that age, level of education, and tobacco use were independently associated with BMI. The odds ratio (OR) and 95% confidence intervals (CI) for thinness (BMI<18.5 kg/m(2)) were OR 6.52, 95% CI 5.38 to 7.89 for men and OR 4.83, 95% CI 3.71 to 6.28 for women, respectively, (p<0.001) for the lowest level of education (illiterate group). The OR and 95% CI for overweight were 2.25, 2.20 to 2.58 for college educated men and 1.90, 1.64 to 2.20 for college educated women, respectively, p<0.001. Both smoking (2.33, 2.09 to 2.59; 2.89, 1.77 to 4.72 for men and women, respectively, p<0.001) and smokeless tobacco use (1.65, 1.52 to 1.80; 2.26, 2.14 to 2.38 for men and women, respectively p<0.0001) were significantly associated with low BMI. Conclusions: Sequelae of thinness and overweight represent major public health problems. The results of this study, indicating an equal prevalence of thinness and overweight in an urban area and their association with age, level of education, and tobacco use raise concerns of an emerging public health crisis in urban India. Comment in: J Epidemiol Community Health. 2002 Nov;56(11):804-5.
full text at: http://jech.bmjjournals.com/cgi/content/full/56/11/876

Nut / OphC India (2001) Pat: Case-control study
Patel PS, Raval GN, Patel DD, Sainger RN, Shah MH, Shah JS, Patel MM, Dutta SJ, Patel BP. **A Study of Various Sociodemographic Factors and Plasma Vitamin Levels in Oral and Pharyngeal Cancer in Gujarat, India.** *Asian Pac J Cancer Prev*. 2001 Jul-Sep;2(3):215-224.
Biochemistry Research Division, The Gujarat Cancer & Research Institute, Ahmedabad - 380 016, India. gcri@ad1.vsnl.net.in

This study examined various socio-demographic factors, dietary patterns, habit of tobacco consumption and plasma vitamin levels in 56 healthy individuals, 146 patients with oral precancerous conditions (OPC) and 132 untreated oral and pharyngeal cancer patients. The subjects were interviewed using a detailed health, habit and diet questionnaire. Plasma b-carotene, vitamin-A and vitamin-E levels were determined spectrophotometrically. An increased incidence of OPC was observed in the age group of <30 years which was associated with tobacco chewing. The main incidence of cancer was in the age group 30-60 years where the habit of tobacco smoking was more prevalent. Most of the subjects were from rural areas, poor, and unaware of the association of diet with cancer. The body mass index was lower ($p=0.045$) in patients with OPC and cancer patients compared to the controls. Plasma b-carotene and vitamin-E levels were lower in patients with OPC ($p=0.000$ and 0.031, respectively) and untreated cancer patients ($p=0.000$ and 0.071, respectively) than the controls. ROC curve revealed that plasma vitamin levels have the ability to discriminate between controls and cancer patients. Lower plasma b-carotene and vitamin-E levels were observed in tobacco consumers as compared to non-consumers. Odds ratio revealed that controls and patients with OPC having tobacco habit and lower plasma levels of b-carotene were at higher risk ($p<0.05$) of developing cancer. Regression study and Analysis of Variance revealed that plasma b-carotene levels were inversely associated ($r(2)=0.14$, $p=0.001$ and $F=0.000$, respectively) with increase in the stage of cancer. The data provide interesting clues about the potential role of diet, tobacco habits, socio-demographic status and plasma vitamin levels in etiology of oral and pharyngeal cancer in Gujarat, where no such findings are reported.

Nut India (1998) Sin: Validation study and descriptive epidemiological study
Singh RB, Ghosh S, Niaz MA, Rastogi V, Wander GS. **Validation of tobacco and alcohol intake questionnaire in relation to food intakes for the Five City Study and a proposed classification for Indians.** *J Assoc Physicians India*. 1998 Jul;46(7):587-91.
Centre of Nutrition and Heart Research Laboratory, Medical Hospital and Research Centre, Moradabad.

A cross-sectional survey was conducted among 1,806 subjects (904 men and 902 women) 25-64 years of age. The survey instruments were questionnaires according to guidelines of WHO and other Indian studies and assigned scores for various aspects of tobacco and alcohol consumption. All subjects with tobacco and alcohol consumption were classified separately into mild, moderate and heavy consumers and previous consumption was also recorded. The overall prevalence of tobacco consumption was significantly higher in men compared to women (27.5 vs 11.6%), while mild tobacco intakes were comparable (2.0

vs 1.6%), moderate (22.2 vs 7.7%) and heavy (3.3 vs 2.2%) tobacco consumptions were significantly higher in men compared to women. The overall prevalence of alcohol consumption was 10.4% in men with no women reporting alcohol consumption. The prevalence of moderate (6.6%) alcohol intakes was significantly higher compared to mild (1.2%) and heavy (2.5%) alcohol consumption. Whisky and country liquor were most commonly consumed alcoholic beverages. Smoking (20.7 vs 1.6%) and tobacco chewing (13.3 vs 10.7%) in men and women respectively were common modes of tobacco consumption. Tobacco consumption was significantly associated with lower consumption of vitamin C and beta-carotene and lower body mass index. These findings suggest that tobacco and alcohol consumption assessed by scores constructed on the basis of various attributes appear to be accurate and the questionnaires may be used with precision for classification and assessment in other population groups.

Nut / TUS India (1994) Cho: Tobacco use survey with analysis of health effects
Choudhary S, Choudhary SK, Mishra S. **Effect of Tobacco chewing on Physical Health of Tribal Population,** in the *Maharashtra Journal of Extension Education*, Vol. 13, 1994,pp 237-240.

For abstract see TUS / Nut India (1994) Cho: Tobacco use survey with analysis of health effects.

5. Health Impact of Second-hand Smoke

(Also called “environmental tobacco smoke” (ETS), “passive smoking”, “sidestream smoke” and “involuntary smoking”)

Fifteen abstracts of studies on the impact of second-hand smoke on health are cited in this section. Effects include: low birthweight in infants exposed passively, and bronchial asthma, upper respiratory infections, reduced lung function, lung cancer.

ETS India (2002) Par: Prevalence study
Paramesh H. **Epidemiology of asthma in India.** *Indian J Pediatr*. 2002 Apr;69(4):309-12. (Pediatric Pulmonologist, Lakeside Medical Center and Hospital, Bangalore, India. dr_paramesh1@yahoo.com)

Allergic respiratory disorders, in particular asthma are increasing in prevalence, which is a global phenomenon. Genetic predisposition is one of the factors in children for the increased prevalence, but urbanisation, air pollution and environmental tobacco smoke contribute more significantly. Our hospital based study on 20,000 children under the age of 18 years from 1979,1984,1989,1994 and 1999 in the city of Bangalore showed a prevalence of 9%,10.5%,18.5%, 24.5% and 29.5% respectively. The increased prevalence correlated well with demographic changes of the city. Further to the hospital

study, a school survey in 12 schools on 6,550 children in the age group of 6 to 15 years was undertaken for prevalence of asthma and children were categorized into three groups depending upon the geographical situation of the school in relation to vehicular traffic and the socioeconomic group of children. Group I-Children from schools in heavy traffic areas showed prevalence of 19.34%, Group II-Children from heavy traffic region and low socioeconomic population had 31.14% and Group III-Children from low traffic area school had 11.15% respectively. (P: I & II; II & III <0.001). A continuation of study in rural areas showed 5.7% in children of 6-15 years. Persistent asthma also showed an increase from 20% to 27.5% and persistent severe asthma 4% to 6.5% between 1994-99. Various epidemiological spectra of asthma in children are discussed here.

ETS India (2002) Sin: Cross-sectional study
Singh D, Arora V, Sobti PC. **Chronic/recurrent cough in rural children in Ludhiana, Punjab.** *Indian Pediatr.* 2002 Jan;39(1):23-9.
(Department of Pediatrics, Dayanand Medical College and Hospital, Ludhiana, Punjab 141 001, India. dmchldh@glide.net.in)

Objective: To determine the prevalence, age distribution and common causes of chronic/recurrent cough in rural children. Design: Prospective study. Setting: Pediatric population in five villages of Dehlon Block of Ludhiana, Punjab. Methods: 2,275 children in the age group of 1 to 15 years were screened by house to house survey for chronic/recurrent cough using defined criteria. A detailed work up of selected cases was carried out. Underlying etiology was determined using clinical and laboratory parameters. Five hundred children in the study population formed the control group. Variables associated with chronic/recurrent cough were analyzed in cases and controls. Results: Twenty four children were diagnosed with chronic/recurrent cough showing a prevalence rate of 1.06 percent. The most common cause was bronchial asthma (66.7 percent) followed by postnasal drip syndrome (25 percent). Family history of allergy/asthma was noted in 11 (45.8 percent) children as compared to 52 (10.4 percent) in the control group ($p < 0.01$). Family history of smoking was recorded in 16.7 percent of cases in contrast to 6.4 percent in controls ($p = 0.05$). There was no significant association with overcrowding, pets and kind of cooking fuel used. Conclusions: The most common cause of chronic/recurrent cough was bronchial asthma. There was a significant association with family history of allergy/asthma and smoking.

ETS India (2001) Gup: Cross-sectional
Gupta D, Aggarwal AN, Kumar R, Jindal SK. **Prevalence of bronchial asthma and association with environmental tobacco smoke exposure in adolescent school children in Chandigarh, north India.** *J Asthma* 2001 Sep;38(6):501-7.
(Dept of Pulmonary Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh, India)

Prevalence of asthma and its association with environmental tobacco smoke (ETS) exposure were examined among adolescent schoolchildren in Chandigarh, India. Using a

previously standardized questionnaire, data from 9090 students in the 9- to 20-year age range were analyzed. There were 4367 (48%) boys, in whom the observed prevalence of asthma was 2.6%. Among 4723 (52%) girls, asthma was present in 90 (1.9%) students. Presence of one or more respiratory symptoms was reported by 31% students. More students with asthma had either parents or other family members smoking at home as compared to nonasthmatics (41% vs. 28%, $p<0.0001$). The odds ratio for being asthmatic for patients exposed to ETS compared to those not exposed to ETS was 1.78 (95% confidence interval 1.33-2.31). ETS was also positively associated with prevalence of all the respiratory symptoms, with odds ratios varying between 1.6 and 2.25.

ETS India (2000) Rat: Case-control study
Ratageri VH, Kabra SK, Dwivedi SN, Seth V. **Factors associated with severe asthma.** *Indian Pediatr.* 2000 Oct;37(10):1072-82.
(Dept of Pediatrics, All India Institute of Medical Sciences, New Delhi 110 029, India.)

Objective: To study the role of various factors associated with development and severity of bronchial asthma in children between 5-15 years of age. Setting: Tertiary Care Medical College Hospital. Methods: A case control study was carried out during May 96 to April 98. Sixty children each suffering from mild (chronic) and severe asthma (chronic) and 60 controls were enrolled to study the association of various risk factors with development of asthma and for severe disease. Results: On univariate analysis factors associated with significant risk for development of asthma included family history of asthma ($p = 0.003$), lack of exclusive breastfeeding ($p = 0.05$), past history of bronchiolitis ($p = 0.02$), associated allergic rhinitis ($p = 0.04$) and atopic dermatitis ($p = 0.01$). For development of severe asthma, associated factors were early onset of symptoms ($p = 0.01$), family history of asthma in grandparents ($p = 0.04$) and more than 10 cigarettes per day smoked by any family member. No significant effect of air pollution, overcrowding, pets and passive smoking were found on either development of asthma or it's severity. On multivariate analysis only age of onset below 48 months was associated with severe asthma (OR 2.13, 95% CI 1.00-4.54). Exclusive breastfeeding for more than 4 months was the most protective factor for development of asthma (OR 0.25, 95% CI 0.08-0.70). A strong association between development of asthma and past history of bronchiolitis or tuberculosis (OR 5.26, 95% CI 1.7-16.20) and presence of associated atopic dermatitis or rhinitis (OR 7.5, 95% CI 1.64-34.48) was observed. Conclusion: History of associated allergic diseases and past history of bronchiolitis were significantly associated with development of asthma. Exclusive breastfeeding for first 4 months of life was protective. The most significant factor associated with severe asthma was onset of illness before 48 months of age. There was no significant effect of air pollution, over crowding, pets at home or passive smoking on severity of asthma.

ETS India (1999) Bis: Prospective study
Biswas A, Biswas R, Manna B, Dutta K. **Risk factors of acute respiratory infections in underfives of urban slum community.** *Indian J Public Health.* 1999 Apr-Jun; 43(2):73-5.

(R G Kar Medical College, Calcutta.)

To ascertain the risk factors of Acute Respiratory Infections (ARI) in children, a prospective study was conducted for a period of one year among 112 underfives in urban slum community of Calcutta. Incidence of ARI was found significantly higher in undernourished children of poor socio-economic class. Parental smoking habit and solid fuel use for cooking were recognised as important risk factors of ARI.

ETS India (1999) Jin: Case-control study
Jindal SK, Jha LK, Gupta D. **Bronchial hyper-responsiveness of women with asthma exposed to environmental tobacco smoke**. *Indian J Chest Dis Allied Sci* 1999 Apr-Jun; 41(2):75-82.
(Department of Pulmonary Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh. skjindal@ch1.dot.net.in)

Effect of chronic environmental tobacco smoke (ETS) exposure on bronchial responsiveness (BR) was assessed by measuring BR in stable, nonsmoker asthmatic women, and PD20 was compared between the exposed and non exposed groups. Nonspecific bronchoprovocation test was performed by histamine inhalational challenge. Of fifty patients included in the study, 23 (46%) had history of ETS exposure of 1.22 (+/- 0.61) hours per day for an average of 13.07 (+/- 6.1) years. The PD20 was significantly lower in the ETS exposed group ($p < 0.05$). When the subjects were compared, based on their cumulative exposure expressed by an exposure index (El = duration of exposure in years multiplied by average number of hours per day), there was a statistically significant difference in PD20 depending on El level. It is concluded that BR is greater, and reflects the higher morbidity in the ETS exposed patients with asthma.

ETS / Cresp India (1999) Pat: Descriptive report
Patel DR. **Smoking and children.** *Indian J Pediatr* 1999 Nov-Dec; 66(6):817-24.
(Department of Pediatrics, Michigan State University, Kalamazoo Center for Medical Studies 49008, USA. patel@KCMS.MSU.EDU)

Tobacco use by children and adolescents is a major health threat. Many carcinogens and other harmful compounds have been identified in tobacco smoke. The major component, nicotine, is highly addictive. In India, approximately 5,500 children and adolescents start using tobacco products daily, some as young as 10 years old. The majority of users first tried tobacco prior to age 18. Children and adolescents are exposed to the harmful effects of nicotine from smoking or second hand smoke from others; and from use of smokeless tobacco. There is increased prevalence of respiratory disease, ear and sinus infections, asthma, oral disease, and many long-term complications such as cardiovascular disease and cancers due to tobacco use. Prevention and treatment strategies include behavioural approaches and pharmacotherapy. There is an increased urgency especially for countries like India to address the problem of tobacco use by children and adolescents as the tobacco industry faces legal and public opinion obstacles in Western countries like

United States. Medical practitioners can play an important role by implementing preventive and treatment strategies in their practices.

ETS India (1999) Rap: Case-control-study
Rapiti E, Jindal SK, Gupta D, Boffetta P. **Passive smoking and lung cancer in Chandigarh, India.** *Lung Cancer* 1999 Mar;23(3):183-9.
(Unit of Environmental Cancer Epidemiology International Agency for Research on Cancer, Lyon, France)

This study assessed the relationship between exposure to environmental tobacco smoke (ETS) and lung cancer in non-smokers. A case-control study among lifetime non-smokers was conducted in Chandigarh, India. Cases consisted of 58 non-smoking histologically confirmed lung cancer patients; two controls for each case were selected, one among other patients admitted to the wards and one among the visitors to hospital patients. Subjects were asked about ETS exposure from different tobacco products in childhood and in adulthood at home, at the work place and in vehicles. Multivariate logistic regression analysis was used to assess the effects of ETS exposure variables on lung cancer. Exposure to ETS during childhood was strongly associated with lung cancer (odds ratio (OR) = 3.9; 95% confidence interval (CI) = 1.9-8.2), the effect mostly arising from exposure to cigarettes smoke. The excess risk was observed with either a smoking father or mother. An increasing risk was found with increasing number of smokers and duration of exposure. Restricting the analysis to women produced higher estimates of the risk. No increased risk was found with exposure to a smoking spouse, except for those exposed only to cigarette smoke (OR = 5.1; 95% CI = 1.5-17). A weak association was seen between lung cancer and ETS exposure at the workplace, which increased with the number of years of exposure. Exposure in vehicles also was detected as a risk factor for lung cancer in non-smokers. This study suggests that ETS exposure may be a strong risk factor for lung cancer also in India, a country with low prevalence of smoking and, therefore, low rates of lung cancer. Other studies need to be conducted in similar settings to confirm the role played by ETS exposure early in life in the causation of lung cancer.

ETS India (1998) Beh: Comparative study
Behera D, Sood P, Singh S. **Passive smoking, domestic fuels and lung function in north Indian children.** *Indian J Chest Dis Allied Sci* 1998 Apr-Jun;40(2):89-98.
(Department of Pulmonary Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh)

A study on the effects of passive smoking and exposure to domestic cooking fuels on lung functions of 200 school children from north India found that forced vital capacity and FEV1 were the lowest in boys whose households used biomass fuel ($p < 0.05$) and PEFR and FEF 25% and 50% were lowest in boys with their homes using kerosene as fuels. All these were best for LPG fuel. However, in girls there was no significant difference in different parameters, although the values were lower in those using kerosene and biomass fuel. All parameters were lower in passive smokers irrespective of

the type of fuel used although they were not statistically significant. However, FEF 50% was significantly less in passive smokers whose households used mixed fuels. The same was true for PEFR, PEFR %, and FEF 25% in cases of LPG fuel use.

ETS India (1996) Jin: Comparative study
Jindal SK, Gupta D, D'Souza GA, Kalra S. **Bronchial responsiveness of non-smoking women exposed to environmental tobacco smoke or biomass fuel combustion**. *Indian J Med Res* 1996 Dec;104:359-64.
(Department of Pulmonary Medicine, Postgraduate Institute of Medical Education & Research, Chandigarh)

Bronchial responsiveness (BR) in three groups of housewives with or without history of exposure to tobacco smoke or combustion of biomass fuels was studied. Methacholine bronchoprovocation test was used to study BR. The group I subjects (60), who served as controls, were nonsmokers and had no chronic exposure to passive smoking or environmental tobacco smoke (ETS) or biomass fuels. Three of these women showed a 20 per cent FEV1 fall with a cumulative methacholine dose of 72.5 mg or less. Of 60 women in group II (ETS-exposure) and 52 in group III (biomass exposure), 26 (43.3%) and 10 (19.2%) respectively showed bronchial hyper-responsiveness (BHR). The odds ratios for BHR in groups II and III were 14.53 and 4.52 respectively. The number of hyper-responders was significantly more and the mean PD20 less in the exposed than the non-exposed groups. The occurrence of BHR in the ETS exposed group was more ($P < 0.05$) than the biomass combustion group. There were more hyper-responders (both groups II and III) amongst those who had an exposure index (EI) of 50 or more compared to those with EI of less than 50. We conclude that chronic cumulative exposure to both ETS and biomass combustion produces significant BHR. Further, BHR developed more often on ETS exposure, and when the exposure was present for a longer period.

ETS India (1996) Sin: Descriptive report
Singh UK, Suman S, Singh VK, Sinha RK. **Impact of passive smoking.** *Indian J Pediatr* 1996 Mar-Apr;63(2):139-41. (Department of Pediatrics, Patna Medical College)

Passive smoking causes irritation of mucous membranes of eyes and respiratory tract, predisposing passive smokers to more frequent upper respiratory infections and aggravation of asthma, particularly a problem for infants and children. Infants and children remain the unfortunate victims of their elder's smoking habits. Assessing involuntary exposure of infants and children to environmental tobacco smoke can be improved by accounting for its multiple determinants:

- The actual duration of time that the smoker smokes in the presence of the child.
- The number of cigarettes and the number of smokers at any given time.
- Environmental characteristics such as temperature, humidity, and ventilation.
- The type of tobacco product smoked, i.e., bidi, hukka, etc.

The majority of Indians live in overcrowded homes, which make matters worse for passive smokers. The quantification of cotinine in plasma, saliva and urine is accepted as

a reliable marker of chronic exposure to tobacco products, while nicotine indicates recent exposure to tobacco smoke. Measurement of these two parameters is likely to identify the individuals at risk so that necessary intervention can be done.

ETS India (1994) Jin: Comparative study
Jindal SK, Gupta D, Singh A. **Indices of morbidity and control of asthma in adult patients exposed to environmental tobacco smoke.** *Chest* 1994 Sep;106(3):746-9. (Department of Pulmonary Medicine, Postgraduate Institute of Medical Education and Research, Chandigarh, India)

The study compared indices of morbidity and control of asthma in 100 adult patients exposed to environmental tobacco smoke (ETS) inhalation (group 2), with 100 asthmatics not exposed (group 1). Exposure was established from the history of smoking by the patient's spouse and other close contacts. Asthma control and morbidity were assessed during follow-up visits in the chest outpatient clinic, inquiring into emergency department (ED) visits, hospitalization, acute episodes, requirement of parenteral drugs at home, corticosteroids, and maintenance bronchodilators in the preceding 1-year period. Index per patient was also calculated. Lung function was recorded by measuring forced expiratory flows on the day of the follow-up visit. The mean age and disease duration were comparable, but the expiratory flows were lower in the patients exposed to ETS. More patients in group 2 required daily bronchodilators (66 percent) and intermittent corticosteroids (56 percent). The number of ED visits, acute episodes, and parenteral bronchodilators per patient were significantly more ($p < 0.01$) in group 2 patients. Similarly, the number of weeks of absence from work and of corticosteroid requirement were more ($p < 0.01$) in the ETS-exposed patients. We conclude that the control of asthma is poor and morbidity greater in adult patients with asthma exposed to ETS at home and/or at work. Comment in: Chest. 1994 Sep;106(3):662-3.

ETS / Preg-Outcomes India (1992) Mat: Cohort study
Mathai M, Vijayasri R, Babu S, Jeyaseelan L. **Passive maternal smoking and birth-weight in a south Indian population.** *Br J Obstet Gynaecol* 1992 Apr;99(4):342-3. (Christian Medical College & Hospital, Vellore, India)

Objective: To determine the effects of passive maternal smoking on birthweight. Design: Cohort of consecutive singleton live births. Setting: Teaching hospital in South India. Subjects: 994 infants and their mothers. Results: All the women were themselves non-smokers; 520 (52%) were passive smokers, the remainder were not exposed to tobacco smoke. Infants born to passive smokers were on the average 55 g lighter than those born to non-smokers. Passive smoking was associated with a decrease in birthweight of 63 g (95% CI 12-114 g) even after adjusting for other variables known to affect birthweight.

ETS India (1992) Set: Descriptive report
Sethi GR. **Environment and acute respiratory infections.** *ICCW News Bull.* 1992 Jul-Dec;40(3-4):27-9.
There are 4.3 million deaths annually (33% of all child deaths) due to acute upper and lower respiratory infections including measles and pertussis. Morbidity is much higher: in India 30-35% of pediatric hospital admissions are for acute respiratory infections (ARI). Some of the risk factors for ARI are bottle feeding, overcrowding, outdoor and indoor pollution, low birth weight, and malnutrition, according to World Health Organization studies. A typical example of an Indian child with frequent hospitalizations for lower respiratory infections is a case where the father smokes and the mother works outside the home, which is a squatter hut near a highway and a power plant. In Rio de Janeiro, risk factors are maternal stress or depression, poor supervision, and poor housing. Prevalence of ARI was 80% in a 15-day recall period. In Gambia, children of polygamous unions and those exposed to indoor cooking fires are at high risk. In Hong Kong, poor environmental air quality has been identified with ARI. In the US factors associated with ARI are smoking, passive smoking, and air pollution. A child exposed to smoking will have 20% more days being bedridden than otherwise.

ETS India (1990) Mal: Descriptive report
Malhotra AK. **The plight of nonsmokers and the nurses' responsibility**. 1990;10:303.

Compared to smoke inhaled directly by smokers, sidestream smoke has five times more carbon monoxide, three times more tar (which is carcinogenic) and other noxious substances. The health of passive smokers is endangered. Lung and other cancers, other diseases of the lungs and heart and damage to unborn children can occur in nonsmokers frequently exposed to sidestream smoke. Women are commonly passive smokers in India, where a large proportion of men smoke, but women do not. Nurses (predominantly women) should take a lead in educating the public and protecting the rights of women and other nonsmokers. Suggested actions included organizing meetings of housewives through the State branches of the Trained Nurses Association of India to educate them about the harm caused by passive smoking, organising public education campaigns during Nurses' Week, coining slogans and displaying them, discouraging smokers in public places and at social gatherings, helping implement nonsmoking legislation by educating smokers and promoting adequate legislation to protect nonsmokers.

6. Toxicity of Tobacco Products

Abstracts of twenty-seven articles are contained in this section on the toxic constituents of Indian tobacco products, including bidis and cigarettes (their smoke), and smokeless products, like gudhadku and masheri.

TP India (2002) Sha: Chemical Analysis
Shaikh A.N., Negi, B. S., Sadasivan, S. **Characterization of Indian Cigarette Tobacco and its Smoke Aerosol by Nuclear and Allied Techniques**. *Journal of Radioanalytical and Nuclear Chemistry*, 2002: 253(2), 231-234.
(Environmental Assessment Division, Bhabha Atomic Research Centre Mumbai-400 085, India)

Forty brands of tobacco used in Indian cigarettes, 20 brands of bidis (tobacco rolled in wrapper leaves), 15 brands of chewing tobacco and 15 brands of snuff tobacco were analyzed by nuclear and allied techniques. The elements measured in tobacco can be grouped into seven categories from less than 1 ppm to 5% by weight. Concentration level varied from 0.5-5% for (Ca, K, Cl), 400-1500 ppm (Fe), 200-600 ppm (Na), 100-300 ppm (Ti, Mn, Br and Sr), 10-100 ppm (Cu, Zn and Rb), 1-10 ppm (Cr, Ni, Pb and La) and less than 1 ppm (As, Co, Cd, Sb, Hg and Eu). Among the above elements Cr, Ni, As, Cd, Pb, Hg and Sb are considered toxic. The percentage transfer of the elements from cigarette tobacco to smoke particles during smoking was also estimated using a smoking machine and collecting the smoke particles on a filter paper. The results show that Br, Cr, Sb and Zn have high percentage transfer from tobacco to its smoke of the order of 2-15%. Out of these Sb has the highest 15%. Cobalt, Fe and Sc have lowest percentage of transfer of the order of less than 1%. The percent transfer of these elements from tobacco to tobacco smoke is higher in case of bidis (1.5-3.0 times) than in cigarettes. Non-filter cigarettes have higher transfer (2-3 times) than filter tip cigarettes.

TP India (2001) Mal: Comparative product assay study
Malson JL, Sims K, Murty R, Pickworth WB. **Comparison of the nicotine content of tobacco used in bidis and conventional cigarettes.** *Tob. Control* 2001 Jun;10(2):181-3.
(National Institute on Drug Abuse, Intramural Research Program, Baltimore, MD, USA)

Objective: To compare the nicotine content of 12 unfiltered brands of bidi cigarettes (hand rolled cigarettes imported from India) with 8 popular brands of filtered and unfiltered US and conventional cigarettes from India. Method: Identical laboratory procedures were used to determine nicotine content (in duplicate) and physical characteristics. Results: Nicotine concentration in the tobacco of bidi cigarettes (21.2 mg/g) was significantly greater than in the tobacco in the commercial filtered (16.3 mg/g) and unfiltered cigarettes (13.5 mg/g). Conclusions: Bidis contain higher concentrations of nicotine than conventional cigarettes. Therefore, it is logical to presume that bidi smokers are at risk of becoming nicotine dependent. These findings belie a popular belief among US teens that bidis are a safe alternative to commercial cigarettes.

TP India (2001) Sri: Comparative air quality study
Srivastava PK, Pandit GG, Sharma S, Mohan Rao AM. **Volatile organic compounds in indoor environments in Mumbai, India.** *Sci Total Environ* 2000 Jun 8;255(1-3):161-8.
(Environmental Assessment Division, Bhabha Atomic Research Centre, Mumbai, India)

Air samples, representing different types of indoor environments, were collected and analyzed for eight hydrocarbons namely, n-hexane, benzene, heptane, toluene, p- and o-xylene, ethyl benzene and n-decane using a cryogenic preconcentration system and a gas chromatograph with a flame-ionization detector. Simultaneous outdoor samples were also collected to determine indoor to outdoor (I/O) ratios for every compound at each location. Seven different types of indoor environments were investigated for VOC levels. Toluene concentration levels were found to be high in a hall which was recently renovated. The indoor environment of a kitchen in which a kerosene stove was used and smoker's rooms showed high levels of benzene. The concentrations of VOCs during painting were high; levels of VOCs depended on the type of paint used. The study revealed that the indoor concentrations of selected VOCs on occasions could be significantly high due to various sources. The data presented here can be useful in developing air quality standards for indoor air.

TP India (1999) Cha: Review
Chaudhry K. **Is *pan-masala*-containing tobacco carcinogenic?** *National Medical Journal of India*, l999, 12(1):21-7.

Background: Pan masala-containing tobacco (PM-T) was introduced in the Indian market during the 1970s. It is a mixture of areca nut, tobacco, lime, catechu and spices. Despite mounting evidence of health hazards of tobacco, tobacco manufacturers as well as policy-makers often seek evidence regarding the carcinogenicity of newer tobacco mixtures such as PM-T. Methods: All the studies on pan masala (with or without tobacco) listed on MEDLARS, and the studies known to the expert committee on the subject constituted by the Directorate General of Health Services, were reviewed. The studies on individual components and PM-T like substances were also reviewed. The interpretations of carcinogenicity of PM-T has been made, based on studies on (i) PM-T, (ii) PM-T like mixtures, and (iii) the effect of individual ingredients of PM-T and the likely effects of their combinations. Results: Studies on Chinese hamster ovary cells and Ames tests indicate that PM-T is mutagenic. There is limited evidence that it may be carcinogenic to animals. The proportion of areca nut and tobacco in PM-T is between the proportion of these substances in two known tobacco and areca nut mixtures in India (Mainpuri tobacco and mawa). Studies on Mainpuri tobacco indicate that it is carcinogenic, while literature suggests an association between mawa use and oral submucous fibrosis. Conclusion: Human studies on PM-T like mixtures and the limited studies on PM-T suggest that PM-T is likely to be carcinogenic.

TP India (1999) Ric: Laboratory report
Rickert WS. **Determination of yields of "tar", nicotine and carbon monoxide from bidi cigarettes: final report.** Ontario, Canada: Labstat International, Inc. 1999. Final report, produced for the Massachusetts Department of Public Health, Tobacco Control Program.

Report on the results of laboratory analysis, under contract to the Massachusetts Department of Public Health, of the selected contents of the smoke from a sample of bidi's. The Federal Trade Commission testing method was used, with the puff volume adjusted to 45 millilters, puff interval adjusted to 30 seconds, and puff duration to 2 seconds. Cigarette holders with seals were used to hold the bidis during the smoking process. A linear port Filtrona Model 400 smoking machine was used to determine total particulate matter, gas chromatography was used to determine moisure and nicotine content of the total particulate matter, and to derive the tar delivery. Carbon monoxide in the smoke produced was determined according to established standard method. The average yields per bidi were as follows: CO: 32.4 mg, nicotine: 3.78 mg, tar: 51.2 mg. The CO/tar ratio was 0.63 and the nicotine/tar ratio was 13.53. The average nicotine content of the bidis tested was 21.8 mg/g, which was 6-2 mg/g higher than the filler in 10 popular America cigarette brands.

TP India (1998) Pak: Comparative product assay study
Pakhale SS, Maru GB. **Distribution of major and minor alkaloids in tobacco, mainstream and sidestream smoke of popular Indian smoking products.** *Food Chem Toxicol* 1998 Dec;36(12):1131-8.
(Carcinogenesis Division, Cancer Research Institute, Tata Memorial Centre, Parel, Mumbai, India)

Various Indian tobacco products--cigarette, bidi, chutta and a brand of US cigarette--were analysed by gas chromatography-flame ionization detection (GC-FID) for the levels of nicotine and minor tobacco alkaloids in tobacco, mainstream smoke (MS) and sidestream smoke (SS) employing modified smoking standards, namely two puffs/min. The analysis clearly demonstrated relatively higher levels of nicotine and minor tobacco alkaloids in tobacco from bidi (37.7 mg/g) and chutta (34.5 mg/g) compared with the Indian and US cigarettes (14-16 mg/g) studied. Relatively lower levels (SS/MS) of nicotine in SS from bidi and chutta compared with Indian/US cigarettes, suggest that the contribution of nicotine in SS from a single bidi/chutta to environmental tobacco smoke (ETS) is very much less than that of a single Indian/US cigarette. Reduced levels of nicotine in SS of bidi/chutta result in relatively higher deliveries of nicotine in MS as reflected by higher MS/SS values. The observed differences are likely to be due to different tobacco processing, burning rate/temperature and design of the smoking product.

TP India (1988) Pur: Bio-assay
Puri S, Dani HM, Singh J. **Assay of carcinogenicity of tobacco metabolites employing microsomal degranulation technique.** *Indian J Exp Biol*, l998 May, 36(5): 483-7.
(Department of Biochemistry, Panjab University, Chandigarh, India.)

Carcinogenicity of salivary extracts of different types of tobaccos smoked and chewed in India and Pan Parag were tested using microsomal degranulation technique. Results obtained on the basis of RNA/protein ratios (Indices to confirm the detachment of ribosomes from microsomes) showed that tobaccos used for cigarette, bidi, hukah and

chewing tobacco with lime as well as Pan Parag were positively carcinogenic. Two fractions out of 7 isolated chromatographically from salivary extract of chewing tobacco plus lime were found to be carcinogenic. Elemental and spectral analyses indicated that the fractions are possibly an aromatic compound with an aliphatic side chain and N-(buty1 nitrosamine)-1-(3-pyridyl)-4-hydroxy-1-butanone.

TP India (1996) Gup: Descriptive report
Gupta PC, Murti PR, Bhonsle RB. **Epidemiology of cancer by tobacco products and the significance of TSNA.** *Crit Rev Toxicol* 1996;26(2):183-98.
(International Agency for Research on Cancer, Lyon)

Globally, oral cancer is one of the ten most common cancers. In some parts of the world, including the Indian subcontinent, oral cancer is a major cancer problem. Tobacco use is the most important risk factor for oral cancer. The most common form of tobacco use, cigarette smoking, demonstrates a very high relative risk--in a recent cohort study (CPS II), even higher than lung cancer. In areas where tobacco is used in a smokeless form, oral cancer incidence is generally high. In the West, especially in the U.S. and Scandinavia, smokeless tobacco use consists of oral use of snuff. In Central, South, and Southeast Asia smokeless tobacco use encompasses nass, naswar, khaini, mawa, mishri, gudakhu, and betel quid. In India tobacco is smoked in many ways; the most common is bidi, others being chutta, including reverse smoking, hooka, and clay pipe. A voluminous body of research data implicating most of these forms of tobacco use emanates from the Indian subcontinent. These studies encompass case and case-series reports, and case-control, cohort, and intervention studies. Collectively, the evidence fulfills the epidemiological criteria of causality: strength, consistency, temporality, and coherence. The biological plausibility is provided by the identification of several carcinogens in tobacco, the most abundant and strongest being tobacco-specific N-nitrosamines such as N-nitrosonornicotine (NNN) and 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK). These are formed by N-nitrosation of nicotine, the major alkaloid responsible for addiction to tobacco. The etiological relationship between tobacco use and oral cancer has provided us with a comprehensive model for understanding carcinogenesis.

TP India (1996) Nip: Bioassay
Niphadkar MP, Bagwe AN, Bhisey RA. **Mutagenic potential of Indian tobacco products.** *Mutagenesis* 1996 Mar;11(2):151-4.
(Carcinogenesis Division, Tata Memorial Centre, Parel, Bombay, India.)

The mutagenic potential of aqueous extracts of masheri (ME), chewing tobacco alone (CTE) and a mixture of chewing tobacco plus lime (CTLE) was tested using the Ames assay. ME exhibited mutagenicity in Salmonella typhimurium TA98 upon metabolic activation with aroclor-1254-induced rat liver S9, while nitrosation rendered it mutagenic in TA100 and TA102. CTE exhibited borderline mutagenicity in the absence or presence of S9 in TA98 and TA100 and after nitrosation in TA102, while nitrosation led to doubling of TA98 and TA100 revertants. In contrast, CTLE exhibited direct mutagenicity

in TA98, TA100 and TA102, was mutagenic to TA98 upon S9 addition and induced mutagenic responses in all three tester strains after nitrosation. Experiments using scavengers of reactive oxygen species (ROS) suggested that CTLE-induced oxidative damage in TA102 was mediated by a variety of ROS. The high mutagenic potency of CTLE vis a vis that of CTE may be attributed to changes in the pH leading to differences in the amount and nature of compounds extracted from tobacco. Thus, exposure to a wide spectrum of tobacco-derived mutagens and promutagens may play a critical role in the development of oral cancer among users of tobacco plus lime.

TP India (1995) Nar: Assay study
Narang AP, Greval RS, Goyal SC. **Arsenic adulteration in Indian tobacco.** *Indian J Med Sci* 1995 Mar;49(3):55-7.
(Department of Biochemistry, Dayanand Medical College & Hospital, Ludhiana)

Sixty samples of smoking and chewing tobacco from in and around Ludhiana, Punjab were tested for arsenic content. No significant difference between the two groups could be detected. The probable role of arsenicosis in neuropathy and liver disease in the Indian population is discussed.

TP India (1994) Pat: Bioassy
Patel RK, Trivedi AH, Jaju RJ, Adhvaryu SG, Balar DB. **Ethanol potentiates the clastogenicity of pan masala--an in vitro experience.** *Carcinogenesis* 1994 Sep;15(9):2017-21.
(Cell Biology Division, Gujarat Cancer Society, Ahmedabad, India)

The significance of the interaction between alcohol and tobacco in causing head and neck cancers is well documented. Our previous reports on in vitro studies using aqueous and organic extracts as well as cytogenetic studies among pan masala consumers have conclusively shown the genotoxic potential of pan masala--a dry mixture of the areca nut, lime, catechu, unspecified flavouring agents, etc., often containing tobacco, widely consumed in India. In this report, the clastogenic effect of ethanol and pan masala in different combinations was evaluated on Chinese hamster ovary cells using chromosome aberration (CA) frequency as an endpoint. An ethanol concentration of up to 2.0% had no effect on CA/cell value. The low-dose continuous treatment and high-dose short-term pre-, post- and simultaneous treatment of ethanol and aqueous extract of pan masala with and without tobacco yielded dose-dependent elevations in CA frequency, compared to any of these two substances alone. Thus, these results provide evidence that alcohol consumption may potentially increase the risk of oral cancer among pan masala chewers.

TP India (1993) Kay: Comparative study
Kayal JJ, Trivedi AH, Dave BI, Nair J, Nair UJ, Bhide SV, Goswami SV, Adharyu SG. **Incidence of micronuclei in oral mucosa of users of tobacco products singly or in various combinations**. Mutagenesis 1993; 8:1, 31-33.

Carcinogenesis Division, Cancer Research Institute, Tata Memorial Centre, Parel, Bombay, India.

Frequencies of micronucleated cells (MNCs) were analyzed in the exfoliated buccal mucosa of normal healthy individuals from different parts of India who were regularly using either areca nut alone, mava, tamol, tobacco with lime, dry snuff or masheri. The analyses were also carried out among oral submucous fibrosis patients who had the habit of chewing either mava or areca nut. Compared with 'no habit' healthy individuals, all the groups, irrespective of their type of habit, had significantly higher frequencies of MNCs.

TP India (1992) Das: Comparative study
Das RK, Dash BC. **Genotoxicity of 'gudakhu', a tobacco preparation. II. In habitual users.** *Food Chem Toxicol* 1992 Dec;30(12):1045-9.
(Environmental Mutagenesis Unit, School of Life Sciences, Sambalpur University, Orissa, India)

The genotoxic potential of 'gudakhu', a paste-like tobacco preparation that is used widely in Orissa, India, was evaluated using the micronucleus test in exfoliated cells of the buccal mucosa. Cells from 120 habitual users and from 102 non-users were examined. The incidence of micronuclei (MN) was increased in the mucosa cells of users, and the increase was significant in those who had used gudakhu for more than 5 years. The increased incidence of MN was significantly correlated with the period of use of gudakhu, as well as with the frequency of daily use. There were no significant differences between the results for men and women.

TP India (1992) Sti: Comparative study
Stich HF, Parida BB, Brunnemann KD. **Localized formation of micronuclei in the oral mucosa and tobacco-specific nitrosamines in the saliva of "reverse" smokers, Khaini-tobacco chewers and gudakhu users.** *Int J Cancer* 1992 Jan 21;50(2):172-6.
(Cancer Imaging, British Columbia Cancer Research Centre, Vancouver, Canada)

"Reverse"-cigar smokers (who hold the burning end of cigars within the mouth), dippers (who place a mixture of Khaini-tobacco and slaked lime into the lower gingival groove) and users of tobacco-containing toothpaste (gudakhu) in Orissa, India, were examined for precancerous oral lesions, the frequency of micronucleated cells at 3 different intra-oral sites, and levels of tobacco-specific nitrosamines (TSNA) in the saliva. Among reverse-cigar smokers, a high incidence of leukokeratosis nicotina palati, an elevated frequency of micronucleated cells in the palate (2.5% as compared to 0.6% in non-smokers and non-chewers of tobacco) and tongue (2.1%) from which carcinomas preferentially develop, and up to 5890 ppb nitrosonornicotine and up to 1880 ppb N-nitrosoanatabine in the saliva were found. Among Khaini-tobacco chewers, the frequency of micronucleated cells was elevated to 2.1% in the gingival groove, and up to 1580 ng N-nitrosonornicotine, 690 ng N-nitrosoanatabine, 90 ng N-nitrosoanabasine, and 180 ng 4-(methyl-N-nitrosamino)-1-(3-pyridyl)-1-butanone) per ml of saliva were observed. The

localized elevation of the frequency of micronuclei and cancer development is probably due to a synergistic effect of hyperthermia and tobacco-related carcinogens among reverse-cigar smokers, and to the close, prolonged contact between the mucosa and tobacco among Khaini-tobacco/slaked lime dippers. Neither pre-cancerous lesions nor an elevated frequency of micronuclei were seen in the oral mucosa of users of gudakhu, a tobacco-containing toothpaste, which may be due to the low amount of TSNA released from the gudakhu and the short exposure time, which is restricted to the period of tooth brushing.

TP India (1991) Kum: Assay study
Kumar R, Siddiqi M, Tricker AR, Preussmann R. **Tobacco-specific N-nitrosamines in tobacco and mainstream smoke of Indian cigarettes.** *Food Chem Toxicol* 1991 Jun;29(6):405-7.
(Department of Pharmaceutical Sciences, University of Kashmir, Srinagar, Jammu, India)

Different brands of Indian cigarettes were analysed, by gas chromatography-thermal energy analysis, for the presence of carcinogenic tobacco-specific N-nitrosamines (TSNA) in both tobacco and mainstream smoke. Preformed TSNA in cigarette tobacco ranged between 68 and 730 ng N-nitrosonornicotine (NNN)/cigarette, between 19 and 174 ng 4-(N-nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK)/cigarette and between 98 and 519 ng N-nitrosoanabasine (NAB) together with N-nitrosoanatabine (NAT)/cigarette. The amounts of NNN, NNK and NAB/NAT in mainstream smoke were 11-156, 7-73 and 17-146 ng/cigarette, respectively.

TP India (1990) Bhi: Bioassay
Bhide SV. **Carcinogenic potential of some Indian tobacco products.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 217-222.
(Cancer Research Institute, Tata Memorial Centre, Bombay, India)

Although there is epidemiological evidence to link tobacco use with oral cancer in India, the carcinogenic potential of tobacco products has not yet been established in long-term bioassays. In a study conducted in animal systems with tobacco products commonly used in India, we conclude that (i) certain tobacco products used in India are carcinogenic to animal systems; (ii) the carcinogenicity is enhanced by a commonly used herbicide and by chillie extract; (iii) betel quid containing tobacco extract is less harmful than an extract of tobacco alone; and (iv) bidi smoke condensate is also carcinogenic. It is suggested that various modulatory factors may be involved in oral carcinogenesis, and the identification of such factors constitutes an important means of reducing the risk from tobacco.

TP India (1990) Pak: Product assay
Pakhale SS, Jayant K, Bhide SV. **Chemical analysis of smoke of Indian cigarettes, bidis and other indigenous forms of smoking--levels of steam-volatile phenol, hydrogen cyanide and benzo(a)pyrene.** *Indian J Chest Dis Allied Sci* 1990 Apr-Jun;32(2):75-81.
(Cancer Research Institute, Tata Memorial Centre, Bombay)

Levels of steam-volatile phenol, hydrogen cyanide and benzo(a)pyrene in various types of tobacco smoking products marketed in the country have been determined for the first time. Steam-volatile phenol levels in six popular brands of Indian cigarettes varied from 118 to 226 micrograms, and in six popular brands of bidis, from 129 to 273 micrograms. Cheroot and cigarillos yielded 400 micrograms and 333 micrograms steam-volatile phenol respectively. The hydrogen cyanide levels in the mainstream smoke of five popular brands of Indian cigarettes varied from 366 to 638 micrograms and in the mainstream smoke of four popular brands of bidis from 688 to 904 micrograms. Cheroot and cigarillos yielded 588 micrograms and 1119 micrograms hydrogen cyanide respectively. The values of benzo(a)pyrene content in Indian cigarettes varied from 85 to 114 ng and in bidis from 108 to 144 ng. Herbal bidi and cheroot had 1315 ng and 2519 ng benzo(a)pyrene respectively. Cigarettes were smoked as per international standard smoking conditions. Levels of noxious agents were found to be higher than in currently marketed western cigarettes, but cannot be directly compared with those of cigarettes as they were smoked under modified conditions.

TP India (1989) Bhi: Product assay and bioassay
Bhide SV, Kulkarni JR, Padma PR, Amonkar AJ, Maru GB, Nair UJ and Nair J. **Studies on Tobacco Specific Nitrosamines and Other Carcinogenic Agents in Smokeless Tobacco Products.** In: Sanghvi LD and Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 121-131.

Analytical and biological studies of smokeless tobacco products were carried out. Tobacco with or without betel quid, masheri, a pyrolysed tobacco product used as dentifrice, creamy snuff and snuff used for inhalation were analysed for tobacco specific nitrosamines (TSNAs). All the products contained µg/g quantities of nitrosonornicotine (NNN), 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK), N' -nitrosoanatabine (NAT) and N' – nitrosoanabasine (NAB) when analysed. Even the tobacco used for preparation of cigarette, bidi and chutta had substantial amounts of TSNAs. In short term tests for mutagenicity of tobacco, masheri and two important TSNAs e.g. NNN and NNK, it was observed all were mutagenic in Ames test and micronuclei test. Subsequent long term studies on carcinogenicity revealed that masheri induced preliminary stomach papillomas, while tobacco, NNN and NNK induced lung tumors, forestomach tumors and occasionally liver tumors. The studies conclusively prove that tobacco products containing preformed TSNA are mutagenic and carcinogenic.

TP India (1989) Cha: Product experiments
Chakraborty MK, Ghelani LM and Patel BK. **Agricultural and Technological Experiments to Reduce Toxic Chemicals in Bidi Smoke.** In: Sanghvi LD and Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 89-100.

Experimental bidis from tobacco plants with varying genotypes and grown with differing agricultural practices, as well as bidis with varying physical characteristics were tested for their levels of dry TPM, carbon monoxide, nicotine and phenol in smoke. It was observed that well recognized pre-harvest factors affecting tobacco productivity could alter only marginally the levels of these toxic chemicals in bidi smoke. Certain geographical areas, because of their agroclimatic condition and other edaphic factors, are capable of producing relatively less toxic bidi tobacco than other areas. But very few such areas are under bidi tobacco in the country, so the effect is marginal. Among the various physical modifications attempted, replacement of tendu leaf wrapper by cigarette paper reduced the toxic chemicals in bidi smoke considerably but this procedure had its own problems. Perforation of bidis was another modification, which delivered smoke with less toxic chemicals but were difficult to popularize because of loss of smoking pleasure and smoking strength. Bidis with three different filters (20 mg each, of cotton, amber-scented cotton and cigarette filter) also reduced the toxic components in bidi smoke. Scented cotton filter bidi resulted in maximum reduction in smoke toxicants (46.5% to 71.5%), and consumer appeal was also very high.

TP India (1989) Jay: Product assay
Jayant K and Pakhale SS. **Toxic Constituents in Bidi Smoke.** In: Sanghvi LD and Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 101-110.

There are over 130 million bidi smokers in India. Epidemiologic studies have established bidi smoking to be a risk factor in cancers of the upper alimentary and respiratory tract, coronary heart disease and chronic obstructive lung disease. Levels of harmful constituents in a single bidi smoke were estimated under internationally recommended smoking conditions for cigarettes except for puff frequency. The bidi had to be smoked at 2 puffs per minute (instead of one) to keep it burning. Chemical analysis of the bidi smoke shows that overall toxicity as measured by total particulate matter (TPM) and nicotine is high (tar 23-41 mg/ bidi, nicotine 1.74 – 2.78 mg/ bidi). Hydrogen cyanide, which is the strongest cilia toxic agent in tobacco smoke is estimated to vary from 688 µg to 904 µg per bidi. Phenols are known tumor promoting agents and their levels range from 129 µg to 273 µg per bidi. Furthermore benzo(a)pyrene which is often used as an indicator of concentration of tumorigenic PAH in the smoke varies from 108 ng to 144 ng. Emission levels of tar and nicotine based on actual smoking behaviour of the bidi smoker, reveal that the bidi smoker is generally exposed to greater health hazard than indicated by standard machine estimates. Bidis and cigarettes were smoked on the

smoking machine (a) as per standard smoking condition for bidis (for a comparative study of product characteristics) and (b) as per smoking behaviour of the respective type of smokers (to assess exposure levels). The long bidi, despite having less tobacco (1/3 that in a cigarette) was found to yield tar and nicotine values similar to filter king cigarettes in the first comparison and even higher than filter king in the second. For the regular bidi, levels of tar were lower than in cigarettes in both the comparisons. However, the nicotine levels were similar to nonfilter and filter (70 mm) cigarettes in the first comparison and similar to filter king in the second. Low tar and low nicotine bidis are not as yet marketed in the country. Various methods of reduction standardized in the laboratory, some of which are suitable for commercial adoption are discussed.

TP India (1989) Kam: Agricultural experiments
Kameswara Rao BV. **Agricultural Experiments to Reduce Toxic Substances in Cigarette Smoke.** In: Sanghvi LD and Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 111-120.

The chemistry of tobacco leaf has a profound influence on the qualitative and quantitative composition of tobacco smoke and its biological effects. The leaf chemistry in turn is determined by production practices and processing techniques. The chief among them are the genetic and cultural factors (agronomical, pathological, entomological and physiological) and finally the post-curing technologies. This paper discusses the work done on these three aspects by the author and others in the field. Genetic modifications of tobacco plants have resulted in successfully evolving high yielding, pest and disease resistant varieties commensurate with desirable quality traits. However, few deliberate attempts have so far been made to exploit the existing genetic variabilities in lowering tar levels. Other factors also have not yielded any tangible results. It needs to be added that spectacular results have been achieved by adopting innovative cigarette manufacturing technologies for producing low tar cigarettes.

TP India (1988) Nag: Product bioassays
Nagabhushan M, Bhide SV. **Anti-mutagenicity of catechin against environmental mutagens**. *Mutagenesis* 1988 Jul;3(4):293-6.
(Carcinogenesis Division, Tata Memorial Centre, Parel, Bombay, India)

Catechu is the non-mutagenic component of betel quid. We tested catechu extract and catechin for anti-mutagenic activity in Salmonella typhimurium strain TA98 against environmental mutagens relevant to India. Catechu extract, as well as catechin, shows a dose-dependent decrease in the mutagenicity of tobacco and masheri extracts, and bidi and cigarette smoke condensates in TA98 with S9 mix. Mutagenicity of extracts of charred and non-charred meat in TA98 is also inhibited by catechu extract and catechin in a dose-dependent manner with or without S9 mix.

TP India (1987) Bhi: Product Assays and Biossays
Bhide SV, Kulkarni J, Nair UJ, Spiegelhalder B, Preussmann R. **Mutagenicity and carcinogenicity of masheri, a pyrolysed tobacco product and its content of tobacco-specific nitrosamines.** *IARC Sci Publ* 1987;(84):460-2.
(Cancer Research Institute, Tata Memorial Centre, Parel, Bombay, India)

Masheri, an indigenous pyrolysed tobacco product in India, was studied for its chemical, mutagenic and carcinogenic profile. Masheri extract was found to be rich in N-nitrosamines and polycyclic aromatic hydrocarbons. It was highly mutagenic in the presence of an exogenous metabolic system in the Ames test and in the micronucleus test, in a dose-dependent manner. It also induced 8-azaguanine-resistant mutants in Chinese hamster V79 cells. On skin painting, it showed a weak carcinogenic effect in Swiss nude mice. The saliva of masheri users showed high levels of N'-nitrosonornicotine (NNN; 14-43 ppb) and N-nitrosopyrrolidine (NPYR; 2.2-8.3 ppb). Thus, this widespread habit, predominant among women, could be an additive risk factor in the high incidence of oropharyngeal cancer prevalent in India.

TP India (1987) Bhi: Comparative study
Bhide SV and Jayant K. **Salivary Thiocyanate levels and biological markers in tobacco habitués: a study on Indian sample.** *Tob. Res.* 13(1):9-13,1987.

Thiocyanate levels in saliva of cigarette and bidi smokers were tested and compared with those of the no habit group. It was observed that the mean values of the no habit group and the tobacco chewers did not vary in a significant manner but a significant increase was observed in case of cigarette and bidi smokers. The mean value in bidi smokers was higher than that of cigarette smokers.

TP India (1985) Nai: Bioassay
Nair J, Ohshima H, Friesen M, Croisy A, Bhide SV, Bartsch H. **Tobacco-specific and betel nut-specific N-nitroso compounds: occurrence in saliva and urine of betel quid chewers and formation in vitro by nitrosation of betel quid.** *Carcinogenesis* 1985 Feb;6(2):295-303.

In order to evaluate exposure of betel quid chewers to N-nitroso compounds, saliva and urine samples were collected from chewers of betel quid with or without tobacco, from tobacco chewers, from cigarette smokers and from people with no such habit, and were analysed for the presence of N-nitrosamines by gas chromatography coupled with Thermal Energy Analyzer and alkaloids derived from betel nut and tobacco by capillary gas chromatography fitted with nitrogen-phosphorous selective detector. The levels of the betel nut-specific nitrosamines, N-nitrosoguvacoline and N-nitrososoguvacine (the latter being detected for the first time in saliva), ranged from 0 to 7.1 and 0 to 30.4 ng/ml, respectively. High levels of tobacco-specific nitrosamines were detected in the saliva of chewers of betel quid with tobacco and in that of chewers of tobacco, ranging from 1.6 to 59.7 (N'-nitrosonornicotine), 1.0 to 51.7 (N'-nitrosoanatabine) and 0 to 2.3 [4-(methyl-

nitrosamino)-1-(3-pyridyl)-1-butanone] ng/ml. Urinary concentrations of certain N-nitrosamino acids, including N-nitrosoproline, were determined as a possible index of exposure to nitroso compounds and their precursors in the study groups: no clear difference was observed. The betel nut-specific alkaloid, arecoline, was present at high levels in the saliva of betel quid chewers with or without tobacco. Nicotine and cotinine were also detected in saliva and urine of chewers of tobacco and of betel quid with tobacco. In order to assess whether N-nitroso compounds are formed in vivo in the oral cavity during chewing or in the stomach after swallowing the quids, the levels of N-nitroso compounds in betel quid extracts were determined before and after nitrosation at pH 7.4 and 2.1. The results indicate that N-nitroso compounds could easily be formed in vivo. The possible role of N-nitroso compounds in the causation of cancer of the upper alimentary tract in betel quid chewers is discussed.

TP India (1985) Pak: Product experiments
Pakhale SS, Jayant K and Bhide SV. **Methods of reduction of harmful constituents in bidi smoke.** *Indian J Chest Dis Allied Sci.* 1985 Jul-Sep;27(3):148-52.

Bidi smoking is the most prevalent smoking habit in India and is known to be a high risk factor for cancers of upper alimentary and respiratory tracts as well as cardiovascular and respiratory diseases. Bidis with lower dry TPM and nicotine could result in the reduction of risk of these diseases especially the above-mentioned cancers. However, being a cottage industry product, manufacturers do not have the know-how or the facilities for experimentation to modify the bidis. To overcome this limitation, we have for the first time developed four inexpensive methods, which are effective in reducing harmful constituents in bidi smoke. Dry TPM and nicotine in the modified bidis showed reduction varying from 19% to 66% and 55% to 63% respectively. These methods as well as the earlier reported field tested method of cotton silver filter could be tried out commercially.

TP India (1985) Shi: Bioassays
Shirname LP, Menon MM, Murdia US, Bhide SV. **Comparison of mutagenicity of Indian cigarettes and bidi smoke condensates.** *Indian J Exp Biol.* 1985 Mar 23(3):145-8.

Mutagenicity of cigarette and bidi smoke condensates were studied and compared using Ames test, micronucleus test and induction of 8 azaguanine resistant mutants in V79 Chinese Hamster Cells. Both the condensates were found mutagenic in presence of S9 mixture. In Ames test dose dependent mutagenic effect of both the condensates was observed. Between the two condensates, bidi smoke condensate was found to be more mutagenic while in other two tests the effects were of similar magnitude. Both the condensates induced mixed function oxygenases and arylhydrocarbon hydroxylase activities in the liver of mouse injected with the condensate.

7. Interventions to Reduce Tobacco Use

This section contains 26 abstracts of articles describing interventions designed to modify tobacco use behaviours. Some abstracts describe strategies, either proposed or used in an intervention. Others report on interventions evaluated by behavioural variables, such as initiation, cessation and prevalence, while still others were evaluated by the incidence of oral lesions following an intervention. All in all, the results demonstrate the acceptability and efficacy of such interventions in rural areas and in one urban area (Mumbai). These studies demonstrate changed behavior after health education on the dangers of tobacco and improved health outcomes after people stopped using tobacco products. Several of the reports describe the same studies, as different results were reported over a period of several years of intervention and follow-up.

Int India (2000) Vaj: Descriptive report of an intervention
Vajpeyi R. **Addressing the Tobacco Menace with Traditional Tools: An Experience of Naryan Seva Sansthan.** *Lifeline*, September 2000, 4: 9-11. WHO SEARO, New Delhi, India.
(Voluntary Organization in Interest of Consumer Education)

The article reports that an NGO, Narayan Seva Sansthan, has used traditional tools to drive home the message about tobacco hazards in a rural part of the state of Rajasthan. "Rath Yatras" or chariot rallies have been organised and taken around the state. The "Rath" has a special place in Hindu mythology. It is associated with power, protection and status. The "Rath Yatras" aim to kindle those emotions in rural people, who approach the chariots out of "curiosity, awe and fun". In the process, they imbibe the messages given by the volunteers and are made aware of the ill effects of tobacco use. Similar techniques are used by the Sansthan activists when they tour the countryside in caravans, halting at regular intervals. Folklore is also invoked amongst people using song, dance and other cultural events, which draw huge crowds and familiar and accessible to people. The volunteers explain the effects of tobacco use, and show pictures of people suffering from mouth cancer and other diseases caused by tobacco use.

Int India (1999) Ing: Intervention study
Ingole N, Shastri SS and Dinshaw KA. **Changing trends in the occurrence of oral precancerous lesions in Mumbai**. Paper submitted for the "XV Asia Pacific Cancer Conference" at Chennai, 1999.

The Department of Preventive Oncology, Tata Memorial Hospital is involved in the down staging of Head & Neck, Breast and Cervical Cancers through health education and screening activities. Objective: To investigate 1) whether there has been an increase in the health seeking behaviour towards early detection of oral cancers? 2) Whether there are any apparent changes in the trends of occurrence of head and neck cancers? 3) Whether there is any change in the pattern of occurrence of different types of

precancerous lesions? Methodology: The months of June and July were selected randomly and all patients reporting to the out patient clinic of Department of Preventive Oncology for examination of Head & Neck cancer during these months in the past three consecutive years were included in the study. The results suggest that (a) Health seeking behaviour has increased tremendously, probably due to the awareness campaigns conducted through various media by us and other organizations in Mumbai; (b) There has been a noticeable increase in the number of pre-cancerous lesions over the past 3 years; (c) A static trend in oral pre-cancerous lesion-like leukoplakia and sub-mucous fibrosis is seen, while there appears to be a significant increase in occurrence of erythroplakia. Conclusion: Cancer education and awareness programmes having shown great success, and need to be backed up by screening facilities. It is recommended that General Practitioners and Dentists be involved in routine screening of oral pre-cancerous lesions.

Int / TC India (1998) Bha: Descriptive report of an intervention (letter)
Bhandari U. **A tobacco-free town.** *World Health Forum* 1998;19(3):301.

Villagers in Koolimadu, Kerala, launched an antismoking movement when one of the villagers, a chain smoker, died of cancer. When convinced that smoking reduces lifespan, people could be persuaded to give up tobacco. In view of the enthusiastic response, the district administration imposed a total ban on using and selling tobacco and declared the area a tobacco free zone. Groups of youths monitor the ban. So far the penalty for violators of being excluded from village life for a day has not had to be imposed. This small scale success could act as a beacon for others to follow.

Int India (1997) San: Descriptive report of community intervention and screening
Sankaranarayanan R. **Health care auxiliaries in the detection and prevention of oral cancer.** *Oral Oncol* 1997 May;33(3):149-54.
(Unit of Descriptive Epidemiology, International Agency for Research on Cancer, Lyon, France)

Oral cancer is one among the few human cancers with a vast potential for prevention. One of the operational strategies considered to translate preventive measures into practice in developing countries has been the use of community health workers and other health auxiliaries of the primary health care system to disseminate anti-tobacco health education messages and to provide mouth examinations in high-risk individuals during their routine home visits and community meetings. Studies conducted in India and Sri Lanka to address the role of the above approach indicate that it is feasible to train community health workers and other health auxiliaries in primary prevention and early detection of oral cancer and precancerous lesions. However, no evidence of the efficacy of such an approach in reducing the incidence and mortality from oral cancer is yet available. Sufficient evidence in terms of efficacy and cost effectiveness is needed to justifiably convince health administrators to include non-communicable disease control in general and oral cancer screening in particular as part of the primary health care delivery by community health workers and other health auxiliaries especially when considering the

burden of already existing work responsibilities. The need for studies in this direction is very obvious. However, the opportunities for 'case-finding' and health education should be utilised when encountering high-risk subjects both in primary medical and health care.

Int India (1995) Mat: Educational intervention study
Mathew B, Sankaranarayanan R, Wesley R, Nair MK. **Evaluation of mouth self-examination in the control of oral cancer.** *Br J Cancer* 1995 Feb;71(2):397-9.
(Regional Cancer Centre, Kerala, India)

This study was planned to evaluate the feasibility of mouth self-examination (MSE). Some 450 college students distributed to 9,000 households a brochure describing the risk factors of oral cancer, the appearance of premalignant and malignant lesions of the oral cavity and the methods of MSE with pictures. All subjects with tobacco habits and/or aged 30 years or over were asked to read the brochure carefully and to report to the clinic conducted in their locality on fixed days, if they suspected an abnormality while practising MSE. Out of the approximately 22,000 eligible subjects, 8,028 (36%) practised MSE. Among the 247 subjects reporting to the clinics, 7 (3%) had oral cancer and 85 (34%) had oral precancerous lesions; the others had either benign lesions or normal anatomical variations. Six of the 7 subjects with oral cancer had stage I disease, 5 of whom accepted treatment and were alive disease-free 5 years later. The detection rates of oral cancer compared favourably with the previously reported detection rates using trained health workers. Although this study demonstrated that MSE is feasible, larger studies are required to evaluate whether health education could result in a sustained practice of MSE resulting in reduction in incidence of and mortality from oral cancer.

Int India (1995) Ana: Educational intervention study
Anantha N, Nandakumar A, Vishwanath N, Venkatesh T, Pallad YG, Manjunath P, Kumar DR, Murthy SG, Shivashankariah, Dayananda CS. **Efficacy of an anti-tobacco community education program in India.** *Cancer Causes Control* 1995 Mar;6(2):119-29.
(Coordinating Unit, National Cancer Registry Programme, Kidwai Memorial Institute of Oncology, Bangalore, India)

To assess the efficacy of an anti-tobacco community education program in Kolar District, Karnataka, India, an experimental and two control areas were chosen with comparable population, health, and socioeconomic parameters. The two main objectives were to prevent individuals who currently did not smoke or chew tobacco from starting, and to get people who smoke or chew tobacco to stop. Using specially trained primary health care center personnel of the government health care system, a baseline tobacco-use survey of the population was followed by anti-tobacco education of the community in the experimental area only. A repeat survey was done after two years, and a final survey after a further three years. Methods of health education of the community included screening of films, exhibits, and personal contact with a display of photographs of the harmful effects of tobacco. Results were evaluated through changes in prevalence rates,

quit rates, and initiation rates. The final survey showed that in the experimental area, prevalence in the combined sample declined 10.2 percent in males and 16.3 percent in females compared with the baseline rates, and quit rates were 26.5 percent in males and 36.7 percent in females. Among men, a higher proportion (30.2 percent) gave up chewing than smoking (20.4 percent). Erratum in: Cancer Causes Control 1995 May;6(3):280.

Int India (1994) Gup: Intervention study evaluated by oral lesions
Gupta PC, Mehta FS, Pindorg JJ, Aghi MB. **A Behavioural Intervention study of primary prevention of oral cancer among reverse smokers of Srikakulam district Andhra Pradesh.** In: *Oral Oncology* Volume III A *Research*. Ed. Verma AK. 3rd International Congress on Oral Cancer, Madras. MacMillan India Congress on Oral Cancer, 1994, pp 64-67.
(Tata Institute of Fundamental Research, Mumbai India)

The objective of this 10-year epidemiological study was of find out whether health education could result in reverse smoking being given up and thereby decrease the incidence of Palatal Cancers. Interviews and mouth examination of the intervention cohort and control cohorts were carried out. Health Education was provided to the intervention cohort. Palatal changes, particularly the red areas, were recorded. There was a significant difference between percentage of smoking and other kinds of tobacco use in the intervention and control cohorts. The annual age adjusted incidence rates were 2.4 and 7 per 1000 of red areas in intervention and control cohorts in Srikakulam districts after 10 years of follow-up. From the study it was concluded that red areas were the most important component of palatal changes and origin of palatal cancer. Primary prevention of palatal cancer is possible among the population who have many misconceptions about beneficial effects of tobacco.

Int India (1994) Han: Health education strategies (seminar proceedings)
Hans G (Ed). **Healthy Lifestyles: A Basis for Good Health, NSS Unit, TISS: Mumbai.** Proceedings of the seminar organised on July 28-29, 1993, TISS Publication, 1994.

Concern about the increased incidence and early onset of lifestyle related diseases motivated a seminar to explore the possibility of a much needed programme of overall health for student youth, as against the compartmentalized approach to specific health issues. The suggested strategy was one which could enable young people to choose a healthy lifestyle through health consciousness, inculcation of good health as one of the values of life and access to scientific facts on specific health concerns like tobacco, alcohol and substance abuse, sexual precocity, suicide and other stress related problems, injuries and violence. Considering that lifestyle problems occur in clusters, it seems sensible to deal with them together as against the isolated approach. After expert presentations and discussion on the Keynote address by a WHO expert, on the incidence of lifestyle related diseases among youth and the concept of lifestyle and its determinants,

the proposed Lifestyle Education strategy on educational campuses was discussed. The report documents the papers presented and the discussions.

Int India (1994) Mur: Descriptive Report of interventions and studies
Murti P.R., Bhonsle R.B., Gupta P.C. **Tobacco control activities in Kerala, India.** Tobacco Control, SAARC Edition 1994; 1:37

Tobacco use is widely prevalent in Kerala in the form of bidi smoking and betel quid (pan) chewing. Overall, tooth-related problems (48%) and peer-group influence (38%) are common initiating factors for tobacco use. There is an inverse relationship between level of education and use of tobacco. Recognizing the adverse health effects of tobacco use, tobacco control programs are being implemented by various groups and other committed individuals. An extensive intervention study demonstrated the feasibility of tobacco control, provided guidelines, and showed the benefits that could be gained. Other health promotional activities that are being implemented are coordinated by competent professional bodies; but many committed person work independently as well. A strong need to coordinate and guide these activities for optimum benefit to the people is felt. In that context the recently formed National Organization for Tobacco Eradication (NOTE) is noteworthy.

Int India (1992) Agh: Intervention study
Aghi MB, Gupta PC, Mehta FS, Pindborg JJ. **An intervention study of tobacco habits among rural Indian villagers**. In: *Smokeless Tobacco or Health - An International Perspective*. September 1992. USA. Smoking and Tobacco Control Monograph 2. NIH Publication No. 92-3461, pp 307-12.

In a house-to-house screening survey, 36,000 tobacco chewers and smokers were selected from the rural population in three districts of three States in India-Kerala, Andhra, and Gujarat. These individuals were interviewed about their tobacco habits and examined for the presence of precancerous lesions in a baseline survey and then annually over 9 years. They were educated through personal communication as well as mass media to give up their tobacco habits. The results have indicated consistently that it is possible to induce changes in tobacco use of rural populations through educational efforts. This is further substantiated by a significant decrease in the incidence of precancerous lesions. As most cancers in India are reported to be preceded by precancer, this study demonstrates that the primary prevention of oral cancer is feasible, effective, and practicable.

Int India (1992) Agh: Communication strategies for intervention
Aghi MB, Gupta PC, Bhonsle RB and Murti PR. **Communication strategies for intervening in the tobacco habits of rural populations in India.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 303-306.

(Basic Dental Research Unit and WHO Collaborating Center for Oral Cancer Prevention, Tata Institute of Fundamental Research, Bombay, India)

A 10-year prospective intervention study was conducted in three rural areas among 36,000 tobacco users in India with the objective of behavioural modification and habit cessation. This was a complex exercise, considering that the study population was diverse, illiterate and non-voluntary, coupled with characteristic life styles, beliefs and perceived notions on the medicinal importance of tobacco. In-depth studies and pilot surveys were conducted prior to planning the intervention. On the basis of these studies, several communication inputs were designed: (i) personal communication, (ii) films, (iii) posters, (iv) folk-drama, (v) radio programmes, (vi) cessation camps, (vii) dental treatment and (viii) newspaper articles. These were pretested and the population was exposed to them in measured doses. These approaches were found suitable and brought about habit cessation in 14% of the tobacco users. Personal communication which afforded one-to-one interaction was the most preferred input by the population.

Int India (1992) Gup: Intervention study evaluated by oral lesions
Gupta PC, Mehta FS, Pindborg JJ, Bhonsle RB, Murti PR and Aghi MB. **A 10-year follow-up study for primary prevention of oral cancer among Indian villagers.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 304-313.
(Basic Dental Research Unit and WHO Collaborating Center for Oral Cancer Prevention, Tata Institute of Fundamental Research, Bombay, India; Department of Oral Pathology, Royal Dental College Copebhagen and Dental Department, Rigshospitalet, Copenhagen, Denmark)

Oral cancer is caused by tobacco chewing and smoking. In this behavioural intervention study in Ernakulam district, 12,000 tobacco users were interviewed about their tobacco habits, examined for the presence of oral precancerous lesions and exposed to an intensive programme of health education on tobacco use. The control cohort was a subset from an earlier study which used a similar methodology but with minimal behavioural intervention. Results after 10 years of follow-up showed that a higher percentage of individuals stopped using tobacco completely in the intervention cohort than in the control cohort. Several other indicators also showed that the intervention had been effective. As a result, the annual incidence of the most common oral precancerous lesion, leukoplakia, decreased substantially in the intervention cohort. Since most oral cancers are known to be preceded by oral precancerous lesions, the results demonstrate that primary prevention of oral cancer is feasible and practicable.

Int India (1992) Gup: Intervention study evaluated by oral lesions
Gupta PC, Mehta FS, Pindborg JJ, Bhonsle RB, Murti PR, Daftary DK, Aghi MB. **Primary prevention trial of oral cancer in India: a 10-year follow-up study.** *J Oral Pathol Med* 1992 Nov;21(10):433-9.

(Basic Dental Research Unit, Tata Institute of Fundamental Research, Bombay)

Oral cancer is caused by chewing and smoking of tobacco. To assess the feasibility of primary prevention of oral cancer, two cohorts were studied in base-line surveys and then followed up annually for 10 years in Ernakulam district of Kerala state. The intervention cohort consisted of 12,212 tobacco users aged 15 years and over, who were exposed to a concentrated program of education against tobacco use. The control cohort was a non-concurrent cohort of 6,075 tobacco users studied using similar methods but with a minimal amount of advice against tobacco use. The stoppage of tobacco use increased and the incidence rate of leukoplakia decreased significantly and substantially in the intervention cohort compared to the control cohort. The decreased incidence of leukoplakia was indicative of a decreased risk of oral cancer since the two are intimately related. The study demonstrated feasibility of primary prevention of oral cancer.

Int India (1992) Gup: Descriptive report of habits and intervention
Gupta PC. **Smokeless tobacco use in India**. In: *Smokeless Tobacco or Health - An International Perspective.* September 1992. USA. Smoking and Tobacco Control Monograph 2. NIH Publication No. 92-3461, pp 19-25.

Smokeless tobacco (ST) use is very common in India and neighboring countries. The betel quid chewing habit and its variants predominate, but several other forms of ST also are popular. The major use of ST is in the form of custom-made preparations from individual ingredients for immediate use. In recent years several commercial ST products have been marketed, backed by intense advertising and promotion campaigns. It has been possible to educate rural Indian populations and thereby persuade them to reduce their tobacco use; such education has significantly decreased the risk of oral cancer.

Int India (1992) Jos: Intervention
Joseph DT. **Anti-tobacco campaign in Maharashtra, India: achievements and perspectives.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 345-347. (Maharashtra Institute of Development Administration, Pune, India)

Recognizing that cancer is a preventable disease, the Government of Maharashtra, India, undertook an aggressive anti-tobacco campaign, consisting of health education programmes, slogans and billboards reminding nonusers of their right to a tobacco-free environment; a counter-campaign against cigarette advertisements was launched in Bombay City. Coupled with these activities, legislation was enacted making smoking in Government establishments and closed spaces in Maharashtra an offence.

Int India (1991) Gup: Intervention studies evaluated by oral lesions and screening studies
Gupta PC. **Betel quid and oral cancer: prospects for prevention.** *IARC Sci Publ* 1991;(105):466-70.
(Basic Dental Research Unit, Tata Institute of Fundamental Research, Bombay, India)

Betel-quid chewing is an ancient and socially accepted practice. The introduction of tobacco reinforced this practice, and now almost all habitual chewers of betel quids include tobacco. It is well established that chewing of betel quid with tobacco causes oral cancer and is largely responsible for the high incidence of oral cancer in several South Asian countries. The feasibility of primary prevention of oral cancer was studied in a population-based prospective intervention study. A cohort of 12,212 betel-quid chewers and smokers was exposed to a programme of health education for stopping chewing and smoking and subjected to annual examinations for detection of oral precancerous lesions. Evaluations after one, five and eight years showed that primary prevention of oral cancer is feasible and practicable. Early detection of oral cancer is an important control measure. In a secondary prevention study, 53 basic health workers were trained in the detection and referral of lesions suspected of being oral cancer. Over one year, they examined more than 39,000 high-risk individuals, resulting in the detection of 20 cases of oral cancer. The sensitivity and specificity of their diagnoses was assessed through a re-examination of a 5% sample: we concluded that it was possible to incorporate a secondary prevention programme into the existing health care system.

Int India (1990) Gup: Intervention study evaluated by oral lesions
Gupta PC, Mehta PS, Pindborg JJ, Daftary DK, Aghi MB, Bhonsle RB and Murti PR. **A primary prevention study of oral cancers among Indian Villagers. Eight-year-follow up results.** In: *Evaluating effectives of primary prevention of cancer*, Ed. Hakama M, Beral V, Cullen JW & Parkin DM. Lyon, International Agency for research on Cancer, 1990.

This cohort study was carried out in Ernakulam district in Kerala state to assess the feasibility and effectiveness of primary prevention programme for oral cancer. The intervention cohort consisted of tobacco users 15 years and over. The intervention cohort was subjected to a concentrated programme of health education (personal as well as mass media communication) concerning tobacco use in various forms, whereas the control cohort was not subjected to any such campaign. Reduction of tobacco use was higher in intervention cohort than control cohort. The annual age-adjusted incidence of leukoplakia after 8 years of follow up was 2.5 and 3.5 per 1000 amongst men and women in intervention and control cohorts. Among men decrease was seen in chewers but more in smokers and men with mixed habits. Health education was effective in decreasing use of tobacco. Also a positive dose response was seen in tobacco use and oral leukoplakia.

Int / OSF India (1990) Mur: Intervention study evaluated by oral lesions
Murti PR, Gupta PC, Bhonsle RB, Daftary DK, Mehta FS, Pindborg JJ. **Effect on the incidence of oral submucous fibrosis of intervention in the areca nut chewing habit**. *J Oral Pathol Med* 1990 Feb;19(2):99-100.
(Basic Dental Research Unit, Tata Institute of Fundamental Research, Bombay, India)

Incidence of oral submucous fibrosis was calculated from a 10-yr prospective intervention study of 12,212 individuals with a strong component of health education about tobacco and area nut chewing. Based on 11 new cases among 6341 chewers, the annual incidence was 8.0 per 100,000 among men and 29.0 for women. An earlier 10-yr follow-up study, with no intervention component, served as control. Based on 11 new cases among 3,809 chewers, the annual incidence was 21.3 per 100,000 for men and 45.7 for women controls. Although the decrease in the incidence in the intervention cohort was not statistically significant due to small number of cases, the results underscored the causal role of areca nut chewing and indicated the potential for primary prevention of oral submucous fibrosis.

Int India (1989) Agh: Intervention study evaluated by oral lesions
Aghi MB, Gupta PC, Mehta FS, Pindborg JJ. **An Intervention Study to Control and Contain Oral Cancer.** In: Sanghvi LD and Perin Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 141-146.

In a house to house screening survey, 36,000 tobacco chewers and smokers were selected from the rural population in 3 districts of 3 states in India (Kerala, Andhra and Gujarat). These individuals were interviewed about their tobacco use and examined for the presence of precancerous lesions in a baseline survey and then annually for 9 years. Detailed interviews of the habitues were conducted to investigate the reasons for starting and continuing tobacco use, the perceived social, economic and health implications and possible reasons that could make them give up their habits. They were educated on reasons to give up their tobacco using personal communication and mass media. Among the various communication modes, one-to one-interaction and cessation camps appear to have aided the target population immensely. The project's unique feature has been its user-based philosophy, characterised by providing appropriate input depending upon the 'stage' of the subject in knowledge, attitudes and practices. The results indicate that it is possible to induce changes in tobacco use by rural populations through education. This is further substantiated by a significant decrease in the incidence of precancerous lesions. As most cancers in India are preceded by precancer, this study demonstrates that primary prevention of oral cancer is feasible, effective and practicable. This type of project could be used at the national level by training the MPW and health personnel to perform oral examinations for early detection of lesions both precancerous and cancerous.

Int India (1989) Bha: Intervention study
Bhargava MK, Javare Gowda JL, Ramakrishna V, Narayan R, Achuthan C, Subbe Gowda HB, Shanmugam AV, Basavaraj HR, Kumaraswamy SV, Raghunath P, Murthy AG. **Development of Intervention Studies in Karnataka to Modify Tobacco Related Behaviour.** In: Sanghvi LD and Perin Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 150-158.

A survey-cum-education project in rural Karnataka assessed the efficacy of an anti-tobacco community education program. The objectives were: 1) to prevent onset of tobacco habit in non-habitués and 2) to stop the habit in habitués. The paper describes in detail the first phase of the project.

Int India (1989) Mat: Intervention studies
Mathew B. **Intervention Studies of Tobacco Behaviour Modification in Kerala State.** In: Sanghvi LD and Perin Notani PP, eds. *Tobacco and Health: The Indian Scene.* Proceedings of the UICC workshop, 'Tobacco or Health', April 15-16, 1987. Tata Memorial Centre, Bombay, 1989, pp 147-149.

The Community Oncology Division of the Regional Cancer Centre was started in May 1985 and since then has engaged in various intervention programmes in Kerala state, to modify tobacco related behaviour. These programmes are described in the paper.

Int India (1988) Nar: Comparative report on educational materials
Narayanan RS. **A comparison of cancer educational resources to prevent smokeless tobacco usage in India and the United States.** *J Cancer Educ* 1988;3(4):257-8.

The prevalence of smokeless tobacco use in India is much higher than in the United States, but health education materials on smokeless tobacco are much more widely available in the United States than in India. High incidences of oral cancer among both men and women in India is attributed in large measure to smokeless tobacco use, chewed especially in pan (betel quid), but there are many more forms of smokeless tobacco in use in India than in the United States. The reasons for the paucity of educational materials on smokeless tobacco seem to include: the fact that infectious diseases, being very common, are the main focus of most health education materials; health professionals are reluctant to use their skills in preparing and advising on the preparation of such materials; there is a lack of an indigenous cancer education strategy, financial resources are limited; the establishment of a national cancer control plan and Regional Comprehensive Cancer Centres are only recent phenomena. There is a need for more print and audiovisual materials. This should be done keeping in mind the high quality of tobacco advertising that commands the attention of the public, as well as current trends in tobacco use patterns. Educational material must be attractive, with simple language and unequivocal meaning: it should incorporate messages about all forms of tobacco chewing and

smoking. Skilled commercial artists should be motivated to work with health professionals and health authorities in preparing these materials.

Int / Psy (1987) Agh: Descriptive report of tobacco habit psychology
Aghi MB. **Psychological aspects of acquisition and cessation of tobacco habits in India.** *World Smoking and health*, 1987,12(2).
(Tata Institute of Fundamental Research)

(For abstract, see: Psy / Int India (1987) Agh: Descriptive report)

Int India (1987) Agh: Description of intervention communication methodology
Aghi MB. **Intervention: A step to contain and control oral cancer.**
Presented at the UICC Workshop April 15-16, 1987, Tata Memorial Centre, Bombay.

Objective: The intervention was designed to make people leave their tobacco habits and to investigate any effect this might have on incidence and regression rate of precancerous lesions and in controlling/assessing oral cancer incidence. Methods: A study population of 12,000 tobacco habitues aged 15 years and over were selected from each of the three districts of Ernakulam (State of Kerala), Bhavnagar (State of Gujarat) and Srikakulam (State of Andhra Pradesh). Tobacco use included smoking cigarettes, bidis, smoking chutta, both conventionally and reverse and chewing tobacco with or without lime. Every individual in the target population was examined annually by a team of professional dental surgeons and social scientists to measure the changes in the incidence and regression pattern of leukoplakia. The interventions were planned after appropriate pilots and pretesting. Detailed interviews of the habitués investigated the reasons for starting and continuing tobacco use, perceived social, economic and health effects and the reasons that might make them give up their habits. Pilot surveys were conducted to assess the communication media facilities available to the target population. The unique feature of this project has been its user-based philosophy, characterized by providing appropriate input, depending upon the stage of the subject. Modes of communication used were: (1) personal communication, one to one contact with the target population to help them sort out various doubts and learn how to quit; (2) films gave information about the links between tobacco use and oral cancer, how the habits starts and and how it can be given up; (3) posters were displayed as a reminder to the target population that they ought to be reconsidering their tobacco habits; (4) newspaper articles were published to inform and educate people on the subject of oral cancer; (5) folk dramas were enacted to talk about the prevalent superstitious and misconception about tobacco; (6) radio programs motivated people to give up their tobacco habits to prevent cancer; and (7) various other activities like clinics, exhibits, group meetings, and cessation camps were carried out. Conclusion: This type of project can be used at the national level by training the MPW and Health personnel to examine the mouths for early detection of lesions both precancerous and cancerous.

Int India (1986) Gup: Intervention study
Gupta PC, Aghi MB, Bhonsle RB, Murti PR, Mehta FS, Mehta CR, Pindborg JJ. **An intervention study of tobacco chewing and smoking habits for primary prevention of oral cancer among 12,212 Indian villagers.** *IARC Sci Publ* 1986;(74):307-18.

In a house-to-house screening survey, 12,212 tobacco chewers and smokers were selected from the rural population in the Ernakulam district, Kerala state, India. These individuals were interviewed about their tobacco use and examined for the presence of oral cancer and precancerous lesions, first in a baseline survey, and then annually, over a five-year period. They were educated using personal and mass media communication to give up their tobacco habits. The control group was provided from the results of the first five years of a 10-year follow-up study conducted earlier by the authors in the same area with the same methodology but on different individuals without any educational intervention. The stoppage of the tobacco habit was substantially higher in the intervention group (9.4%) than in the control group (3.2%). Logistic regression analysis showed that the behavioural intervention was helpful to all categories of individuals, however, the effect was different for different categories: intervention was more helpful to men, chewers, and those with a long duration of the habit. These individuals rarely quit their habit without intervention.

Int India (1986) Gup: Intervention study evaluated by oral lesions
Gupta PC, Mehta FS, Pindborg JJ, Aghi MB, Bhonsle RB, Daftary DK, Murti PR, Shah HT, Sinor PN**. Intervention study for primary prevention of oral cancer among 36 000 Indian tobacco users.** *Lancet* 1986 May 31;1(8492):1235-9.

In a house-to-house survey, 36,471 tobacco chewers and smokers were selected from the rural population in three areas of India. These individuals were interviewed about their tobacco use and examined for the presence of oral leukoplakia and other precancerous lesions, in a baseline survey, and then annually for 5-years. Personal advice and mass media was used to encourage them to give up their tobacco habits. The follow-up rate was 97%. The control cohort was provided by the first 5-year results from a 10-year follow-up study conducted earlier in the same areas with the same methodology but on different individuals without any educational intervention. In Ernakulam district (Kerala) and Srikakulam district (Andhra) substantially more people stopped their tobacco habit and reduced the frequency of tobacco use in the intervention cohort than in the control cohort; in Bhavnagar district (Gujarat) the intervention group showed only a slightly higher proportion stopping their tobacco habits and no difference in the proportion reducing them. The 5-year age-adjusted incidence rate of leukoplakia in Ernakulam district was 11.4 in the intervention group versus 47.8 among men, and 5.8 versus 33.0 among women; and for palatal lesions in Srikakulam district the corresponding figures were 59.8 versus 260.8 among men and 289.5 versus 489.5 among women. In Bhavnagar the incidence rate of leukoplakia did not differ between the cohorts. Since most oral cancers are preceded by precancerous lesions, education on tobacco habits should be a feasible and effective approach to primary prevention of oral cancer.

Int India (1985) Agh: Descriptive report on educational strategies
Aghi, MB. **Strategies to motivate people against the use of tobacco.** Paper for WHO Regional Workshop on Control of Tobacco Related Diseases, Delhi, July 22-26, 1985.

The information given should be correct, and simple enough to reach the least educated. All media should be used, both those directed to masses and those directed to small groups and individuals. Information given to motivate people against the use of tobacco should include personalization of the risk. All levels of health workers should be made aware that smoking is fast becoming a visible cause of disease and that the hidden costs of the future consequences can be avoided by taking action now. Consumers and potential consumers need to be informed of what happens when tobacco is consumed and how necessary it is to avoid it. The health educator must not use tobacco. The information given should be personally relevant to the consumer, tailored to his/her beliefs and lifestyle. The positive message of the importance of staying healthy goes a long way to convince people. A tobacco free life is a healthy life. By staying away from tobacco you are avoiding many diseases. Focus on the prevalent tobacco habits in the area, when addressing a group. Request people to give up tobacco for just a few days and then decide whether they should give it up permanently or not. Make yourself available to support those giving up tobacco and see them through their withdrawal symptoms, which are only temporary. Emphasise that those who have given up tobacco have said that the discomforts do not last very long. Impress upon parents that their children are more likely to use tobacco if they do. Parents who die prematurely due to tobacco use deprive their children of their social support. Tobacco use is harmful and expensive. Money saved – health gained. Professionals, doctors and educated people are starting to stay away from tobacco. Tobacco cannot cure toothache, but can cause oral cancer. Avoid smoking and you will breathe easier. Smoking is like slow poisoning. Tobacco use during pregnancy may harm your child.

8. Tobacco Control Policies and Measures

Thirty articles on tobacco control policies and measures summarized here contain suggestions and reports of existing and proposed policies, interventions, legislation and litigation at Central and State levels and reactions by the tobacco industry and public.

TC India (2003) Sta: News article
Staff Reporter**. Experts support Tobacco Control Bill. Coalition of public health experts step forward to support pro-health legislation.** *The Hindu*. Monday, April 7, 2003, New Delhi, page 4.

A coalition of health experts has stepped forward to support the Government of India in preparing the landmark Tobacco Control Bill, due to be tabled in the Parliament shortly by the Union Minister of Parliamentary Affairs, Health and Family Welfare, Sushma

Swaraj. The Bill aimed at controlling tobacco supply and demand, consumption and advertising, is expected to go a long way in curtailing the life-threatening effects of tobacco usage on Indian society.

The coalition of health professionals, research scientists, NGOs and like-minded people from organisations including the Cancer Patients Aid Association, Consumer Education and Research Centre, HRIDAY - SHAN, Tata Institute of Fundamental Research and VHAI have come together to form the Advocacy Forum for Tobacco Control (AFTC). "It is in the nation's interest that the Bill is passed at the earliest in its current form", says the Coordinator of HRIDAY-SHAN and founding member of AFTC, K S Reddy. "The Bill will help in curbing the colossal threat from Tobacco, increasingly corroding people's health. It will also help prevent the sale of tobacco products to minors and curb tobacco advertising. It will be a major advance for the public health efforts in India."

The Bill, meanwhile, also seeks to put a total ban on advertising of tobacco products and prohibits sponsorship of sports and cultural events either directly or indirectly. Also, it prohibits the sale of tobacco products to minors, and specifies that the new warning on cigarette packs should be more prominent in terms of liability, language, colour and display. The Bill proposes that the Nicotine and Tar content will have to be specified on packs. Goods without specified warnings on nicotine and tar will be confiscated and penalties will be levied.

"In March this year, delegates to the World Health Organisation agreed upon the wording of the Framework Convention on Tobacco Control (FCTC), the world's first anti-tobacco treaty. The Indian Tobacco Control Bill has many provisions similar to FCTC, and if made into an Act, will establish India as the pioneer nation to conform to WHO standards regarding tobacco", explained Dr.Reddy.

According to WHO projections, by 2030, tobacco will be the leading cause of death, claiming 10 million lives a year. The proportion of tobacco-related deaths that occur in developing countries is expected to increase from the current 50 per cent of global tobacco related deaths to 70 per cent for the same period. The incidence could be higher in India, with one billion cigarettes currently being smoked everyday. It is very likely that tobacco related deaths, which currently number 800,000-900,000 per year, would rise three to four-fold over the next 30 years.

TC India (2003) Shi: Descriptive report

Shimkhada R, Peabody JW. **Tobacco control in India.** *Bull World Health Organ.* 2003; 81(1):48-52. Epub 2003 Mar 11.

(Department of Epidemiology, School of Public Health, UCLA, Los Angeles, CA, USA.)

Legislation to control tobacco use in developing countries has lagged behind the dramatic rise in tobacco consumption. India, the third largest grower of tobacco in the world, amassed 1.7 million disability-adjusted life years (DALYs) in 1990 due to disease and injury attributable to tobacco use in a population where 65% of the men and 38% of the women consume tobacco. India's anti-tobacco legislation, first passed at the national level in 1975, was largely limited to health warnings and proved to be insufficient. In the last decade state legislation has increasingly been used but has lacked uniformity and the

multipronged strategies necessary to control demand. A new piece of national legislation, proposed in 2001, represents an advance. It includes the following key demand reduction measures: outlawing smoking in public places; forbidding sale of tobacco to minors; requiring more prominent health warning labels; and banning advertising at sports and cultural events. Despite these measures, the new legislation will not be enough to control the demand for tobacco products in India. The Indian Government must also introduce policies to raise taxes, control smuggling, close advertising loopholes, and create adequate provisions for the enforcement of tobacco control laws.
http://www.scielosp.org/scielo.php?script=sci_arttext&pid=S0042-96862003000100010&lng=en&nrm=iso

TC India (2002) Cha: Descriptive report
Chaudhry K. **Tobacco Control in India**. In Agarwal SP, Rao YN and Gupta S (eds). *Fifty Years of Cancer Control in India.* National Cancer Control Programme, Directorate of Health Services, Ministry of Health and family Welfare, Government of India. November 2002, pp196-211. Available at http://www.mohfw.nic.in/cancer.htm (Indian Council of Medical research, New Delhi)

The chapter begins with a succinct summary of prevalence studies in India, tobacco-attributable deaths and key diseases, and the ICMR estimates of treatment costs. IT summarizes key tobacco control efforts in India under the sub-headings: Warnings on cigarette packages/advertisements, Warnings on smokeless tobacco products, Cabinet guidelines for smoking in public places, Comprehensive legislation on tobacco control, Multisectoral approach for tobacco control (including the 1991 national conference and various government-led consultations and discussions), Community education on tobacco, Expert committee on health hazards of pan masala containing tobacco, Tobacco control cell, FCTC, Tobacco control and society.

TC India (2002) Con: Descriptive news report
Consumer Coordination Council. **Anti-tobacco activities of Consumer Organisations**. Consumer Network, December 2002, 9 (4):2-4. www.consumer-netindia.org

This article in the quarterly news magazine of the Consumer Coordination Council of India briefly notes the various activities of consumer organisations in cities in India: Mumbai (seminar), Chennai (information dissemination, especially in schools), Ahmedabad (advocacy litigation and law), and New Delhi (monitoring the tobacco industry's trade and marketing practices.

TC India (2002) Sim: News analysis
Simpson D. **India: states ban oral tobacco**. *Tobacco Control* 2002;11:291.

Gutkha and paan masala, two oral products used with or without tobacco, were banned from 1 August 2002 in Maharashtra state, where even school and college students are

increasingly becoming users. The ban covers the manufacture, storage, distribution, sale, and advertising. A 1997 survey in the capital Mumbai (formerly known as Bombay) found that 10–40% of school children and 70% of college students used the products. Perhaps the most interesting aspects of the move concern how it was made. First, no new law has been passed: the ban was made following a state Cabinet decision, by simply issuing an order under "enabling" legislation, the Prevention of Food Adulteration Act. Second, it is widely rumoured that Mr Sharad Pawar, leader of the ruling political party, was diagnosed and treated for oral cancer due to gutkha use just a few days before the Cabinet decision. Many are doubtful about the potential effectiveness of the Maharashtra ban, as there are few officials to enforce it and at present users and illegal traders can cross into neighbouring Madhya Pradesh or Gujarat states to get it. In addition, a ban on the sale of gutkha within 100 metres of educational institutions and government owned offices in Mumbai has not been enforced. However, the net is tightening, with Madhya Pradesh and Uttar Pradesh passing their own, similar bans, and the Rajasthan cabinet has decided in principle to ban gutkha. In addition, the high courts in Tamil Nadu and Andhra Pradesh have also ordered bans, although in each case, implementation has been stayed by the Supreme Court on procedural grounds. Oral tobacco is estimated to cause over 160 000 new oral cancer cases in India every year.

TC India (2002) Pai: News Article
Pai S.A. **Gutkha Banned in Indian States**. *Lancet Oncology* 2002:3(9) 521.

The manufacture, sale, and use of gutkha (a chewable, flavoured tobacco product) and pan masala (a non-tobacco product made of areca nuts) has been banned in the state of Maharashtra, India, for the next 5 years. Anyone selling these substances will face a minimum fine of Rs1000 (about US$40) and possible imprisonment of up to 3 years.

TC India (2001) Gov: Draft bill
Government of India. **The Cigarettes and Other Tobacco Products (Prohibition of Advertisement and Regulation of Trade and Commerce, Production, Supply and Distribution) Bill 2001**. As introduced in the Rajya Sabha.

(no abstract available)

TC India (2001) Gup: Policy report
Gupta PC. **Tobacco Products Bill 2001: an aid to public health.** *Natl Med J India* 2001 May-Jun;14(3):131-4.

The control of tobacco use is extremely important for improving public health. The Tobacco Control Bill proposed by the Government of India should be seen thus. Will the measures proposed therein help in reducing the use of tobacco? The salient features of the Bill and their likely usefulness are as follows:

- Prohibit the advertisement of all tobacco products. This has been identified by many studies as the most important prerequisite for tobacco control. It also responds to the principle that commercial enterprises must not be allowed to mislead the public.
- Prohibit smoking in public places. This is based on the premise of protecting nonsmokers from tobacco smoke and its attendant dangers. Children are the most vulnerable, as shown by scientific studies.
- Prohibit the selling of tobacco products to persons below 18 years of age. This is an emotive and politically correct policy, which even the tobacco companies support. However it is very hard to enforce, and has been found ineffective in curbing tobacco use among children, as children usually get what they want.
- Indicate nicotine and tar contents on the packets. This is to be seen in the context of the next point, although it does little for tobacco control and sometimes may actually be harmful by providing false assurances.
- Have warnings of adverse health effects on tobacco product packages in English as well as Indian languages. The public, as consumers, should be informed of the risks of using tobacco products.
- Place a total ban on sponsoring any sports/cultural event by cigarette and other tobacco product companies. Sponsorship is a form of advertising and as such should be banned. A study carried out in India showed that this form of advertisement led to children experimenting with tobacco.

In India there is a whole range of products that need to be controlled. The Central and State governments have jurisdiction over different areas: while the Central Government can legislate on cigarettes, the States are responsible for legislation on bidis, and other smoking and smokeless products. Several states have begun the legislation process. Smokeless tobacco products, since they satisfy all criteria of being food items, need to be governed by applicable laws, such as the illegality of producing carcinogenic foods. The Central Committee on Food Safety has reported to the Central Government that smokeless tobacco products are hazardous to health. Thus the Government is duty bound to ban these products but is choosing to proceed slowly. The proposed Bill needs to be placed in both houses of Parliament and be passed before it becomes law. It would signify a new beginning for tobacco control efforts and improvement of public health.

TC India (2001) NGO: Declaration
NGOs of India (various) **Indian NGO declaration on the Framework Convention on Tobacco Control**. Reproduced in *Consumer Network* 9 (4):24, December 2002, Consumer Coordination Council.
(www.consumer-netindia.org)

On 17 December, 2001, twenty-four NGOs in India released a declaration to the media in Delhi, noting the steady increase in tobacco-attributable disease and death, alarmed by aggressive advertising and promotion by the industry, and conscious of the importance of civil society's active participation in the FCTC process. The declaration affirms their support for the FCTC and the tobacco control bill that was subsequently approved by the Indian parliament, and urges the central and state governments in India to raise taxes on tobacco products, and use a small part of the revenues for proven effective tobacco

control measures, and urges governments to ban all forms of tobacco advertising, promotion and sponsorship, to support international actions to curb tobacco product smuggling, and take measures to protect the public from exposure to tobacco smoke.

TC India (2000) Cha: Analytical Report
Chaudry, K. **Multisectoral and intersectoral approach to national tobacco control**. Background paper for WHO's Conference on Global Tobacco Control Law: towards a WHO Framework for International Tobacco Control, New Delhi, 7 January, 2000, 34 pages.
Available on line on the Tobacco Free Initiative website of the WHO, Framework Convention on Tobacco Control/Technical conferences/WHO Meeting of Public Health Experts - at http://www5.who.int/tobacco/page.cfm?tld=91
(Deputy Director General, Indian Council of Medical Research)

This 34 page paper lists the various stakeholders with an interest in tobacco growing, sales and tobacco control, and notes the need for intersectoral action, if efforts to reduce tobacco use are to succeed. It provides a useful international context, before focusing on intersectoral efforts in India. These include working with the education ministry in Goa, with the Agriculture ministry to identify viable alternative crops for farmers; a large educational campaign with All India Radio, and Parliamentary discussion of the issues of tobacco in 1995. There is a discussion of the economics of tobacco in India, including a review of health and other costs associated with tobacco, and an extensive discussion of taxation of tobacco products in India. The paper also discusses the use and evidence for impact of other tobacco control measures in India, as well as pointing out how multi-sectoral actions could make a difference, with respect to: health warnings, reducing tar and nicotine levels, advertising restrictions, bans on smoking in public places, community education, tobacco product bans, and crop substitution. The final section suggests mechanisms to strengthen inter-sectoral efforts to reduce tobacco use in India.

TC India (2000) Gup: Descriptive report
Gupta PC**. Ethical issues raised by smoking**. Proceedings of the Symposium on International Health and Medical Ethics – Harvard SPH Takemi Symposium, December 1-2, 2000. Tokyo. Japan Medical Association and Harvard School of Public Health.

Cigarette smoking has been universally accepted as a cause of serious disease and death all over the world. Recently even cigarette companies have stopped questioning this scientifically established fact. The relationship between smoking and diseases continues to raise interesting ethical issue for health professionals. At one time, smoking by doctors in their office in presence of patients, even offering them a cigarette may have been a norm, today it would be completely unacceptable. Quite naturally, doctors were the first group in which the prevalence of smoking declined substantially. In many countries, associations of health professionals have been in the forefront in actively propagating anti-tobacco messages and working towards tobacco control. There are still many areas where certain practices could be considered questionable – for example

smoking is still not banned in all meetings of health professionals and conferences organized by their associations. The International Union Against Cancer is the first major organization to mandate a complete ban on smoking in any event organized under their auspices. There are other examples of complicity, e.g., most physicians still do not mind leaving magazines in their waiting rooms that advertise smoking. Ethically, medical practitioners should not smoke and should advise their patients against smoking and also should not provide any direct or indirect endorsement of advertising and promotion of smoking. A related issue is exposure of non-smokers to environmental tobacco smoke (ETS). Scientific evidence of adverse health consequences on exposure to ETS is conclusive and many public polices have been implemented on the basis of this evidence. It has also been concluded that exposure of children to ETS may result in specific health problems such as middle ear infections and exacerbation of asthma attacks. Whereas smoking by pregnant women receives routine attention in medical practice because of possible harm to fetus, possible harm to children by smoking parents has received little attention so far.

TC India (2000a) Gup: Interview and commentary
Gupta PC. **The Case Against Gutka in India.** *Lifeline,* March 2000, Vol 3: 12 & 14. WHO SEARO, New Delhi, India.

Gutka is a generic name for a product that contains tobacco, areca nut and several other substances, sold in powdered or granulated form in small sachets. It is chewed and sucked, then spat out or swallowed. It was introduced in India as a commercial product in the early 1970s, and quickly became widely sold and used. Gutka causes cancer of the mouth, which takes many years to develop, and oral submucous fibrosis (OSF), which develops fast, and has become epidemic in India. A study of over 20,000 adults in Gujurat in the 1990s found a prevalence of OSF of 11% among mawa users, whereas it had been 0.2% in the same district in 1967. The increase was attributable to increased use of areca nut products. To try and curb and regulate gutka promotion and use, a public interest litigation was filed in a State High Court. The Central Committee on Food Standards conducted hearings and investigations, and concluded that gutka is dangerous, and recommended an outright ban. The gutka lobby fought against the ban, and one manufacturer said: “Gutka is harmful and we do not object to a ban, but cigarettes should be banned first.”

TC India (2000) Kha: Descriptive Report
Khanna SR, Vajpayi R and Assunta M. **Consumer protection and tobacco-NGO strategies for combating tobacco proliferation in developing countries of Asia**. Background paper for WHO’s Conference on Global Tobacco Control Law: towards a WHO Framework for International Tobacco Control, New Delhi, 7 January, 2000, 33 pages.
Available on line on the Tobacco Free Initiative website of the WHO, Framework Convention on Tobacco Control/Technical conferences/WHO Meeting of Public Health Experts - at http://www5.who.int/tobacco/page.cfm?tld=91

(Commerce and Business Studies, University of Delhi; Dept. of English, Kamala Nehru College, University of Delhi, Consumers' Association of Penang (CAP))

This paper lists the various stakeholders in tobacco and tobacco control: government, industry, consumers, the judiciary, and provides examples of how they have interacted in India, and the roles that NGOs have played or could play, in working with (or against) each group. It also discusses six areas "basic to consumer protection that countries should address in tobacco control measures" (p8): tobacco advertising, sponsorship, restrictions on cross-border media, restriction on smoking in public places, bans on sales to minors, and restrictions on labelling, packaging and pricing. In each case, examples from various countries in Asia are given, and comments made on the situation in India. Another section discusses the various consumer rights that are involved in tobacco use and control, and then a Section discusses "Why NGOs Should Work in the Area of Anti-Tobacco", the roles that NGOs can play, and the problems they typically encounter. A section that talks about the strategies that NGOs can use in tobacco control, includes a short case study on 'Narayan Seva Sansthan', an Indian NGO operating in rural Rajasthan, that has taken the anti-tobacco message deep into the heartland of the state and has been able to succeed with its culture-specific approach. Simple tools like use of the local language, pictorial references, posters and catchy slogans in the local dialect have been implemented to good effect It also comments briefly on NOTE - India, (National Organisation for Tobacco Eradication) an anti-tobacco networking organisation based in the western Indian state of Goa, which has been successful in targeting schoolteachers and the education department to act as catalysts to bring about increased awareness of the harm that tobacco causes. The paper also provides numerous specific examples of NGO activities in other countries. Another Indian example described is that of the Regional Cancer Centre, Trivandrum, which is not an NGO but a governmental centre working towards the goal of tobacco induced cancers eradication in the southern Indian state of Kerala. RCC (TVM) has developed a community based anti-tobacco education model which strives to develop a personalised approach towards education, using volunteers from the community. It also describes an example of litigation initiated by an Indian NGO, VOICE (Voluntary Organisation in Interest of Consumer Education) against tobacco giant ITC for indulging in unlawful forms of advertising in 1985, and the efforts by VHAI (Voluntary Health Association of India), a Delhi based health NGO, to counter surrogate advertisements or brand stretching ploy initiated by tobacco companies, by litigation against WILLS (a subsidiary of BAT) for surrogate advertising through sponsoring the Indian Cricket team.

TC India (2000) Kum: Policy report
Kumar S. **India steps up anti-tobacco measures**. *Lancet*, Vol 356, Sep 2000, p 1089.

This article mentions the various steps taken by the Indian Govt. to discourage tobacco use. It highlights the incidence of oral cancers and disease due to tobacco consumption. A public interest Writ Petition was filed in the Delhi High Court for lapses in implementation of the Delhi Prohibition of Smoking and Non-smoker health Protection Act 1996. The petition specifically charged that the Delhi Government was not implementing sections 8 and 9 of the Act which pertain to the sale of tobacco products to

anyone younger than 18 years of age and the sale of such substances in the vicinity of educational institutions. Delhi's Health Minister, A.K. Walia, said that the ban on sale to children would come into effect immediately, and the ban on sale near schools would begin in Jan.2001.
On Sept.8 the Central Govt. amended the Cable Network Rules and banned television advertisements for tobacco, alcoholic drinks and baby-milk formula on television.
India's Health Minister C.P. Thakur told the Lancet at the Regional Committee Meeting of the WHO that India was moving towards banning smoking in Government Offices nationwide and was working on comprehensive tobacco-control legislation. The national sample surveys data indicate that there are some 184 million tobacco users in India, this has attracted the attention of experts and policy makers in India. The incidence of oral cancers in India caused by tobacco chewing is one of the world's highest, at nearly a third of all cancers cases. In urban India 25% of people older than 40 years of age who smoke also have chronic bronchitis. A major study by the ICMR found that three tobacco related disease groups – cancers, coronary artery disease and chronic obstructive lung disease cost the country more than the sales value of all tobacco products. According to the ICMR there are 1.60 lakh people developing cancer, 4.5 million people with angina or heart disease and 3.9 million people with chronic obstructive lung disease as a result of tobacco consumption. According to WHO, by the year 2020, tobacco will be solely responsible for 13.3% of all deaths in India. Despite public health measures, experts are concerned that the tobacco industry is increasingly targeting the young, among whom tobacco consumption is increasing.

TC / ECON India (2000) Mal: Descriptive Report
Malhotra, SP. (2000) **Tobacco Use and Control in India.** A paper presented at the seminar Organized by RITC and IDRC on *Economics of Shifting from Tobacco*, at the Center for Multi-Disciplinary Research, Dharwad, India, 29-30 November 2000.

The paper summarizes the economic contribution of tobacco to the Indian economy, government support for tobacco growing, and arrangements for licensing of tobacco product manufacturers. The paper comments on the profitability of tobacco relative to other crops that might be viable alternatives, and reports on some studies on this topic. There is also mention of tobacco tax revenues, exports, and trends in consumption. The second part of the paper summarizes government measures to reduce tobacco use, including a discussion of taxation, providing data on tax rates between 1987 and 2000, and shows market shares and tax revenues accounted for by different tobacco products. Advertising restrictions are described, as well as health warnings, and restrictions on tobacco use in public places.

TC / Int India (1998) Bha: Descriptive case report
Bhandari U. **A tobacco-free town**. World Health Forum 1998;19(3):301.

Villagers in Koolimadu, Kerala, launched an antismoking movement when one of the villagers, a chain smoker, died of cancer. Convinced that smoking reduces lifespan, the

people could be persuaded to give up tobacco. In view of the enthusiastic response, the district administration imposed a total ban on using and selling tobacco and declared the area a tobacco free zone. Groups of youths monitor the ban. So far the penalty for violators of being excluded from village life for a day has not had to be imposed. This small scale success could act as a beacon for others to follow.

TC India (1998) Tiw: News report
Tiwari M. **Eschew tobacco**. *Down to Earth*, May 15, 1998, p 15.

As the health ministry ponders a recommendation to ban the production and sale of all chewable tobacco products, Rs. 1400 crores pan-Zarda-Gutka industry has gone into a tizzy. The industry says that the ban would mean a loss of millions of rupees in revenue and jobs to tobacco farmers and workers. The Central Committee on Food Standards [CCFS] recommended a countrywide ban on chewing tobacco. It has collected scientific evidence that links chewing tobacco with oral cancer and other complications. Health ministry officials say that the committee has also taken into account various studies such as the one by National Institute of Nutrition, Hydrabad, Regional Cancer Centre (RCC), Thiruvananthpuram and Gujarat Cancer Research Institute Ahmedabad. An estimated 60-85% of oral cancer cases are caused by chewing tobacco. The government will lose more than Rs.700 crores by way of excise duty if the ban comes into effect, says B.K. Das President, Bhartiya Supari Zarda Trade Association, New Delhi. Das complains that instead of banning cigarettes, the Government has singled out the chewing tobacco industry on baseless ground. Similar efforts by Government of Andhra Pradesh, Goa, Gujarat and Maharashtra to "discourage, restrict and minimize" the use of chewing tobacco have not borne fruit, notes the report of the expert group.

TC India (1998) Vai: Letter
Vaidya SG, Vaidya JS. **Tobacco industry buys govt. silence.** *The Lancet*, Vol 351, Feb.1998.
(National Organisation for Tobacco Eradication.)

In a letter to the Lancet Dr. Vaidya S.G. and Jayant Vaidya supported the criticism of the 1 million Pounds donation to the Labour Party by “Formula One constructors Association” in return for exemption of “ Formula One Motor Racing” from tobacco advertising ban. Dr. Vaidya describes the difficulties faced by the Goa Govt. (Indian State) over the proposed Bill which calls for a ban of smoking and spitting in public places in the State of Goa. He refers to a India Tobacco Company’s (ITC) contribution to PM’s and CM’s relief fund to ensure inaction on part of the state and federal Govt. in India with regard to the passing of the bill.

TC India (1997) Cho: Policy report
Choudhary K. **Legislative Action in Tobacco Control,** in *Health for Millions,* Jan-Feb 1997, pp 15-17.

Various studies in India during the 1980s have shown that the prevalence of tobacco use among men above 15 years of age varied between 46% and 65% in urban areas and between 32% and 74% in rural areas. Among women it varied between 2% and 16% in urban areas and between 20% and 50% in rural areas. Legislative restriction on the use and availability of tobacco products may provide sufficient disincentives for a majority of tobacco users as well as discourage starters. The warning on tobacco products is merely a base for indicating to the consumers that the consumption of these products is not safe. A study carried out in 1990, showed that 8% of people in Europe cited health warnings on cigarette packs and advertisements as one of the factors for giving up smoking. A study on 865 smokers in Calcutta observed that the statutory warning had an effect on the habit in 30% of smokers. There is a lot of scope for improving upon the warning which at present does not cover bidis, could be worded more strongly and given in several languages, stronger colors etc. A ban should be imposed on advertisements, and consideration given to helping tobacco farmers to switch to other crops. In India, Cigarette (Regulation of production, supply and distribution) Act 1975 made it mandatory for all manufacturers as persons trading in cigarettes to display a statutory warning-"Cigarette smoking is injurious to health", on all cartons or products of cigarettes and cigarette advertisements. In 1995, the issue of rules and regulation framed under the Cigarette Act was considered by a Parliamentary Committee on Subordinate Legislation, after consulting evidence provided by various government officials, persons concerned with tobacco promotion and anti-tobacco promotion activist. The Committee felt the need for stricter measures and provided various suggestions for the control of tobacco.

TC India (1997) Sim: Policy report
Simpson D. **India: tobacco toothpaste squeezed out.** *Tobacco Control* 1997; 6:171-174.

Tobacco toothpaste, also called “creamy snuff”, believed by users to be good for their teeth, was banned by the Union Government in 1992. This news article reported that the Supreme Court dismissed an appeal by an Ayurvedic manufacturer from Madhya Pradesh that had challenged a judgement of the State High Court upholding the ban. The Supreme Court ruled that the government was justified in imposing the total ban in the public interest because oral hygiene products containing tobacco can cause oral cancer, as stated by the World Health Organisation and other expert bodies.

TC India (1996) Kum: Policy opinion study
Kumar A, Mohan U, Jain VC. **Academicians' attitudes and beliefs towards anti-smoking measures.** *Public Health* 1996 Jul;110(4):241-6.
(Upgraded Department of Social and Preventive Medicine, K.G. Medical College, Lucknow, India)

Academic staff of Lucknow University (India) and its various faculties were questioned on their attitudes and beliefs regarding various anti-smoking measures, using a questionnaire based on WHO guidelines. Of the male teachers 21.4% were current smokers and 12.3% were ex-smokers. Non-smokers were in greater agreement with various anti-smoking measures than current and ex-smokers, and more females -all of whom were non-smokers- than their male counterparts supported these measures. Endorsement of various anti-smoking measures differed from group to group, however, academicians agreed most with the notion that "Everybody has a right to breath air free of tobacco smoke'. "Sale of tobacco completely banned' was the measure opposed by most of the academicians. "Preventing diseases" and "Religious reasons" were, respectively, the most and least important motives for not smoking.

TC India (1996) Nad: Policy Report
Nadkarni V, Maitra S. **The anti tobacco movement: two bills to ban cigarette advertising.** T.I.S.S. Diamond Jubilee conference, 1996, *Health Campaigns* (unpublished).
A ban on cigarette advertising was imposed on Doordarshan five years ago, and more recently, the Delhi Prohibition of smoking and nonsmokers health protection bill, 1995 was passed. The key provisions in the two anti-smoking bill are:

- Prohibit advertising and promotion of all tobacco products.
- Restrict smoking in certain specified public places.
- Make printing of nicotine and tar content on the packs mandatory.
- Regulate printing of warnings on packs in multiple languages.

Along with the bills, a voluntary self-regulation code for cigarette advertising is being formulated by Tobacco Institute of India (T.I.I). The code aims to formalize uniform standards of self-regulation for the advertising, sponsorship and promotion of tobacco. In Bombay the consumer Guidance Society of India (CGSI) with their Group Against Smoking Promotion (GASP) have taken up the movement against cigarette advertising and publicity. VHAI Delhi has started a programme-Action to combat Tobacco Indian Organization (ACTION), which focuses on issues of passive and active smokers.

TC India (1996) Nay: Descriptive report
Nayar U, Narayan L (Ed). **Involvement of youth in health education and health promotion: Tobacco, alcohol and substance abuse.** WHO-TISS workshop proceedings, TISS, 1996.

The workshop concluded that youth organizations were playing a vital role in health education and promotion in the areas of tobacco, alcohol and substance abuse. They advocated giving priority to preventive programmes. It was also acknowledged that such organizations could achieve little alone and there was need for networking. Acknowledging that addiction continued to increase, the workshop gave specific recommendations for effective field interventions, including advocacy.

TC India (1993) Cha: Historical descriptive report
Chattopadhayya A. **Harmful effects of tobacco noticed in history.** *Bull Inst Hist Med Hyderabad*. 1993;23(1):53-8.

According to medical investigations tobacco smoking causes cancer of lip, tongue, tonsil and other parts of the mouth. And also lung cancer, chronic bronchitis, coronary artery diseases and emphysema are caused by cigarette smoking. Three contemporary rulers, emperor Jahangir of India, James I of England and Shah Abbas I of Persia noticed the harmful effects of tobacco and tried to stop this practice. Khalil Pasha issued a prohibitory decree against smoking tobacco and he announced that anybody caught smoking would have his lips cut and eyes taken out. In 1044 Hijri, Russia also passed certain regulations against smoking. In India Guru Govind Singh prohibited tobacco smoking for the members of the Sikh community. He said "Wine is bad; Indian hemp (bhang) destroyth one generation; but tobacco destroyth all generations'.

TC / Int India (1992) Jos: State Health Education Campaign Report
Joseph DT. **Anti-tobacco campaign in Maharashtra, India: achievements and perspectives.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 345-347.
(Maharashtra Institute of Development Administration, Pune, India)

(Abstract given in Interventions section, see: Int / TC India (1992) Jos: Descriptive report

Recognizing that cancer is a preventable disease, the Government of Maharashtra, India, undertook an aggressive anti-tobacco campaign, consisting of health education programmes, slogans and billboards reminding nonusers of their right to a tobacco-free environment; a counter-campaign against cigarette advertisements was launched in Bombay City. Coupled with these activities, legislation was enacted making smoking in Government establishments and closed spaces in Maharashtra an offence.

TC India (1992) Lut : Descriptive report
Luthra UK, Sreenivas V, Menon GR, Prabhakar AK and Chaudhry K. **Tobacco Control in India: problems and solutions.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 241-248.
(Indian Council of Medical Research, New Delhi, India)

Tobacco control is a subject of worldwide importance. India is the third largest producer of tobacco in the world, and the tobacco industry in India is labour intensive and provides employment to millions of people. It also earns the Government much revenue and foreign exchange. Tobacco in any form, however, is detrimental to health: about 13% of the estimated five million deaths in the adult population can be attributed to tobacco use.

A conservative estimate of the annual health care costs attributable to tobacco-related diseases exceeds the revenue earned from tobacco by Rs. 6850 million (US $ 403 million). The Government of India has initiated several measures to tackle the problem. The Cigarette Act of 1975 stipulates that packets of cigarettes and cigarette advertisements display the statutory warning that cigarette smoking is injurious to health. Laws prohibit smoking in closed spaces such as cinemas, theatres, buses and on domestic flights. Tobacco advertisements are banned in state-controlled media. The National Cancer Control Programme launched in 1984, gave high priority to eliminating tobacco-related cancers. Unfortunately, these measures are yet to make a significant impact. A comprehensive programme is described with the aim of creating a tobacco-free society in the country during the next century.

TC India (1992) Nai: Health Education Methods
Nair MK, Mathew B, Sankaranarayanan R and Wesley R. **Control strategies for tobacco-related cancers in Kerala, India.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 249-253.
(Regional Cancer Centre, Trivandrum, India)

Various cancer control activities undertaken by the Regional Cancer Centre, Trivandrum, Kerala, India, include a novel method of utilizing the services of National Service Scheme Volunteers, primary health care workers, social workers and unemployed youth in both primary and secondary prevention of cancer. These approaches were found to be effective.

TC India (1992) San: Descriptive report
Sanghvi LD. **Challenges in tobacco control in India: a historical perspective.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 47-56.
(National Cancer Registry Project (ICMR), Tata Memorial Hospital, Bombay, India)

The major economic and other challenges to tobacco control in India are put into a historical perspective. Tobacco was introduced into the country in the early 17th century, and common indigenous products, such as hookah, chutta, bidi and tobacco chewing, were introduced over the century. The area under tobacco cultivation grew rapidly from 1880, until it stabilized at around 450,000 ha in 1970; subsequent output increases are due primarily to improvements in yield. Cigarette and bidi smoking and tobacco chewing are the major forms of tobacco use in India. Tobacco cultivation, manufacture and distribution provide employment to millions of people. A sizable proportion of the central excise revenue from tobacco is generated from cigarettes; bidi; hookah, chutta and chewing tobacco yield very little tobacco revenue as they are consumed largely by poor people, and have low prices and tax rates. Public information and education on tobacco

should be implemented immediately to control tobacco use. Concurrent strategies to curb tobacco use might take the form of enhancing taxation, and extending it to indigenous tobacco products, curbing advertisements for cigarettes and bidis, and reducing tar and nicotine levels of all products

TC India (1990) Cha: Descriptive
Chaudhry K Prabhakar AK and Luthra UK. **Tobacco Control in India - Search for Strategies**, in Durston B and Jamrozik K (eds), *The Global War*, proceedings of the 7th world conference on tobacco or health. (publisher unknown) Perth, Western Australia, 1990.

In this article the author gives statistical information on tobacco cultivation and production, use, tobacco related diseases, mortality due to tobacco, and tobacco control initiatives. Legislative measures to date, including the Act of 1975 and gaps in legislation are described. The author suggests that gaps in the prohibition of advertising, and tobacco use in public places could be filled and higher taxation would help to control tobacco use. He mentions that agricultural experiments to reduce the toxic chemicals in tobacco have yielded encouraging results and that alternative crops to tobacco have been identified in various parts of the country, suggesting the possibility of a gradual transition. The author states that the social change required along with political actions would require community education. Anti-tobacco education needs to be targeted at decision makers, professionals and the general public, especially youth. Educational interventions have been successfully carried out in several rural areas. Under the National Cancer Control Programme, at least 17 out of 28 states have constituted their State Cancer Control Boards and are formulating plans of action. At least seven states have started tobacco control activities in the form of community education and prohibition of smoking in public places. Anti-tobacco education is still at the level of operational research, with a search for cost effective strategies. The Indian Council of Medical Research is experimenting with various agencies, the health infrastructure and educational systems. Such programmes are ongoing at Bangalore, Goa, Trivandrum and Agra. Recently the Council initiated a project, Radio DATE (Drugs, Alcohol and Tobacco Education) with All India Radio, in the form of 28 weekly episodes broadcast by all 104 stations in 17 languages, from 8th April, 1990. Research priorities of the ICMR include the economics of tobacco and health, operational research for a cost-effective package of community education and tobacco use behaviour.

9. Health Hazards Faced by Tobacco Workers

This section contains twelve articles on the health hazards faced by tobacco workers. Some are about women beedi (bidi) workers and the symptoms and diseases they are prone to; others describe studies on tobacco processors, who breath in high levels of tobacco dust, causing mutagens in blood and urine samples and chromosomal damage.

One is about the hazards faced by tobacco harvesters, due to absorption of nicotine through unprotected hands and feet, which causes headaches and other symptoms.

Occ India (2000) Gop: Descriptive report
Gopal M. **Health of women workers in the beedi industry**. *Medico Friends Circle Bulletin*, Jan-feb 2000

This paper highlights issues of occupational health of women workers in the home-based bidi industry using a case study in a block of the Tenkasi Taluk of Tirunelveli district. The data presented were from an unpublished thesis reporting on a survey of 237 home-based women bidi workers. There were nearly 5.5 lakh workers in the bidi industry in Tirunelveli. The women worked without rest or leisure, had poor food habits, little exercise, and some faced aggravated health problems during pregnancy. The fear of the exploitative shopowner was always present, adding to their worries and tensions. The women commonly suffered from physical ailments: 5 main symptom groups were seen among women workers. 1) Aches and pains related to bidi work like backaches, neck aches, headaches, burning of eyes, pain in the legs and numbness of the fingers were reported by 65% of respondents; 2) Coughs were reported by 9.7%; 3) stomach related pains including cramps, gas, spasmodic pains leading to diarrhoea were reported by 8.4%; 4) Giddiness and breathlessness were common; 5) Other symptoms included piles, urinary burning, white discharge, joint pains and swelling, fevers, palpitation, wheezing and worry.

Occ India (1999) Bhi: Ambient and biological monitoring study
Bhisey RA, Bagwe AN, Mahimkar MB, Buch SC. **Biological monitoring of bidi industry workers occupationally exposed to tobacco.** *Toxicol Lett* 1999 Sep 5;108(2-3):259-65.
(Carcinogenesis Division, Cancer Research Institute, Mumbai, India. cri3@soochak.ncst.ernet.in)

Ambient and biological monitoring was undertaken among tobacco processors who are chronically exposed to tobacco particulates via nasopharyngeal and cutaneous routes. Ambient monitoring revealed that the inspirable dust concentration was 150-fold higher in the tobacco factory than in the control environment, and was associated with chronic bronchitis in workers. Increased systemic exposure to tobacco constituents was evident from the high levels of cotinine, thioethers, promutagens and direct acting mutagens in workers' urine. The mean glutathione level and glutathione S-transferase activity were significantly lower in the peripheral blood lymphocytes of workers; however, the frequency of the GSTM1 null allele was similar to that in controls. A significant increase in chromosomal damage was noted in target and non-target cells of tobacco processors. In view of the association between tobacco use and several non-communicable diseases, the findings of the present study indicate an urgent need to minimize tobacco exposure among the processors.

Occ India (1995) Bag: Controlled biological monitoring study
Bagwe AN, Bhisey RA. **Occupational exposure to unburnt bidi tobacco elevates mutagenic burden among tobacco processors.** *Carcinogenesis* 1995 May; 16(5):1095-9. (Carcinogenesis Division, Tata Memorial Centre, Parel, Bombay, India)

The nature of mutagenic burden due to occupational exposure to tobacco flakes and dust was determined among 20 female tobacco processors (TP) and 20 matched controls (C) by testing urinary mutagenicity in the Ames assay. In addition, urinary cotinine was estimated as a marker of tobacco absorption. Workers and controls were sub-divided into those with no tobacco habit (NH) and those habituated to the use of masheri (a pyrolysed form of tobacco) as a dentifrice (MH). Cotinine was not detected in samples from C-NH while the mean urinary cotinine levels in TP-NH and TP-MH were significantly higher than that in C-MH (3.46 +/- 0.95 and 3.57 +/- 0.46 versus 1.80 +/- 0.58 mM/M creatinine; $P < 0.02$). The majority of the urine samples from C-NH were non-mutagenic in the presence or absence of rat liver S9 while those from C-H were mutagenic to TA98 and TA102 strains upon metabolic activation. On the other hand, direct mutagenicity to TA98, TA100 and TA102 strains respectively was noted in 6/10, 5/10 and 8/10 samples from TP-NH and 7/10, 4/10 and 3/10 samples from TP-M. Generally, beta-glucuronidase treatment reduced or abolished the mutagenic potential of workers' urine samples indicating that glucuronide conjugates may have partially contributed to direct mutagenicity. Experiments using scavengers of reactive oxygen species revealed that direct mutagenicity in TA102 strain was mediated mainly via hydroxyl radicals. The results clearly demonstrate that tobacco processors are exposed to a wide spectrum of mutagens that cause frame-shift, base pair substitution and oxidative damage.

Occ India (1995) Mah: Controlled biological monitoring study
Mahimkar MB, Bhisey RA. **Occupational exposure to bidi tobacco increases chromosomal aberrations in tobacco processors.** *Mutat Res* 1995 Apr;334(2):139-44. (Carcinogenesis Division, Tata Memorial Centre, Parel, Bombay, India)

In India, workers engaged in processing of tobacco for the manufacture of bidis (the indigenous substitute for cigarettes) are chronically exposed to tobacco flakes and dust via the cutaneous and nasopharyngeal routes. Hence, workers in a tobacco processing factory were monitored for chromosomal aberrations (CA) using peripheral blood lymphocytes as the test system. Cytogenetic analysis revealed a significant increase in deletion fragments and chromatid gaps in the exposed group. The frequency of aberrant metaphases and the proportion of individuals with CA were significantly higher in workers than in controls, indicating that occupational exposure to tobacco imposes considerable genotoxicity among tobacco processors.

Occ India (1993) Bag: Comparative biological monitoring study
Bagwe AN, Bhisey RA. **Occupational exposure to tobacco and resultant genotoxicity in bidi industry workers.** *Mutat Res* 1993 Apr;299(2):103-9.

(Carcinogenesis Division, Tata Memorial Centre, Parel, Bombay, India)

In India, over 3 million workers employed in the bidi industry receive massive, chronic exposure to unburnt tobacco, mainly by the cutaneous and nasopharyngeal routes. While the hazards of habitual tobacco usage are well established, very little information is available about the effects of occupational tobacco exposure. In the present study, tobacco processing plant workers (TPPW) and bidi rollers (BR) with or without tobacco habits were monitored for occupation-related exposure to tobacco and resultant genotoxicity. Salivary cotinine levels were determined as an index of tobacco exposure and micronucleated buccal epithelial cell (MNC) frequency was recorded as a genotoxic endpoint. Occupational tobacco exposure led to the detection of cotinine in the saliva of 19% of BR and 100% of TPPW with no tobacco habit (NH). The greater degree of exposure in TPPW was evident from the significantly higher mean salivary cotinine level in TPPW-NH as compared to BR-NH (2.86 +/- 0.48 vs. 0.84 +/- 0.26 micrograms/ml; $p < 0.01$). The effect of occupational exposure was also evident in TPPW and BR with the masheri habit. A moderate but statistically significant increase in MNC frequency was observed in habit-free as well as masheri-habituated TPPW and BR as compared with the respective controls. The findings provide preliminary evidence for the clastogenic effects of occupational tobacco exposure.

Occ / LC/ OthC India (1993) Not: Case-control study
Notani PN, Shah P, Jayant K, Balakrishnan V. **Occupation and cancers of the lung and bladder: a case-control study in Bombay.** *Int J Epidemiol* 1993 Apr;22(2):185-91. (Epidemiology Unit, Cancer Research Institute, Tata Memorial Centre, Parel, Bombay, India)

Associations between occupation and cancers of the lung (n = 246) and bladder (n = 153) were examined in a case-control study. Controls (n = 212) comprised cases of oral (75%) and pharyngeal cancers (13%) and non-neoplastic oral diseases (12%) at the same hospital. Only males were studied. A personal interview was conducted and a lifetime occupational history and information on demographic and relevant confounding factors including tobacco use were obtained. For lung cases, comparing 'ever' employed with 'never' employed in a particular occupation, significantly elevated risks (adjusted for smoking) were found for textile workers (odds ratio [OR] = 1.99, 95% confidence interval [CI]: 1.3-3.6) and cooks (OR = 4.48, 95% CI: 1.2-16.9). High risks were also observed among ship and dockyard workers (OR = 2.87, 95% CI: 0.8-10.1) and wood workers (OR = 2.88, 95% CI: 0.9-9.6). For bladder cancers, significantly elevated risk was observed only for chemical/pharmaceutical plant workers (OR = 4.48; 95% CI: 1.2-16.5). Two other sets of risk estimates were obtained: one by comparison with a second unexposed group made up of occupations where there was little likelihood of exposure to any cancer-causing occupational agent, and the other by fitting logistic regression models to the data. All methods yielded similar risk estimates. Tobacco smoking but not tobacco chewing was a risk factor for both sites. (Comment in: *Int J Epidemiol.* 1993 Dec;22(6):1205-6.)

Occ India (1992) Bhi: Controlled biological monitoring study
Bhisey RA, Govekar RB and Bagwe AN. **Toxic effects of exposure to tobacco among bidi rollers.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 223-227.
(Genotoxicity Unit, Cancer Research Institute, Tata Memorial Centre, Bombay, India)

Workers employed in bidi rolling receive prolonged exposure to unburnt tobacco. Since smokeless tobacco use is known to be associated with a high incidence of oropharyngeal cancers, bidi rollers were monitored for the biological effects of occupational exposure to tobacco. Specific exposure was determined by estimating continine levels, while non-specific exposure to electrophilic agents was assessed by estimating urinary thioethers. Urinary mutagenicity was determined using the Ames assay, and micronucleus frequency in exfoliated buccal epithelial cells was recorded as a genotoxic endpoint. Unexposed subjects with similar socioeconomic status were used as controls. Bidi rollers exhibited significantly higher urinary thioether levels and micronucleated cell frequency. An increased number of urine samples contained mutagenic nitrosatable species and promutagenic compounds, with a resultant increase in the mean number of revertants as compared to controls. These results indicate that bidi rollers are at a higher risk for genotoxic hazards due to occupational exposure to unburnt tobacco.

Occ India (1992) Gov: Controlled biological monitoring study
Govekar RB, Bhisey RA. **Elevated urinary thioether excretion among bidi rollers exposed occupationally to processed tobacco.** *Int Arch Occup Environ Health* 1992;64(2):101-4.
(Carcinogenesis Division, Tata Memorial Centre, Bombay, India)

Manufacture of bidis - the Indian version of cigarettes - is one of the largest cottage industries in India. Bidi rollers handle 225-450 g of bidi tobacco per day and inhale tobacco dust and volatile components present in the work environment. Since tobacco is known to be mutagenic and carcinogenic, urinary cotinine was estimated in bidi rollers and control subjects as an index of tobacco-specific exposure while the concentration of urinary thioethers was determined to ascertain exposure to electrophilic moieties. Detection of cotinine in urine samples from bidi rollers with no tobacco habits indicated that occupational exposure leads to cutaneous absorption of tobacco constituents and the resultant increase in exposure to alkylating agents was evident from elevated urinary thioether levels.

Occ India (1992) Rao: Descriptive report
Rao N. **Occupational health Issues of women in bidi industry.** *Mainstream* March 14, 1992,27-28.

This two-page article summarizes symptoms and health problems common among women bidi workers. In Madhya Pradesh, it was estimated that there were 6 to 10 lakh bidi workers, 80% of them women. The environment in their homes and surrroundings is poor. Constant exposure to tobacco makes them prone to bronchial and chest diseases. Tuberculosis is common among the workers and their children. Children's health problems are usually attended to, but the women neglect themselves. Results from a health survey of women bidi workers conducted in Jabalpur, Madhya Pradesh were reported. Several occupation-specific health problems were widespread, like backache and joint pains, giddiness and headaches, eye problems, like watering burning and poor vision. These problems were often unattended to. About 50 to 70% of the women reported gynaecological and related problems. Poor nutritional status and repeated pregnancies seemed to be major contributory factors. Following the Kerala model of cooperation, the women bidi workers of Jabalpur, fed up with their plight, organised a cooperative SEWA (Self Employed Women's Association). They improved their home and working environments, and their symptomatic and chronic problems were monitored and treated by a Government mobile clinic for bidi workers. The cooperative also has raised the women's status and recognition as workers in their families and society. This recognition as major earning members in their families has made them more aware of the importance of maintaining their own health to continue to generate income for the family.

Occ India (1991) Bag: Product assay
Bagwe AN, Bhisey RA. **Mutagenicity of processed bidi tobacco: possible relevance to bidi industry workers.** *Mutat Res* 1991 Oct;261(2):93-9.
(Cancer Research Institute, Tata Memorial Centre, Parel, Bombay, India)

The genotoxic potential of bidi tobacco was evaluated by mutagenicity testing of aqueous, aqueous: ethanolic, ethanolic and chloroform extracts of processed tobacco used in the manufacture of 'bidis', indigenous forms of cigarettes smoked in India. The Salmonella/mammalian microsome test (Ames assay) was used to detect mutagenicity in tester strains TA98, TA100 and TA102. The extracts were tested in the absence and presence of metabolic activation using liver S9 from rat and hamster, and following in vitro nitrosation with sodium nitrite at acidic pH. All the extracts were non-mutagenic in the absence of nitrosation. The nitrosated aqueous extract was mutagenic in strains TA98 and TA100. While weak mutagenicity was elicited by the nitrosated aqueous: ethanolic extract in TA100, the nitrosated ethanolic extract induced a 3-fold increase in the number of revertants in the same strain. Moreover both these extracts elicited a strong mutagenic response in TA102, while the chloroform extract was non-mutagenic even after nitrite treatment. The study indicates that workers employed in the bidi industry are exposed to potentially mutagenic and genotoxic chemicals in the course of their occupation.

Occ India (1991) Bhi: Controlled biological monitoring study
Bhisey RA, Govekar RB. **Biological monitoring of bidi rollers with respect to genotoxic hazards of occupational tobacco exposure.** *Mutat Res* 1991; 261(2):139-47.
(Cancer Research Institute, Tata Memorial Centre, Bombay, India)

Smokeless tobacco habits are associated with a high incidence of oropharyngeal cancer in India. Hence, the biological effects of occupational exposure to smokeless tobacco used for making bidis (the Indian version of cigarettes) were studied in 2 groups of bidi rollers designated BR-K and BR-S and in control subjects with no tobacco habits. Specific tobacco exposure and the electrophilic burden were determined by estimating urinary cotinine and thioethers respectively. Urine mutagenicity was tested with the Ames assay using Salmonella typhimurium strains TA98 and TA100. While cotinine was not detected in control samples, the mean cotinine levels (mmole/mole creatinine) in the BR-K and BR-S groups were 0.79 +/- 0.30 and 0.09 +/- 0.03 respectively. Urinary thioether excretion (mmole/mole creatinine) was significantly elevated in the BR-S group 4.59 +/- 0.52; p less than 0.001) but it was lower in the BR-K group (0.54 +/- 0.08; p less than 0.001) compared to the control (1.83 +/- 0.34). Furthermore, beta-glucuronidase-treated samples from both groups of bidi rollers exhibited increased mutagenicity to TA98 compared to the control group; in addition, BR-S samples exhibited direct mutagenicity to TA98. The results show that occupational tobacco exposure modulates the glutathione conjugation pathway and increases the mutagenic burden of bidi rollers.

Occ India (1991) Gho: Occupational safety intervention study
Ghosh SK, Gokani VN, Doctor PB, Parikh JR. **Intervention studies against "green symptoms" among Indian tobacco harvesters.** *Arch Environ Health* 1991 Sep-Oct;46(5):316-7.
(National Institute of Occupational Health, Ahmedabad, India)

The use of rubber gloves reduced nicotine and cotinine absorption among 29 tobacco harvesters, as evidenced by the urinary excretion rate of nicotine and cotinine. Six (20%) subjects reported that symptoms disappeared when they used gloves, but the remaining 23 workers complained of an occasional headache even when using gloves. Wearing of boots and socks as well as gloves prevented the symptoms and significantly decreased nicotine and cotinine excretion. This suggests that nicotine is absorbed through the feet.

10. Bidi Workers

Eighteen articles (11 with abstracts) discuss problems faced by bidi workers. Mostly home-based women, they face exploitation by contractors, who often refuse to grant them the legally compulsory ID cards that would permit them to obtain benefits (minimum wages and comprehensive health care), reject a proportion of their work and supply inadequate raw materials. These workers also face occupational health problems. Child labour, especially of girls is rampant in this industry in many areas. In some areas, unionisation has helped the women workers improve their lot. However, the bargaining position of home-based bidi workers remains weak. In Kerala, a workers' cooperative produces most of the bidis in factories, where both men and women work. Strategies suggested for empowering women bidi workers include better counting of home-based

workers, providing access to education and healthcare, organizing workers, and creating new livelihoods for them. Responding to perceived decreases in bidi work in some areas, two articles report on research to explore alternative jobs for these women, including home-based occupations like papad, pickle and sauce making, tailoring, tutoring for younger, more educated workers, and para-nursing.

Bidi / ECON India (2002) Joh: Analytic report
John S, Vaite S, edited by Efroymson D. **Tobacco and Poverty, Observations from India and Bangladesh**. PATH Canada, Ottawa, Canada.

(For abstract, see ECON / Bidi India (2002) Joh: Analytic report)

Bidi India (2002) Zeb: Descriptive report
Zebaysh Hirji. **Child's Play: Employing Children In The Bidi Industry.** *Lifeline,* January 2002, 7: ll-12. WHO SEARO, New Delhi, India.
(National Law School of India University, Bangalore, India)

This 2 page commentary explains that the Bidi and Cigar Workers (Conditions of Employment) Act 1966 only prohibits children being employed in industrial premises, and similarly, the Child Labor (Prohibition and Regulation) Act, 1986 prohibits employment of children in a bidi workshop. There is no legal prohibition on children working, or helping make bidis in homes, where most bidi-making takes place. The article also explains that with very low wages, many families get children to help, to raise their output and meagre earnings.

Bidi India (2001) Agh: Descriptive report
Aghi MB. **Exploiting women and children – India's bidi industry**. *Lifeline* – Volume 6, October 2001,8-10.

This article focuses on problems faced by women and children working in the bidi industry. According to government estimates, bidi rolling employs about 4.45 million people, of whom 65% are women and 15 to 25% are children. Women often face discrimination and are paid less than men. Children are even worse off with no wage structure and usually get paid the least. Most families working in the bidi industry live below the poverty line. Girls are more likely to stay home from school to roll bidis than boys. The principal employers work through contractors, or sattedars, who then employ workers in a village or cluster of villages. According to the Government of India, in 1999, about 80% of bidi workers had ID cards. The lack of ID cards exposes workers to exploitation. About 10% of the bidis rolled by workers are arbitrarily taken away as 'standard deduction' by the sattedar to replace defective bidi, regardless of the numbers of bidis actually rejected. Thus the workers lose part of their wages. Some sattedars remove or change names of bidi workers from their registers occasionally, depriving workers of their legally stipulated benefits. Sometimes women and children are not

mentioned in the employee registers, but are considered 'helping hands' to a male worker who is registered. Only small numbers of workers have formed cooperatives, avoiding the contractor system. Even in the co-operatives, when a roller without an ID card dies, the next of kin or dependants are denied any compensation. Being unorganised, women and children cannot fight for their rights. They are reluctant to openly join movements, fearing reprisal from the sattedars and loss of their jobs. Employers tend to shift the industry to other states or neighbouring countries in avoid higher minimum wages. Bidi making also breeds bad health. Children who work for hours sitting cross-legged making bidis often suffer from backaches and knee problems. Initially tobacco dust often makes them feel giddy, and over the long-term, many develop chronic bronchitis, asthma and even T.B. Some complain of a burning sensation in the eyes and throat. They also suffer rheumatic syndromes, allergies, stomach troubles and piles. Government welfare schemes do not reach most bidi workers. The National Child Labour Policy (1987) emphasizes the role of education and its core programme, implemented partly through NGOs and partly through the district administration, is establishing special schools for children who have been working. The incidence of child labour in the bidi industry is partly linked to the level of socio-economic development of an area and partly to the attitude of parents and employers.

Bidi India (2001) Cha: Descriptive Report
Chauhan Y. **History and Struggles of Beedi Workers in India**. All India Trade Union Congress (AITUC), New Delhi, November 2001, 114 pages.

The study traces the history of the trade union movement in the beedi industry and the problems it faces today. It also looks at the problems faced by the industry and its workers. The stated objectives of the study are (i) to document and analyze the emergence and consolidation of trade union movements in the beedi industry, (ii) to document major interventions made by the trade unions, (iii) to understand the problems and constraints of the trade unions in the present-day context, and (iv) to develop a framework and reference base for promoting a comprehensive exercise to document and analyze the roles of the trade unions in beedi industry from a historical perspective. The chapters are as follows: (1) Introduction (2) Beedi Industry: A General Profile (3) Origin and Expansion of Beedi Workers Movement (4) Legislations and Their Impact (5) Threats to Beedi Industry (6) Two Auxiliary Issues (Child labor, and Workers' Cooperatives).

Bidi India (2001) Der: Exploratory study
Dervish Trust, Bhopal in collaboration with Sanket Development Group, New Delhi. **Identifying Alternative Employment and Income Opportunities for Women Bidi Workers in the pilot area of Sagar, Madhya Pradesh, India,** for the International Labour Organisation, New Delhi and Geneva, September, 2001, 50 pages.

The objectives were to describe the development profile of Sagar District and the bidi sub-sector in particular and to recommend potential alternative employment and business

opportunities for women bidi workers. Methods included collating existing information from multiple sources, wide ranging discussions with people with direct or indirect links with the bidi industry, including NGO personnel, and academics from within and outside of Sagar District. Interviews were conducted with self-help group members (not in bidi work) in Sagar, Operations Research Group study team members for DPIP, with sattedars, and with local and other bidi industrialists. Focus group discussions were held with all types of bidi workers: one with contractors, two with tendu leaf collectors, and seven with women bidi-rollers. A household survey was conducted among home-based bidi workers to ascertain their resources and skills. Results**:** Paradoxically, government interventions designed to help, appear to have worsened the situation of the bidi rollers. After the promulgation of the Beedi and Cigar Act, 1960, factory-based beedi rollers (all men) were thrown out of the factories, and the work given to home-based women rollers. The Minimum Wages Act is not strictly followed. Nationalization of tendu leaf collection in MP improved returns to the tendu leaf pickers. To compensate for the resulting significant rise in tendu leaf costs, the bidi industrialists slashed the wages of bidi rollers. Bidi workers of forty years ago said that their livelihood had been adequate, whereas today bidi rollers face a precarious livelihood. Major problems faced by the bidi workers were perpetual poverty, very low wages, no wage bargaining system, no access to entitlements, benefits and gratuity, delayed payments, illiteracy, hidden child labour, constant exposure to tobacco dust, postural pains, hardening of the hands. Most bidi worker households are landless, some are small, marginal farmers. Alternative livelihood options were analysed - the practical snag was that women would not go out of the villages to seek jobs in industrial estates. About 60% of the self-help groups in the state were men's groups. Women need new skills – some suggestions: lift irrigation, forest and watershed management, dairying, horticulture, fisheries, tailoring, and artisanal work. Ten Government programs try to organize individuals into self help groups and use thrift sharing, approaches that might suit the agenda of promoting alternative livelihoods of the women bidi rollers. It was recommended that strong linkages be made with all of them. However, they were single-issue programs and did not deal with problems specific to women bidi rollers. In conclusion**,** an exclusive livelihoods promotion program, aimed at ameliorating the deprivation and misery of women bidi workers was recommended, starting with a pilot project. This total development program would include four priority areas: 1) Promotion of savings and micro-enterprises, 2) Education, awareness and organization building 3) Habitat improvement and 4) Health, nutrition and child-care. It was assumed that the women would continue to roll bidis for an initial period, in order to accumulate some savings (with negotiated higher wages) and to make a smooth transition to another livelihood. A federation of self-help groups would emerge that would share business ideas and promote the new micro enterprises.

Bidi India (2001) ILO: Exploratory study
International Labour Office, Geneva**. Making Ends Meet: Bidi workers in India today - A study of four States.** Working paper of the Sectoral Activities Programme, 151 pages.

Background: Over ninety percent of employment in the tobacco industry in India is in bidi manufacture. The largest proportions of workers are rural, women and many of them are homebased workers. There is a fear in the bidi industry that it is on the decline.
Objectives**:** To examine the socio-economic and working conditions of bidi workers and assess whether there has been a decline in employment, if so, why and the possibilities of diversification of employment. To assess alternative employment opportunities, both from the point of view of economic viability and of the other skills of the women.
Methods: 1) Information from secondary sources was collated, mainly from reports of the government and independent researchers 2) A participatory rapid appraisal was undertaken in four States: Madhya Pradesh, Andhra Pradesh, Gujarat and Kerala by using focus group discussions and individual home interviews with the women bidi workers. Factories where bidi tobacco is processed were also visited in Gujarat. Interviews with contractors, trade unionists, doctors, local government officials and others; examination of local resources, institutions and industries were also conducted.
Findings:
Historical trends: Bidi production in India began in the early 1900s and it grew tremendously to become a major source of employment. From the end of the 1980's, however, a decline set in. According to government figures, there had been a decline in production of bidis from 2885 crores in 1988 to 781 crores in 1999.
Legislation and its implementation: As early as 1931 the Royal Commission of Labour described the working conditions of bidi rollers in factories as exploitative and unhygienic and from the enactment of the Factories Act in 1948 the factories began closing down and the work becoming home-based. After labour laws began to be implemented in the fifties, most employers left Gujarat and Maharashtra permanently migrating to Nizamabad and other parts of Andhra Pradesh. These employers form the majority today and are still flourishing, claiming that labour laws continue to be largely unimplemented. Since then, new laws bearing on the industry have been passed: the Beedi and Cigar Workers (Conditions of Employment) Act, 1966; the Minimum Wages Act, the Industrial Disputes Act, the Bidi and Cigar Worker' (Welfare Fund) Act, 1976 and the Bidi and Cigar Worker' (Cess) Act, 1976. In 1977 the Government of India extended the provisions of the Employees' Provident Fund Act was extended to bidi workers, including home-based workers. The laws continue to be observed mostly in the breach. The Bidi Workers Welfare Fund has been active in most places, providing health care for the workers and their families and the education of children, benefiting only workers with identity cards/passbooks. The size of the Bidi Workers' Welfare Fund was observed to be too small to meet the needs of all the workers. State Government laws for minimum wages and benefits, like paid holidays and health care, do not reach a large proportion of the workers, which the contract system helps employers evade. Labour laws view workers as individuals and do not view a family or a household as a unit of production. Women employed formally in the industry hold passbooks and are entitled to benefits, but informal workers are not. Women with passbooks, from rich households, often take on young girls or women from less advantaged classes as joint rollers. Some of these eventually obtain pass-books. Others girls and women work directly for the contractor without a passbook, but are given a small notebook (*chittai*) for maintaining records of the materials issued to them.

Wages: Wages were highest in Kerala and lowest in Andhra Pradesh. The earnings of bidi workers are lower than those in most other industries and rural workers earn less than urban. Two thirds of home-based workers are paid weekly. For distressed workers, bidi manufacture is their family's only income; for others it is supplementary only. The disparate social status of the workers hinders the evolution of solidarity among them.
Employer –employee relations: Madhya Pradesh – In Sagar, bidi rolling is home-based and bidi rollers are mainly women, working under severe pressure and extremely exploitative conditions, under middlemen. Decreasing work has lead to conflicts with contractors. The workers have no contact or knowledge of the real employer, only the contractors. Andhra Pradesh – In Nizamabad District, three types of manufacturing exist: factory based, home-based and mixed. Workers know the employers. Trade unions are vigilant and most workers are registered in this district, but there are unregistered workers. Gujarat – In Ahmedabad, bidi rolling is exclusively home-based and exploitative, through contractors. The Department of Labour accepts this system, which allows employers to evade compliance with the Provident Fund and Beedi and Cigar Acts. Minimum wages are not paid and workers just subsist on their wages. Recent lulls in the availability of work have been noted. In Kheda, tobacco processors have turned to migrant labour and mechanisation to reduce costs in a market of decreased demand for bidi tobacco. Locals, largely unionised, suffer from unemployment. Kerala – In Kerala, bidi rolling takes place mainly in factories of a large co-operative society (Kerala Dinesh Bidi). It is a professional full-time job and employs many men.
Working conditions and health problems: Appalling conditions were observed in the tobacco processing factories in Kheda, Gujarat, where tobacco dust filled the air, and in the bidi factories in the other three areas in terms of lack of ventilation, airborne levels of tobacco dust/fumes, and or exposure to the sun, and lack of drinking water and toilets, except for one of the factories visited in Nizamabad, Andhra Pradesh and the cooperative factories of Kerala Dinesh Bidi. Home-based bidi rollers visited by the investigators mostly lived in small homes, which were mostly kept clean internally. Constant inhalation of tobacco and sitting posture caused health problems for the workers: asthma, tuberculosis, back-strain, spondylitis, swelling of the limbs, head-aches, digestive problems, especially constipation, heavy menstruation, and pain in the lower abdomen, leucorrhoea, complications of pregnancy, miscarriages and breast cancer.
Educational Status: Most family members of the bidi workers interviewed had some primary level education and about 90% of their children of were attending schools. Education is valued more in Sagar than in the rest of Madhya Pradesh. Most women workers in Nizamabad were illiterate. KDB workers are mostly high school graduates.
Workers' Organisations: The trade union movement has reached out to the bidi workers in a major way since 1920 and currently there are about six major unions and other smaller ones. Cooperatives have also played a prominent role in organising bidi workers. In 1967, after the Beedi and Cigar Workers Act started to be implemented in Kerala and factories in Kerala shifted across the border into Karnataka, the State of Kerala established the Kerala Dinesh Bidi (KDB) Co-operative for the retrenched workers. Other successful co-operative societies were set up in Bankura District of West Bengal, Aurangabad, Maharashtra, and Vadnagar, Gujarat. A State-by-State plan was initiated in 1982, but the co-operatives set up after that, were not successful. This movement lost momentum after shortages of raw materials and lack of policy support from the

Government dampened it in the 1990s. No co-operatives were found in the three districts visited in other States, but trade unions were active in those areas, looking into issues like rejection of bidis by the contractors, implementation of labour laws, child-care and housing, sexual harassment, and causes and effects of industry decline. Women workers in Nizamabad were found to vociferously aware of their rights, arguing with the middlemen about the number of bidis rejected, but there were no women in the leadership.

Perceived declines in the bidi industry: A decline in volume of work and number of working days over the past decade was noted in all four study areas. Madhya Pradesh: Of all four areas studied, the perception of a decline was most pronounced in Sagar. The industry has been shifting its base out of the state over the last decade, resulting in increased unemployment and poverty. Gujarat: In Kheda District the employers have begun to prefer immigrant populations from Rajasthan to the unionised locals, leaving the latter with less work. Kerala: The bidi industry is in recession since 1992, causing bidi workers to suffer. Andhra Pradesh: There has been some decrease in regular employment but apart from agriculture, the women see no other alternatives. Factors held responsible for a decline: Shrinking demand, declines in production (except in Nizamabad), closure of workshops and a decline in the opening of new ones, complaints of bidi manufacturers because of competition from higher quality South Indian bidis, the ban on exports of bidis to the United States and the entry of other forms of tobacco like gutkha and chewing tobacco (Gujarat) and mini-cigarettes (Kerala), as well as the manufacture of illegal bidis. Other factors responsible for a decline in the amount of work available include a widening gap between labour supply and demand; a shift in the industry to areas where cheaper labour is available and labour laws are less likely to be implemented; manufacturers shifting more and more to hidden forms of labour. In Kerala, the KDB cited the anti-tobacco campaign as a cause of decline, as well as, taxation, competition from mini cigarettes and cigarettes. The effects on the workers of a decline in work have been shown by malnutrition, rising debts, family tensions, the break-up of extended families, strikes, and migration. In contrast, the KDB workers have started to find work in other sectors, through the help of the management in diversification of the Cooperative's activities and provision of skills training to the workers. There is a fear of legalisation of the import of foreign cigarettes at cheap rates. Relocation of the bidi industry has probably caused more unemployment and underemployment in some areas than actual declines in overall production.

Diversification Opportunities: Madhya Pradesh: Some women in Sagar District have been moving into domestic work as a last resort. Land and forests are the major resources of the area, but they are in a degraded state. The State Government plans a major development initiative to regenerate them, which will open up new jobs, e.g., in the marketing of forest products like honey, chironji, wood and medicinal plants. The high production of vegetables in the area could be exploited in terms of pickle, sauce and jam making. Tobacco processors have been moving into other industries like bamboo furniture making, leaf plate making, and crockery manufacture. Such areas along with wood working, animal husbandry and auxiliary work in education (e.g., providing tuitions, adult literacy and grading examination papers) would be possible for some of the younger bidi workers, after some training, as found by SEWA (Self-Employed Women's Association). Gujarat: In Kheda District, tobacco growers have been switching over to

banana and sugar cane. Data from a study on skills of 694 women in the bidi industry conducted in 1999 revealed that over half of them had other skills, especially in embroidery, handicraft and tailoring and in food processing. Many industries existed in the district, but not all within reach of the women bidi workers. Such industries included garment manufacture, power looms, food processing, cement, plastics, electricals, cement, diamond polishing, chemicals and glass. New industrial estates were being planned. Positions as para-nurses and in the information technology sector were available to trained young women. Andhra Pradesh: Bidi workers in Nizamabad District had not taken any steps to enter alternative areas of work, as workers and trade unions feel that bidi production will remain the major source of jobs. Discussions with government officials revealed potential new areas of employment in the irrigation and water conservation sector and the upgradation and marketing of traditional products, like sweets, pickles and milk products. Networking with women's savings and credit groups was suggested for consultation on new areas of income generation and on organising former bidi workers into such groups. Kerala: After a period of sluggish sales in Cannanore District, the Kerala Dinesh Bidi Cooperative began a rapid diversification thrust in 1996 consisting of consultations with experts, encouragement of volunteers among bidi workers to enter non bidi work, and provision of training in new skills. It envisions 25 percent of its workers over the next 25 years entering new production activities like beverages, coconut curry sauce, spice and pepper, animal husbandry and raising silk worms. Isolated incidents of diversification of bidi manufacturers have been into pan products, biscuits, tea, soft drinks and basic foods.
Conclusion: Broad areas for intervention (e.g., skills training in other types of home-based work) were found and a more detailed study was recommended.

Bidi India (2001) Raj: Exploratory study
Rajasekhar D and Sreedhar G. **Identifying alternative employment and income opportunities for women beedi workers - A study in Dakshina Kannada District of Karnataka.** *Report submitted to the International Labour Organisation,* New Delhi, February, 2001, 33 pages.

This paper aimed to assess the alternative income generating activities that could be taken up by women beedi workers in the context of perceived decline in the beedi activity in Dakshina Kannada district of Karnataka. It also aimed to assess the situation and needs of women beedi workers, and analyse the possibilities of bringing synergy of efforts by the other development actors within the district in the direction of providing alternatives to women beedi workers. The methodology adopted was to first examine the situation of beedi workers and elicit their needs in terms of alternative Income generating activities (IGAs) through focus group discussions and canvassing a structured scheduled. The needs emerging from the field formed the base to discuss the issue of alternatives further with government officials, market representatives and elected leaders.

The district has high density of population, tops the state in terms of HDI rank. There is considerable occupational diversification into non-farm activities both by men and women. Agriculture, animal husbandry, fisheries and industries also play an important role in providing employment and income. Banking network is well

developed, and the credit flow to non-farm and farm activities is significant. NGOs and Banks in the district have formed 4305 self help groups (SHGs), which are at various stages in so far as linkages with bank branches are concerned. The selected villages are multi-religious and multi-caste, and reportedly provide good employment to the work force. Most of the selected households live in their own semi-pucca house, depend on unprotected water source and have access to electricity. The average household size is large, and the sex ratio is in favour of women. A majority of the members belong to the productive age group. The literacy rates, which are high for both males and females, are mainly the result of having completed primary education and inversely related to the age groups; much more in the case of females probably due to higher drop out rates among them. The age at which girls marry is high among the sample households. The skills possessed by members are in general low, and in the case of females, are essentially related to beedi rolling.

The work participation rates are high among the women largely due to beedi rolling. Most of the female workers undertake beedi rolling, and the incidence of child labour is low. The beedi rolling plays an important role in the household economy. This is especially so in the case of women, in whose case beedi rolling is principal employment and income earning activity. There is limited occupational diversification among women than men. On average, each household has Rs. 36,706 of income and about 36% of the households live below the (official) poverty line. The income from beedi rolling is important for the poorest. Indebtedness is high. The households primarily depend on friends and relatives, and borrow mainly for construction and health.

A majority of women beedi workers have been rolling beedis for more than 15 years, and do not have a separate room for rolling. This affects the health and children's studies in some of the cases. Most of them roll 300-800 beedis per day, and face the problem of receiving sub-standard raw material. The widespread perception that beedi industry is declining is not shared by women beedi workers, though primary data suggests a decline in per capita rolling. The decline in availability of beedi work has not affected the incomes of majority of the households due to various strategies and coping mechanisms adopted by the women beedi workers.The beedi rolling seems to have affected the health of a significant proportion of women. The workers do not benefit much from the welfare provisions in the Act due to unsuitable eligibility conditions, manipulations by the middlemen, deliberate strategy adopted by women to go unorganised, cumbersome procedures, etc.

The women seem unreceptive to the idea that they need to consider alternatives to bidi work. This would be a major stumbling block for any development effort in this regard. Based on discussions with women and other development actors in the district, both traditional/land based activities and non-traditional ones emerged as alternatives. In order to enable the women to undertake these alternatives, a multi-pronged and long-term strategy is needed. The principal components of this strategy are formation and consolidation of SHGs, building a collective of NGOs, encouraging the women to undertake traditional activities in the short-run and non-traditional activities in the long-run, interface between people's institutions and NGOs on the one side and other development actors on the other side, and policy change through lobbying and advocacy.

Bidi / ECON India (2000) Dir
Directorate of Tobacco Development: **Income to Bidi Tobacco Farmers in Gujarat**: Chennai, April 2000.

(no abstract available)

Bidi India (1999) Gho
Ghosh PC. **Report On Ergonomical Study for Improvement of Work and Working Posture for Beedi Workers in Maharashtra region (Nagpur).** Central Labour Institute, No. 5, August, 1999.

(no abstract available)

Bidi India (1999) Gop: Descriptive report
Gopal M. **Disempowered despite wage work – women workers in beedi industry.** *Economic and Political weekly*, April 17-24, 1999, WS-12-WS-20.

By employing a system of production using contractors and home-based workers, the beedi industry is able to gain tremendous profit with little inputs in infrastructure or comprehensive benefits to labour. Women home workers are able to care for children and perform household tasks while earning much needed income, but women put in long hours to fulfil production targets set by employers and have no idea as to how they arrive at the wage levels they set. Women's subordinate status as workers is built into the production process.

Bidi India (1999) Sud: Descriptive report
Sudarshan R and Kaur R. **The tobacco industry and women's employment: old concerns and new Imperatives**. *Indian J Labour Econ*, 42, 1999, 675-685.

The main objective of this review was to give a gender perspective on the employment situation in the bidi industry and to highlight the policy issues relating to women's employment in this industry. According to the National Sample Survey (NSS), three fourths of the total employment in the tobacco industry is in bidi manufacture. Amongst the women in the tobacco industry, 91% are employed in manufacture of bidis. According to the NSS, the total number of women/girls in the bidi industry constitutes three fourths of the total bidi workforce. The official estimates of women in the bidi manufacture vary from 2.2 to over 4 million, the NSS figure is around 3.5 million. According to the NSS, 192,000 girls under the age of 14 years are employed in the bidi industry. Microstudies conducted by NGOs in small areas indicate gross underestimation of the size of the workforce. Such underestimation of the numbers of bidi workers results in their invisibility to policy makers and contributes to their vulnerability to economic exploitation. Reliable estimates are difficult to obtain because 40% of bidi-makers work from their homes. Factory-based work consists of roasting, sorting, grading and

packaging the bidis. Large numbers of home-based workers are mostly underreported to the authorities and only a small fraction of them have been issued identity cards by the employers. Women constitute the bulk of the home-based workforce because this arrangement is convenient to them for simultaneously fulfilling their role as homemakers. Employers and their contractors find this arrangement convenient because they can avoid reporting the workers to the government and providing legally required benefits. The bargaining position of bidi workers in general and of women home-based workers in particular is weak, due to the low level of importance given to female workers, illiteracy of the workers, the contract system and a lack of alternate sources of employment in certain areas, especially for illiterate and unskilled persons. Women bidi workers rarely secure minimum wages, often receiving just over half of their minimal entitlement, yet their contribution to their household income is one third to one half of the total. Illness is common among home-based bidi workers, especially, tuberculosis, asthma, backache, joint pain, and arthritis. Various strategies suggested for empowering women bidi workers included better counting of home-based workers, providing them with access to education and healthcare, organizing the workers to demand their rights, and creating new livelihoods for them.

Bidi India (1997) Hens

Hensman R. **Lessons from Case Studies, Navyuga Beedi Karmika Sangam and SASHA.** Paper presented at the seminar on "Policies and Strategies for Working Women in the Context of Industrial Restructuring" 22nd to 25th September, 1997, Jamia Humdard University, New Delhi.

(no abstract available)

Bidi India (1997) Sri: Descriptive report

Srinivasulu K. **Impact of liberalisation on beedi workers**. *Economic and political weekly* March 15,1997, pp 515-517.

The aim of this paper was to view the beedi worker movement with reference to liberalisation, with emphasis on the Telangana District of Andhra Pradesh. The Beedi industry in various states like Andhra, Pradesh, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh and West Bengal employs around 6 million workers in beedi manufacture. About 90% of this work force are women and children. There was a rise in the beedi industry in Telangana District of Andhra Pradesh after the decline of the handloom industry in this district since the 1960s with the rise of the powerloom sector. Many of the male weavers migrated to western India to work in the powerloom sector and brought their families. The women entered beedi manufacture. After increasing unionisation of beedi workers in western India, the beedi barons of Maharashtra and Gujarat shifted their bases to Telangana District. After this, the male weavers tended to leave their families back home while they came to work on a seasonal basis in western India. Home-based beedi manufacture became an important activity in both areas. In the beedi industry there were 2 systems a) the factory

system b) and the out-work or home-based system. The Beedi and Cigar Workers Act of 1966 was intended to regularise the conditions of work and ensure the payment of minimum wages and benefits. The beedi barons challenged this, but the Supreme Court upheld it in 1974. The response of the beedi barons was to shift beedi rolling to the home-based system, where the laws could easily be avoided. Initially the women beedi rollers also felt this system was convenient for them, as they could attend to their household duties more easily. However, their position became extremely insecure since they were not given any appointment letter or passbook, hence they were easily exploited and harassed in many ways. When, as a part of its liberalisation programme in 1994-95, the Central government halved the excise taxes on cigarettes of length less than 60 mm, several large cigarette companies began producing what became known as 'mini' cigarettes. These sold for a price not much higher than beedis. The fact that cigarettes have been associated with a superior social status made the 'minis' an attractive product to people who formerly could afford only beedis. The volume of production of mini cigarettes increased phenomenally within a year, which posed a threat to the beedi industry. Both the agents and the beedi rollers have suggested that the minis have led to a reduction in the volume of beedi work, from six days a week to about three to four days (by the end of 1996). Women workers said that their wages had been reduced with the reason given that mini cigarettes sales had reduced the volume of sales of beedis. Thus the employment insecurity of the workers has increased. The labour unions have in some cases responded that either the threat of the minis is only a pretext for not implementing the labour laws or have refocused their struggle against the minis. Thus a setback in the articulation of the minimum demands of the workers was predicted in this article.

Bidi India (1996) Bag
Bagchi J and Mukhopadhyay A. **Child Labour in Bidi Industry: Murshidabad District in West Bengal.** School of Women Studies, Jadavpur University, Calcutta (Unpublished), 1996.

(no abstract available)

Bidi India (1996) LB : Official report
Labour Bureau, Ministry of Labour, Government of India. **Socio-Economic Conditions of Women Workers in Selected Beedi Units in India.** Chandigarh/ Shimla, 1996.

(no abstract available)

Bidi India (1995) LB: Official report
Labour Bureau, Ministry of Labour, Government of India. **The Working And Living Conditions of Workers In Beedi Industry In India.** Chandigarh/ Shimla, 1995.

(no abstract available)

Bidi India (1990) Kol: Socio-economic descriptive study
Koli PP. **Socio-economic condition of female bidi workers in Solapur District,** in *Social Change,* June 1990, Vol. 20, No.2, pp 76-81.

The main objective of the study was to look into the socio-economic conditions of female bidi workers. The study was conducted in Barsi town in Solapur District of Maharashtra. About 100 workers were employed in the bidi industry, most of them female. Forty women bidi workers from 7 factories were studied. It was observed that the bidi workers had a very low standard of living and their socio-economic conditions were bad. As many as 75% of the workers were illiterate and 25% were educated up to eighth standard. The majority of the workers were Muslims and 50% of the women were sole breadwinners. They were exploited at work and at home. The workers were in the habit of chewing tobacco and pan and taking snuff. Their wages were so low that the workers were unable to cater to their basic needs.

One article from before 1985:

Bidi India (1980) Moh Socio-economic and occupational descriptive study
Mohandas M. **Bidi workers in Kerala: Conditions of Life & work.** *Economic and political weekly*. September 6 1980,1517-1523.

The study notes the deplorable conditions of workers in the bidi industry all over the country, and refers to reports published earlier in the same journal that highlight the miserable lot of bidi workers in the specific areas of Maharashtra, Karnataka and West Bengal. This paper attempts a quantitative analysis of the economic conditions of bidi workers in Kerala. It considers various aspects like work load, wage and non-wage benefits, savings and indebtedness and the occupational hazards of bidi workers. The paper also touches upon the impact of existing labour legislation covering this category of workers and the tendency of the industry in Kerala to move into states where legislation governing bidi labour is considered favourable. Conclusions: A vast majority of bidi workers are not getting most of the benefits conferred by Bidi and Cigar Workers Acts of 1961 and 1966.The of trend of growing disorganization together with the industry's propensity to shift to neighbouring states have effectively reduced the bargaining power of bidi workers. Consequently, they continue to be a group of neglected workers whose conditions remain miserable. It may be noted that the tendency of inter -state shifting can be minimized by implementing a uniform regional wage policy in all the southern states. Legislation directed to ameliorate their pathetic conditions have not been honestly or effectively implemented. Though the 1966 Act confers all the benefits to home based labour also, it cannot be implemented due to institutional, conceptual and legal complications. Self-employed labour and home-based labour may be organized under workers co-operatives in bidi factories. Even at present, apart from the giant Kerala Dinesh Bidi, only a few workers cooperatives of very small size are operating in the state. What is more important is an organizational set- up like a Bidi Workers Welfare Board to implement the provisions of the Act and operate welfare

measures. The most urgent requirement, however is a scientific probe into the incidence and causes of the so- called occupational diseases. Only a detailed study may show to what extent these diseases are caused by tobacco fumes, filthy and unhealthy atmosphere or such other factors. Above all such a study can help to extend the Employees State Insurance benefits to bidi labour.

11. Tobacco Promotion – Advertising and Sponsorship

Three articles cover product promotions by tobacco companies. See also the section on Psychology where some abstracts report on questions on sports sponsorship in attitude and practice surveys of adolescents.

T Prom India (2002) Con: News Analysis
Consumer Coordination Council.**Tobacco Advertising and Promotional Activities in India.** In Consumer Network 9 (4):15-17, December 2002. (www.consumer-netindia.org)

This news article provides data on amounts spent on tobacco advertising in India in 2000 (Rs 300-400 crore) as reported in the Times of India. Describes (in qualitative terms) the advertising in various media – newspapers and magazines, outdoors; and promotional activities – sports and cultural event sponsorship, surrogate TV advertising, contests, product placement in movies, freesampling, brand stretching and diversification, corporate philanthropy and public relations, and state-patronised tobacco promotion. Cites data from Srivastava noting a 28% increase in spending on tobacco advertising (in 2000?) and lists the existing advertising regulations in India.

T Prom India (2001) Gup News Analysis
Gupta, P.C. **India: Swedish Match steps in**. *Tob Control* 2001;10:304. (Winter)

Swedish Match, a large manufacturer of smokeless tobacco products based in Sweden, purchased the largest match company in India (WIMCO) in 1997. Although WIMCO had nothing to do with tobacco products, those concerned about health were apprehensive that the takeover might lead to Swedish Match launching new smokeless tobacco products in India. These fears proved well founded. In April, Swedish Match launched a new smokeless tobacco product in India called Click. Although the company has made claims for the safety of its smokeless tobacco products in Sweden, and its products are being supported by some as a harm reduction strategy for smoking, no such claims were made while launching Click. The reason given for the launch by Lennant Sunder, president and chief executive officer of Swedish Match was simply: "India has a long tradition of smokeless tobacco use and thus offers exciting business opportunities to Swedish Match in its strategic focus in this category." Currently there are few restrictions on the advertising and sale of smokeless tobacco products in India. The situation may change soon as a comprehensive bill is under consideration in the Parliament that would ban advertising of all tobacco products. Swedish Match has probably launched Click

specifically at this time so as to be able to advertise this new product before a bill is passed into a law and comes into effect. India has a huge smokeless tobacco problem - 40% of all tobacco consumed is in smokeless form. The health consequences of tobacco use in India are huge. A substantial portion of the 630,000 premature deaths attributable to tobacco each year is attributable to smokeless tobacco. In a recently reported cohort study, the age adjusted relative risk of all cause mortality among women who used smokeless tobacco was 1.35, whereas for men who smoked it was 1.63. There is a large variety of smokeless tobacco products in India, but so far they have all been indigenous. The entry of a multinational further complicates a situation that is already very serious.

T Prom India (2001) Tob: News Analysis
Anon. **India: Where there's a Wills, there's a way (round ad bans).** *Tobacco Control* 2001;10:304 (Winter). Website http://tc.bmjjournals.com/

When BAT's Indian subsidiary, ITC, announced a self imposed ban on tobacco promotion early this year, it placed large advertisements in leading newspapers announcing it would be stopping all sports sponsorship as part of the deal. This included its major support of cricket, the national game with near cult status among the young; India's famous cricket team was sponsored by Wills. Few can have thought that ITC/BAT had suffered a crise de conscience, and even if some optimists thought the company might find it more difficult to associate its lethal product with healthy sporting images, they cannot have doubted that it would be working on a contingency plan. Very soon, at least part of that plan was revealed not just a contingency, but a whole new strategy not only to make up for the loss of sports sponsorship, but to take the company into a new era of tobacco promotion. The trouble with sport in a country like India is that its appeal is mainly to boys and men. An unbelievably large pot of gold awaits cigarette companies who can entice Indian women, who apart from a few pockets of traditional forms of tobacco use, are non-smokers, to take up smoking. So what better than a plan that not only links Wills cigarettes with sports, but also adds fashionable, chic, successful and smart associations, with equal potential to appeal to girls and young women as to their male counterparts? Step forward Wills Sport, the latest name in fashion wear now being promoted in Indian cities in the press, at gleaming new Wills Lifestyle shops, and via the internet. With complementary ranges of designer items aimed at both sexes, it looks as if this self proclaimed responsible company has found an effective new way of promoting its wares with desirable, healthy, and clean images, thereby minimising public perception of any association with addictiveness, cancer, respiratory illness, and cardiovascular disease, and the smell and stain of the several thousand chemicals produced in every puff of its products.

12. The Economics of Tobacco

The literature search found nearly 50 documents that discuss the economics of tobacco cultivation, production and consumption in India. The most comprehensive study is The Economics of Tobacco Use, an unpublished report of a Government Expert Committee, dated February, 2001. Several articles analyze data from the National Statistical Surveys on tobacco consumption in the different states of India over the past forty years. Other topics covered in this section include economic gains and losses to the economy due to tobacco, the performance of the tobacco industry, and the potential for crop diversification and alternative uses of tobacco. One article documents parliamentary discussions on tobacco in the economy. Other articles cover topics ranging from descriptions of the efforts of trans-national tobacco companies to expand their operations in Asia, internal issues in multinationals in India and a description of the co-operative management of tendu leaf collection.

ECON / TUS India (2002) Gup: Analytic report
Gupta I, Sankar D. **Tobacco Consumption in India: A fresh look using the National Sample Survey.** Discussion paper no. 47/2002, *Institute of Economic Growth*, Delhi. (Institute of Economic Growth, University Enclave, Delhi-110 007, India)

The paper uses data from the 50th (1993/4) and 52nd (1995/6) rounds of the National Sample Survey, comparing prevalence, disaggregating by rural and urban households, men and women, age group, socio-economic category and states. It finds higher prevalence reported in the later survey for both smoked and smokeless tobacco products. However, it notes differences in the way the data were collected: the 52nd round only reports on regular users, and the 53rd round prevalence is imputed from data on household expenditures. The paper does not explain how it took these differences into account. The paper also reports some statistics on production and exports, and uses the NSS data to estimate the total number of tobacco users in India y gender and age group.

ECON / Bidi India (2002) Joh: Analytic report
John S, Vaite S, edited by Efroymson D. **Tobacco and Poverty, Observations from India and Bangladesh**. PATH Canada, Ottawa, Canada.

The tobacco industry frequently argues that it is a significant source of employment, and that economies, particularly of low-income countries, will suffer greatly if strong tobacco control legislation is passed. This argument is significantly weakened by the fact that growing world population and incomes will contibue to maintain global tobacco consumption for the foreseeable future. The industry also exaggerates the numbers of people employed by tobacco, by counting those for whom tobacco is one of many sources of income. Research suggests that rather than hurting economies or employment, tobacco control would actually benefit both (World Bank, 1999). Profits from the sale of tobacco products are not evenly distributed among those involved in the work. As this

report show, much of th economic gain from tobacco remains in the hands of a powerful few, while a vast number of workers remain desperately poor.

This report documents the conditions of some of those whose work is related to tobacco, as farmers, leaf pickers, and bidi rollers in India and Bangladesh. For many, the income gained from this employment is barely enough to sustain them, or is insufficient to meet the most basic needs. Some have had their health ruined by their work, others consider tobacco-related employment a form of slavery, and would gladly switch to another field if work were available. The report also documents the misery suffered by women, children and tribal people, whose oppressive circumstances make them vulnerable to exploitation by middlemen in the tobacco industry. Investment in education for our children, and initiatives for equality for women and tribal people, would help the poor to rise from their deplorable conditions in tobacco-related employment, while bringing significant economic benefits for the country as a whole as well.

In addition to looking at those whose employment is realted to tobacco, we also investigate some of the more vulnerable population groups who use tobacco, specifically street children and pavement-dwelling families in Mumbai City of India. For the poorest of the poor, who happen to be the most likely to use tobacco, daily expenditures on tobacco products take up a significant portion of daily income, and are a further hindrance to the investments needed to help lift them out of poverty.

The chapters on India in the report, and their authors, are as follows: (1) Tobacco farming in India: an unreliable option to growers and workers, expensive proposition to farmers and a death warrant to forests, by KV Suvarna and N Thomas. Eleven case studies of farmers in Karnataka who explain that they switched away from tobacco because the inputs were expensive, the crop very labor intensive, and getting wood for curing was problematic. (2) Tobacco cultivation in India: time to search for alternatives, by S Kaur. Discusses the problems faced in growing tobacco, especially for farmers and the environment, and possible alternatives. (3) Bidi workers in Ahmedabad, India: monotonous work, low pay, by P Raghavan. Eight case studies highlight the stories of women bidi workers interviewed. (4) Diversification efforts of kerala Dinesh Bidi (India) from tobacco to other consumer products and services: social and economic outcomes, by S John. The cooperative has diversified into 32 new products, including chutney, pickles, masal and curry powder, jam, juices, umbrellas, computer software and data entry, switching 400 of its 25,000 workers into these new products, about half of which are profitable. (5) Collecting Tendu leaf in Rajasthan State, India: tribal people dream of decent rteatment and a fair wage, by N Ahmed. Leaf collecting is hot, arduous, sometimes dangerous, and very poorly paid. (6) Choosing tobacco over food: daily struggles for existence among the street children of Mumbai, India, by S Shah and S Vaite. Reports the findings from a 2002 survey of 400 street children, using area mapping and accidental sampling. Reports age, education, economic activities, incomes, and tobacco use (by over half the children), including quantity used, average expenditure (21% of earnings), food consumption, health status and health care seeking behavior and expenditures, and other expenditures. (7) Caught in tobacco's trap: tobacco expenditures in Rattehalli village, Karnataka, India by KV Suvarna and N Thomas. This reports on total tobacco sales in a small rural village, that average 18 rupees per family per day, where average earnings are only 30 rupees per day. (8) Pavement dwellers in Mumbai,

India: prioritizing tobacco over basic needs, by S Shah and S Vaite. The study surveyed 400 people, asking about working situation, health and spending on health care, and income and expenditures, including on tobacco products. Most (86%) used tobacco, which took very large proportions of their meager income.

ECON India (Undated – 2002?) Pan: Descriptive report
Panchamukhi, P.R., (no date – 2002?) **CMDR and Tobacco Control Initiatives: A Brief Assessment of Performance and Prospects**; Centre for Multi-disciplinary Development Research (CMDR), Dharwad, Karnataka.

Sections are as Follows: I. Introduction, II. CMDR and Tobacco Control Programme, III. Success Story : Some Glimpses, A : Philosophical basis for Centre's Tobacco Control Initiatives, B. Glimpses of Success, V. Future Prospects of Micro-Level Tobacco Control Measures by the Centre.

ECON India (undated, 2001) FAO: Descriptive report
FAO. **Tobacco in India: Long Term Perspective**. (unpublished) "Tobacco Demand, Supply and Trade by 2010: Policy Options and Adjustment". Written in 2001 for the FAO, as one of 6 countries studies for the FAO/SIDA project: 81 pages (includes a 26 page statistical appendix, and an 8 page executive summary).

The report documents the economic contribution tobacco makes in India to farm incomes and employment and government revenues at State and Central levels. It reports on trends in land area devoted to tobacco growing and production volumes and yields. It notes the main tobacco growing States, and types of tobacco grown. It describes government support for tobacco growing, and notes that at least 6 Ministries have some oversight of tobacco (prices, support, research, quality assurance, and licenses for cigarette production) and the apparent mixed impact of government policies. It describes tobacco farmers' costs and returns relative to other crops, and efforts to diversify or switch to other crops. It also notes research underway to develop alternative uses for tobacco. It concludes that the scope for large-scale substitution of tobacco by other crops is limited, at least in the medium and short term, and that switching to the next most profitable crop would entail income falls for farmers, and reduced demand for hired labor, and suggests a phased approach, with support for affected parties. The report describes the oligopolistic Indian cigarette market, with 4 large manufacturing companies, and the technology changes that have occurred. It provides data on government tobacco and tobacco product excise tax revenues (nearly Rs 60 billion in 1998/9). Other tobacco products are manufactured by nearly 7,000 officially registered enterprises, with an average of about 70 workers each. The report notes that consumption of tobacco products has increased in India at an annual rate of about 1.6 percent during the past 30 years, with fastest growth of bidis, which are subject to low taxes and sell at very low prices. Tobacco products accounted for nearly 3% of total private final consumption in 1998/9, a rise since 1970/1. Export incentives and export volumes and values are reported, and it is noted that India exports mostly raw tobacco rather than

cigarettes. The findings of the Indian Council of Medical Research on the cost of major tobacco-related diseases are reported, as are some of the recent efforts by State and Central governments to reduce use of tobacco products. Finally, the report describes likely future prospects for tobacco and tobacco products under a continuation of the present policy regime (higher rate of growth of cigarette industry than in the past decade, and continued growth of the bidi industry, but slow decline in other tobacco products), and if stronger efforts are undertaken to try and persuade people to reduce use of tobacco products (slightly slower rate of growth of tobacco consumption in the country than under the "no change" scenario).

ECON India (2001) DOH: Descriptive and Analytical Report
Department of Health, Ministry of Health and Family Welfare (DOH, MOHFW). (2001) **Report of the Expert Committee on The Economics of Tobacco Use**. (Unpublished) Department of Health, Ministry of Health and Family Welfare, Government of India, February 2001. New Delhi. 213 pages.

An Expert Committee was set up by the Ministry of Health, to do a comprehensive study on the economics of tobacco use, by notification of 26th July 1995. The Committee's terms of reference included: examining tax revenues and foreign exchange earnings, employment and consumer expenditure, as well as the cost of tertiary level medical care for treatment of tobacco related diseases, losses due to fire hazard, ecological damages due to deforestation and disposal of tobacco related waste. Literature on tobacco in India and the rest of the world was reviewed, and new research and data collection was undertaken (on health care costs). The Preface notes a strong conclusion of the Expert Committee: that "the costs of medical treatment and other external costs incurred by the patients and society are even in their underestimated form so staggering as to dwarf the putative indirect financial benefits (to persons and entities other than those who spend a part of their income on tobacco products).

ECON India (2001) Nag: Analytical report
Nagarajan K, Umamaheswara Rao M, Subba Rao R. **Status Report on Tobacco Alternate Crops l995-96.** Central Tobacco Research Institute, Indian Council of Agricultural Research, Rajamundry, December 2001. 2 pages of text, and 14 tables

Reports on efforts by the Central Tobacco Research Institute and its Regional Stations located in different agro-climatic zones to identify remunerative alternate crops to tobacco. Yields and economics of growing various crops are compared to the returns and economics of growing tobacco under rainfed conditions in various zones. None of the alternate crops on their own (mono-crop) were as remunerative as tobacco in almost all the zones, but crop sequence studies and intercropping trials clearly indicate that net returns from two crops can equal net returns from a sole crop of tobacco. Data are (briefly) reported from trials in 7 CTRI research stations, with more details comparing the various crops presented in the Tables.

ECON India (2000) Ann: Pilot Study
Annigeri, VB. **Control of Tobacco Cultivation: Action and Reaction are Equal and Not Opposite**. Working Paper No. 4. Part of the research project on "*Economics of Shifting from Tobacco Cultivation, An Action research Project*". Centre for Multi-Disciplinary Development Research, Dharward, Karnataka, 2000.

This paper discusses the economic benefits and losses from tobacco cultivation and consumption in India, with specific reference to the difficulties of tobacco farmers in the Nippani belt of Belgaum district in Karnataka state. The report describes a questionnaire administered to 2,000 households in 50 villages in three taluks of Belgaum, to gather information on the socio-economic situation of tobacco growers (demographics, household composition, size of land and ownership), income and expenditure, assets, their patterns and costs of production and reasons for growing tobacco, loans and government assistance, willingness to switch to other crops and incentives and help that would be needed for the switch. The key findings were: A significant percentage of farmers were interested in switching away from tobacco because of the difficulties involved in tobacco growing (labor intensive, vulnerable to disease and rain damage at harvesting time), and their poor market power relative to the traders. The project then identified a village for the pilot, with help from the Agricultural Research Center at Nippani, part of the University of Agricultural Sciences, Dharwad. The project also provided education and information (videos, street plays, posters and talks) on the health effects of tobacco use, to help motivate a shift away from tobacco. It was found that peer interaction was the most effective motivation method. Once the village of Sidnal was selected, meetings were help to discuss strategies with the farmers, and options for alternative farming activities, and to get financial assistance from commercial banks. About 100 farmers participated in the pilot.

ECON India (2000) Ano: Descriptive industry report
Anon. (2000) **Nicotine and its Derivatives from Tobacco Waste.**
Code No.: TMS158. A tobacco industry view, obtained from the following website: http://www.tifac.org.in/offer/tlbo/rep/st158.htm

Contents: Introduction: The World of Tobacco- History of Tobacco, History of Tobacco in India, Introduction of VFC tobacco in India, Institutions for Tobacco Development and Regulation, Production of Tobacco, Tobacco varieties grown in India, Harvesting and Curing practices, Grades of Tobacco from India, Tobacco Prices, Nicotine content of Tobacco, World Consumption of Tobacco; Tobacco Utilization Pattern; Tobacco Post Harvest Practices- Virginia Tobacco, Machanized Bulk Curing, Chewing and Hookah Tobacco, Cigar Cheroot and beedi Tobacco; Tobacco Waste : Sources, availability and Utilization- Sources, Availability of Tobacco Waste, Present Utilization of Tobacco Waste; Chemical Constituents of Tobacco- Aroma constituents produced by carotenoid degradation during curing, Nicotine Alkaloids of Tobacco, Nicotine content of Indian Tobacco, Other commercially potential chemicals present in Tobacco; Tobacco Products and Alternate use of Tobacco- Role of Tobacco products in the economy, Tobacco Leaf

Protein, Tobacco Seed Oil ; Products from Tobacco and / or Tobacco Waste- The Delhi declaration of WHO international Conference, Tobacco Products, Major Production Centers, Tobacco waste and dust generated during manufacture of Tobacco products, Products from Tobacco waste, Solanesol, Other Tobacco waste based products; Nicotine and its commercially important derivatives- Nicotine Sulphate, Smoking Cessation Products, Medicinal use of Nicotine derivatives; World Pesticide Market and prospects for Nicotine Sulphate- World pesticide Market Scenario, The Indian Scenario of Pesticides, World Pesticide Markets, Pesticides in current use Insecticides in current use, Insecticides in current use, Nicotine Sulphate: Problems and Prospects, Use of Nicotine Sulphate as insecticides: farmers Opinions; Status of tobacco based industries in India- technical know-how, Case study of Kraun Fine Chemicals Limited, Chikodi, Belgaum (Closed Unit), Case study of Nicosulf Industries and Exports Private Limited (Existing running unit), Export trend: Agrochemicals Versus Nicotine / Nicotine Sulphate / Nicotine derivatives; Overview of Technologies for Nicotine based Products- Technology for Nicotine Sulphate from NCL Pune, Technology developed by the Central tobacco research Institute Rajahmundry, Technology from China, Phytochemicals from Tobacco and Tobacco waste: Integrated approach, Patents on nicotine and its derivatives / Products; Need for Development of Alternate use for Tobacco: (Commercially important Application)- Need for development of alternate use for Tobacco, Commercially important Applications – Smoking Cessation Products, Commercially important Applications – pesticides, Pharmaceutical use of nicotine; Government Policy Support- Policy statement of World Health Organization, Short term Policy measures, Long term Policy measures; Commercial Aspects of Nicotine Sulphate and Nicotine Derivatives- Raw material Costs, Project Cost, Market Price of Nicotine and its Salts, Value added Products from Nicotine.

Conclusions and Recommendations (The views expressed here are purely of those authors writing for Technology Linked Business Opportunity Publications)

Andhra Pradesh, Gujarat and Karnataka together have 82.4% of the country's tobacco growing areas. Beedi tobacco is the major tobacco grown in the country (33%; other tobaccos grown are VFC (23%), Natu (12%), Cigar and Cheroot (3%), Hookah tobacco (14%), Chewing tobacco (13%) and Snuff tobacco (2%). There are 23 major tobacco growing Districts in the country. Natu tobacco is grown in 5 AP Districts. Hookah tobacco is grown in Bihar, WB, Gujarat and UP. Chewing tobacco is grown in TN, WEB, UP and Orissa. Production in excess of the Tobacco Board quota for VFC tobacco in 1999 caused prices to fall. Tobacco leaf processing is not mechanized except for VFC tobacco. AP and Gujarat together contribute 87% of tobacco waste generated in India. India exports tobacco waste, mainly to USA and Japan. Tobacco is a rich source of Protein, Edible oil and chemicals like Aromatic compounds, Solanesol, Nicotine, Organic acids etc. Beedi tobacco has the highest percentage of Nicotine (6.5 – 8.2%) followed by Chewing and hookah tobacco (1.0 – 8.25%), Burley tobacco (1.3 – 6.5%), VFC tobacco (0.9 – 4.65%) and Cigar and cheroot tobacco (0.7 – 5.35%). Among tobacco wastes available in commercial quantities at present Beedi tobacco dust has the highest percentage of Nicotine content (up to 6.3%) followed by Natu and FCV tobacco wastes (1.5 – 3.2%) and Cigarette factory waste has the lowest nicotine content (0.88 – 1.3%). Among the new unexploited tobacco related products: Protein from the green leaves and tobacco seed oil are promising product lines for the future. Commercially important

Nicotine derivatives and products at present are: 1, Nicotine Sulphate, which is used as an insecticide and in pharmaceutical preparations, 2. Nicotine hydrogen tartrate, Nicotine bi-tartrate Nicotine Salicylate, Nicotine hydrochloride, Nicotine dihydrochloride and nicotine, which are used in various smoking cessation products like Gums, Nicotine Inhalers, Nasal Sprays, Nicotine Patches, Nicotine Micro Tabs, Nicotine water etc. 3. Nicotine based tooth Paste and Nicotine water. There are at least five to six units manufacturing Nicotine and Nicotine salts (mainly Nicotine Sulphate 40% solution for use as pesticide) with total installed capacity exceeding 800 TPA of nicotine products, of which only 40 TPA of Nicotine Sulphate was registered for Restricted Use and the remaining for Exports. Nicotine based pesticides are effective in controlling Aphids, Hetroptera, Thysanoptera, Diptera and Hymenoptera. The technology for Nicotine and Nicotine Sulphate in India was first developed at National Chemical Laboratory, Pune with active collaboration of Central tobacco Research Institute, Rajahmundry for field trials. India is currently exporting Nicotine alkaloids, Nicotine Salts and Nicotine Sulphate Mainly to Japan, Europe, Russia, Canada and China. The current Market price of Nicotine and its salts is in the range of $95 - $130 per kg, depending upon the country of origin, Type of Nicotine Salt and quality. The average price realized by India for all Nicotine products (85% Nicotine Sulphate 40%) is around Rs.200 per.

ECON India (2000) Cen: Pilot Study
Centre for Multi-Disciplinary Development Research. **Economic Aspects of Tobacco Cultivation and Consumption. A Pilot Study.** Working Paper No. 1. Part of the research project on "*Economics of Shifting from Tobacco Cultivation, An Action research Project*". Dharward, Karnataka, 2000.

A random survey of 35 tobacco producers and consumers was done in the village of Bennihalli in Chikkodi taluka of the Belgaum district, Karnataka. The survey investigated why people used tobacco and their awareness of its effects on health. Growers were asked whether they would be willing to switch to other crops, what alternatives they would consider, and what help they would need to make the change. Half the farmers said they were willing to switch, but several said they needed irrigation.

ECON India (undated – 2000?) Cen: Review
Center for Multi-disciplinary Development Research (CMDR). **Tobacco Production / Cultivation and Consumption in India—A Review** (unpublished) report, CMDR Dharwad (Karnataka, India), for Research on International Tobacco Control (RITC) a secretariat of International Development Research Centre. 27 pages.

This review is part of a study on Economics of Shifting from Tobacco Cultivation and Consumption. The article reviews the literature on tobacco production and consumption in India, and describes the study undertaken by the Center for Multi-disciplinary Development Research between 1997 and 2000 in Dharwad, Karnataka, India. The review provides data on tobacco employment, export earnings and tax revenues. It explains some of the negative aspects of the tobacco industry: tobacco is a very labor

intensive crop, and has negative consequences for the environment. Tobacco industry workers in India earn low wages, may face gender discrimination, and working conditions can be detrimental to health. The article calls for the government to give support to a workers in the tobacco industry to help them transition to other sectors.

ECON India (2000) Deb: Pilot Study
Debi S. **Some Aspects of Tobacco Cultivation: Empirical Evidence from Village Level Data.** Working Paper No. 7. Part of the research project on "*Economics of Shifting from Tobacco Cultivation, An Action research Project*". Centre for Multi-Disciplinary Development Research, Dharward, Karnataka, 2000.

This paper describes the socio-economic characteristics of 50 villages of three talukas (Chikkodi – 41 villages, Hukkeri-7 villages and Gokak-2 villages) of Belgaum district in Karnataka, which were the site for a survey of 2,000 households. The talukas were purposively selected because more than 80% of farmers were tobacco producers and devoted more than half their land to tobacco. The area under tobacco was 84% in Chikkodi, 12% in Hukkeri, and 4% in Gokak. The areas are densely populated. Average family size in 4 in Chikkodi and 6 in the other talukas. Literacy ranged from 55 to 70%, female literacy from 23 to 40%. Infrastructure is described (types of irrigation, post offices, health centers, schools, roads and markets). The report also describes land use patterns, irrigation, agricultural prices and wages, yields, production costs and net returns. Multiple regression was used to explore the factors that determine the outputs of various crops, looking at land area, % of area irrigated, literacy, cultivation costs and infrastructure.

ECON / Bidi India (2000) Dir
Directorate of Tobacco Development: **Income to Bidi Tobacco Farmers in Gujarat**: Chennai, April 2000.

(no abstract available)

ECON / TC India (2000) Mal: Descriptive report
Malhotra SP. **Tobacco Use and Control in India.** A paper presented at the seminar Organized by RITC and IDRC on *Economics of Shifting from Tobacco*, at the Center for Multi-Disciplinary Research, 29-30 November 2000.

The paper summarizes the economic contribution of tobacco to the Indian economy, government support for tobacco growing, and arrangements for licensing of tobacco product manufacturers. The paper comments on the profitability of tobacco relative to other crops that might be viable alternatives, and reports on some studies on this topic. There is also mention of tobacco tax revenues, exports, and trends in consumption. The second part of the paper summarizes government measures to reduce tobacco use, including a discussion of taxation, providing data on tax rates between 1987 and 2000,

and shows market shares and tax revenues accounted for by different tobacco products. Advertising restrictions are described, as well as health warnings, and restrictions on tobacco use in public places.

ECON India (2000) MOA: Statistical report
Ministry of Agriculture. **Cost of Cultivation of Principal Crops in India.** February 2000. Department of Agriculture and Cooperation, Directorate of Economics and Statistics, Ministry of Agriculture, Government of India.

Provides cost of cultivation per hectare and by output, measured in QTL, considering seed, fertilizer, manure, human labor and animal labor. Data are given for VFC Tobacco grown in Andhra Pradesh, in 1990/91 (283 holdings) and 1992/93 (257 holdings), 1993/4 (279 holdings) and 1994/5 (258 holdings) with the holdings categorised by light/black soil. The costs are also shown, broken down by type of cost (Labor costs, disaggregated by type of labor; seeds, fertilizer and manure, insecticides, irrigation, and costs of curing the tobacco (labor, fuel, bamboo, twine, bags), and interest on working capital, as well as fixed costs (rental value or rent for land, land taxes etc). Data are also given for 23 other crops, with data from between one and ten states for each crop. For Andhra Pradesh, there are data on paddy, ground nut, cotton, sugar cane, jowar, maize, urad, and moong (in addition to tobacco).

ECON India (2000) MOA: Statistics
Ministry of Agriculture, Directorate of Tobacco Development. **Tobacco in India: A Handbook of Statistics**. April 2000, Government of India, Chennai.

(no abstract available)

ECON India (2000) Nai: Action research project report
Naik, NS. **Tobacco: National and International Perspectives (Based on Press Reports) 1995-1999**. Working Paper No. 3. Part of the research project on "*Economics of Shifting from Tobacco Cultivation, An Action research Project*". Centre for Multi-Disciplinary Development Research, Dharward, Karnataka, 2000.

The objectives of the 32-page paper are stated as follows: (1.) To discuss recent developments with regards to tobacco consumption, litigation, damage to health, marketing, taxation and revenue; (2.) record the public opinion shift against the use of tobacco, and (3.) present the impact of this movement, drawing on reports between Nov. 1995 and June 1999 in the main Indian national newspapers (Times of India, The Hindu, Business Line, the Economic Times and Sunday Times). The information is summarized under the following headings: Environmental Impact of Production and Processing; Tobacco and Health; Tobacco Deaths; Tobacco Consumption; Tobacco and Law Suits; Tobacco Ban.

Key anti-tobacco actions in India are described: warnings labels were mandated by law in 1975, smoking bans on public transport are much older but were not well enforced. In 1996/97 Delhi began to prohibit smoking and advertising (and enforce this) in public places and public vehicles. Andhra Pradesh passed similar restrictions. In 1997 the Corporation of Kochi decided to ban the sale of pan masala in its jurisdiction. The Rohilkhand Universtiy campus was declared smoke-free in 1997. It also describes pro-tobacco lobby groups.

Pages 21-25 describe changes in tobacco taxes in India, and tobacco process trends in the late 1990s, and exports of Indian tobacco. It concludes that "tobacco trade has been suffering due to uncertainty in prices, lack of demand and support. Therefore, it is now the right time for the countries to encourage alternative crops to tobacco and also alternate products to tobacco depending industries to avoid thousands of farmers and employees to suffer because of the uncertainties attached to tobacco."

ECON India (2000) Pan: Descriptive and Analytical Report
Panchamukhi, P.R. **Agricultural Diversification as a Tool of Tobacco Control**. Paper presented at the *WHO International Conference on Global Tobacco Control Law*, 7-9 January, 2000, New Delhi. 48 pages. Retrieved from the internet March 2002, at www.tobacco.who.int/page/cfm?tld=94
(Director, Centre for Multi-disciplinary Development Research)

Sections are as follows: I. Introduction. II. Tobacco Crop – Basic Aspects of Cultivation. III. Trends in Tobacco Cultivation: Aggregate Perspectives. IV. Determinants of Decision to Grow or Shift from Tobacco. A Multivariate Statistical Analysis of Tobacco Harvested Area: An International Perspective. Price Elasticity of Supply of Tobacco. V. Economics Aspects of Tobacco Cultivation in India: Insights for Shifting. Determinants of Tobacco Cultivation: A Village Level Analysis for India. Agricultural Output Function for Tobacco and Other Crops: A Comparative Perspective. VI. Economics of Intercropping System as an approach in Agricultural Diversification. VII. Implications of Away from Tobacco. VIII. Measures for Implementing IX. Lessons from Experiences of Selected Countries. X. Any Lessons from Agricultural Diversification in Other Countries Engaged in Cultivation of Merit Bads like Coca and Poppies?. XI. Concluding Observations. XII. Proposed Elements for FCTC - Framework Convention Tobacco Control.
Some important points from this paper are the following:

- The timing of the work needed on a tobacco crop can mean that sowing of tobacco competes with or preempts sowing of food crops.
- Right from the stage of sowing and plant breeding, tobacco is a costlier plant to cultivate than others, though these costs may not be clearly visible since farmers with small holdings and maintaining subsistence agriculture, do not keep accounts for all items of cost, both direct and indirect.
- If the tobacco is cured using wood fuel, as done in some curing methods, farmers may have to cut the trees in their fields or purchase wood. Thus, tobacco cultivation is associated with depletion of forests and with air pollution.

- Very careful nurturing of the plant is required throughout its lifetime. The entire family labour and sometimes hired labour may have to be put in service to protect the plant throughout the growing period. Many women and children are involved and are exposed to pesticides, and children might be kept from school.
- In 21 out of the total of 59 cases in various countries studied yields increased even when there was a reduction in tobacco area. Tobacco control initiatives in recent years do not seem to have much effect on the supply of tobacco.
- The decision to grow a particular crop is a highly individualized one: it may depend upon the farmer's 'assessment' of the quality of the soil, climatic conditions, availability of seeds, availability of marketing facilities, cost of cultivation, availability of credit for input costs, holding size, net return from each crop etc.
- In a study in one of the tobacco regions of India, it was noticed that tobacco is affected positively by the size of the land holding. Literacy level of the farmers is negatively associated with tobacco output. This suggests that if the farmers receive proper education and if they are suitably sensitized about the adverse effects of tobacco then they may tend to reduce tobacco output.
- A package of mixed cropping, shift to other crops with suitable crop insurance, adequate farm inputs for alternative crops, adequate marketing facilities, etc., would be necessary to ensure the success of a policy of a gradual shift from tobacco. The government may have to take initiative to provide irrigation facilities with suitable financial assistance to farmers who shift from tobacco.
- The most important point for ensuring agricultural diversification away from tobacco is the involvement of the tobacco farmers themselves at different stages of implementation of agricultural diversification.
- Initiatives may be taken to form tobacco shifters' cooperatives / associations in order to give a sense of working for a common social cause and also a sense of self assurance under any eventuality.
- The governments of tobacco dependent developing countries should introduce special measures for saving the tobacco cultivators from the debt trap of tobacco dealers.
- The most important measure for effecting diversification away from tobacco would obviously be reduced demand for tobacco and tobacco products. This can be ensured only by suitable health education to the consumers, rehabilitation of tobacco addicts, advice to peple who use tobacco to relieve stress and similar measures.
- Tobacco is considered in India as a commodity of national importance. That is why, according to the Indian Constitution, tobacco is one of the 3 products (sugar and textiles, being the other two) which have been declared as the commodities on which the Government of India can levy an excise duty in lieu of sales taxation levied by the state governments. Suitable amendments to the national constitution may be needed to enable all state governments to levy prohibitive taxes to discourage tobacco use.

ECON India (2000a) Pan: Action research project report

Panchamukhi PR. **Agricultural Diversification as a Tool of Tobacco Control.** Working Paper No. 6. Part of the research project on "*Economics of Shifting from Tobacco Cultivation, An Action research Project*". Centre for Multi-Disciplinary Development Research, Dharward, Karnataka, 2000.

This 60 page paper examines whether supply side measures can be effective in reducing tobacco use, and if so, which measures are needed. It argues that supply side measures can be only long term measures to reduce the tobacco epidemic, and that demand side measures will have greater impact if supplemented by supply side measures. The paper takes a global view, looking at area under tobacco, trends in yields, and whether there is any evidence that tobacco is replacing food and other commercial crops (it finds that it has). It looks at the determinants of tobacco production using international macro data and household data from India. It finds that some factors have a positive association with tobacco growing: export prices, import value, prices of tobacco and tobacco products, fertilizer subsidy, size of land holdings, luke-warm government policies on tobacco control, and exaggeration of the employment, revenue and foreign exchange gains from tobacco. The factors found to discourage tobacco cultivation are: gender ratio, guidance about alternative crops, support for alternative activities, rates of return for alternative activities, mixed cropping, and crop insurance for alternative crops. Factors for which no firm conclusion could be reached were: irrigation, export earnings and yields.

The paper offers suggestions for approaches to agricultural diversification away from tobacco, considering single crop alternatives (sugarcane, soybean, rabi jawar, cotton, onion, sunflower and groundnut), mixed cropping, and dairy farming, horticulture and floriculture as alternatives. The paper summarizes the CMDR Action Research on Economics of Shifting from Tobacco, including the findings of the survey of 2,000 farmers, of whom 1,652 were tobacco farmers: tobacco is highly labor intensive and input intensive, gross returns are higher than other crops, but net returns are not always favourable. Economics of scale are low, and tobacco growing households face unfavourable effects (from pesticides, food contamination, skin and respiratory diseases, and keeping children out of school to help grow tobacco). It also reports on the results of working with 100 farmers, of whom 44 grew no tobacco at all in the year after the pilot began, 14 reduced the area under tobacco by half, and 10 reduced the area under tobacco by one quarter. The rest shifted only marginally or not at all, but 60% of them indicated that they would begin shifting the following year. The author notes that over two-thirds of farmers in the area had already shifted out of tobacco prior to the project. Finally, suggestions are made for provisions for the Framework Convention on Tobacco Control targeting tobacco farmers.

ECON India (2000b) Pan: Action research project report

Panchamukhi AR. **Tobacco in Ancient Indian Literature.** Working Paper No. 2. Part of the research project on "*Economics of Shifting from Tobacco Cultivation, An Action research Project*". Centre for Multi-Disciplinary Development Research, Dharward, Karnataka, 2000.

The 12 page paper outlines briefly the nature of the thinking in Sanskrit literature (and early literature in other regional languages) on tobacco consumption, which is regarded as a social and individual problem. The purpose was to see if early thinking could offer any guidelines for tackling the problem today. The literature includes references to the alleged medicinal properties of tobacco, the addictiveness, and to its harmful effects.

ECON India (2000c) Pan: Action research project report
Panchamukhi PR, Debi S, Annigeri VB, Nayak N. **Study Report on Economics of Shifting from Tobacco Cultivation.** Centre for Multi-Disciplinary Development Research, Dharward, Karnataka, 2000.

This research report (156 pages) describes an "action research" project undertaken in the Nippani belt of Belgaum district in Karnataka state, to understand the issues faced by tobacco farmers, and see whether it was possible to help them to shift to alternative crops. Chapter I describes the study and action research, II describes how tobacco is cultivated, III gives an international perspective on tobacco growing. Chapter IV describes the economics aspects of the tobacco industry and tobacco marketing in India. Chapter V, the Microeconomics of Tobacco Cultivation, provides an analysis of the village and household level data collected as part of the research. Chapter VI describes the Action program, and chapter VII explains the Process of Shifting from Tobacco – experiences in Sidnal. Chapter VIII is a summary and concluding chapter. The survey instruments are appended.

Econ India (2000) Pri: Analytical Industry Report
Pricewaterhouse Coopers. Batmalaysia.com-Corporateinformation-investorRelations-**The TobaccoIndustry-India Final Report**.pdf.url

Preface: PricewaterhouseCoopers' Economic Studies and Strategies Unit has prepared a broad economic analysis of the tobacco industry in India, with qualitative and quantitative assessment of the performance and contribution of the tobacco industry to the Indian economy. Data were obtained from various sources, including official statistics, individual tobacco companies, industry associations and specialized national and international industry, economic and social data bases. The Executive Summary is available on line (see url above), and is summarized here. India has the second largest area planted to tobacco leaf after China, and is the third largest leaf produce (after China and the USA). India's tobacco industry is quite complex, since it comprises cigarettes, bidi and chewed and other smokeless products. The typical consumer buys small quantities regularly. Economic contribution: In 1998, retail sales of tobacco products in India totalled about $US 6,407 million, and the industry accounted for value added of $US 4,296 million, plus $US 1,952 million in value added generated from flow-on impacts into other sectors of the economy. Employment contribution: an estimated 6 million farmers grow tobacco leaf, and employ millions more laborers in tobacco farms. Government revenue contribution in 1998 from tobacco was about $US 1,625 million in indirect taxation revenues or nearly 5 percent of total Budget revenue, with most being from the excise duty.

ECON India (2000) Ram: News article
Rambabu G. **Households Spending Less on Food?** *The Hindu, Business Line*, February 4, 2000.

(no abstract)

ECON India (2000) Thi: Agricultural study
Thimmaih G, Nageswara Rao. **Potential of Tobacco in the Agricultural Economy of Karnataka.** Commissioned by The Tobacco Institute of India, October 2000, New Delhi.

This 58 page study describes the agricultural sector in Karnataka, then focuses on the tobacco industry in India generally, and in Karnataka in particular. It covers the types of tobacco grown, tobacco growing research and development, trends in the amount of different types of tobacco grown in Karnataka state, district-wise area, production and yield, costs of cultivation and income, farm employment generation, marketing and price trends, export trends and foreign exchange earnings, manufactured tobacco in the state, and state and national taxes, including incidence.

ECON India (1999) Nai: Farmer survey
Naidu SK, Umamaheswara Rao M, Krishna Murthy T, Appa Rao M. **Adoption of Alternate Crops to FCV Tobacco in Traditional Black Soils of Andhra Pradesh – A Survey.** *Tobacco Research*, 1999: 25(2): 82-7.

Falling prices and exports and excess production of tobacco in Andhra Pradesh led to efforts to identify alternative crops suitable to the black oils of the state. A sample survey was conducted during 1996-7 in the north, central and south of the state, to study the economic feasibility of alternative crops in the kharif and rabi seasons, to compare their yields and cost-benefit ratios with tobacco, and investigate the factors affecting the adoption of alternative crops by tobacco farmers. Farmers in 34 villages were interviewed (one progressive and one non-progressive village from each of 17 auction platforms).

ECON India (1999) Rat: Analytical Report
Rath GK and Chaudhry K. **Estimation of Cost of Tobacco Related Cancers**, Report of an ICMR Task Force Study (1999), Indian Council of Medical Research, Ansari Nagar New Delhi.1999. 71 pages.

A cohort of 195 patients of cancers of tobacco related sites was followed up for a period of three years with no evidence of disease or till death, to determine their expenditure (medical as well as non-medical) on treatment of their disease; expenditure by the institution on their management; and loss of income due to their absenteeism or premature death. The study was a part of ICMR's task force project on cost of tobacco

related diseases. Item-wise expenditure by patients and their relatives/friends was recorded under various headings, namely, consultation, investigations, treatment with different modalities, transport for the purpose, and any additional cost incurred for lodging and boarding. Information was also collected on actual loss of wages for treatment of the disease. All expenditures by patients were converted to 1990 level, discounting at 10% per annum. The income loss due to premature death was estimated based on the last income level and expected remaining age of the patient estimated from the standard life tables available for different areas of the country. Institutional costs were assessed from institution records and information on the services used by patients. Results: The patients in the cohort spent an average of Rs. 17,965 (including loss of income due to absenteeism), with another Rs. 4,009 being contributed by the institution in the form of various services. The loss due to premature deaths amounted to Rs. 112,475. Thus, the total average cost to a patient of tobacco related cancer diagnosed in 1990-91, was Rs. 134,449 (discounted at 1990 level). Direct cost of a case of tobacco related cancer (by the patient and treating institution) amounted to Rs. 17,774 (Rs. 13,765 by patients or their relatives, and Rs. 4009 by treating institutions). This included expenditure on consultations, investigations, treatment, travel and lodging for treatment, and extra money spent for food during treatment time. Average indirect cost due to tobacco related cancers amounted to Rs. 116,675 (Rs. 4,120 due to absenteeism for treatment and Rs. 112,475 lost income due to premature death). There was very little difference in expenditure by patients on items related to direct medical treatment, according to different demographic attributes of the patients. The few exceptions where such differences were noted included a lower expenditure on chemotherapy among old patients; a higher expenditure by residents of Delhi on consultation and surgery; and higher expenses on radiotherapy for patients where the intent of treatment was curative. The direct non-medical expenditure (on travel, lodging etc) was influenced by personal characteristics of the patients, suggesting a variation in expenditure according to their paying capacities. Better occupation, greater distance of the hospital from the place of residence, younger age of patient, and curative intent of treatment (probably influenced by longevity and higher degree of follow up) were associated with higher expenditure.

ECON India (1999) Sen: Analytical report
Sen A, Sarkar S, Ranade A. **Opportunities and Challenges in Tobacco.** Indira Gandhi Institute of Development Research, Mumbai. Study Sponsored by the Tobacco Institute of India, December l999.

The report deals mainly with tobacco exports and taxes, the potential for increasing exports and recommendations for changes to the pattern of tobacco product taxation. The first chapter is an executive summary. Chapter 2 examines the export potential, in the context of world tobacco production and trade trends, and suggests how India might increase tobacco exports. Chapter III reviews the tobacco industry in Brazil and Zimbabwe, drawing lessons for India. Chapter 4 compares the bidi and cigarette industries in India, looking at cultivation, processing, tendu leaf collection, manufacturing, marketing, employment, overall social and economic impact, and health effects. Chapter 5 deals with issues in tobacco taxation, considering principles of optimal

taxation, comparing specific and ad valorem taxes, progressivity of taxes, product differentiation, and then looks specifically at tobacco taxes in India. A final chapter considers trends in tobacco revenue, consumption and excises in India, comments on mini cigarettes and proposes changes in the taxation system.

ECON India (1998) Bha: Crop trial
Bhat BN, Hundekar AR, Khot RS and Yandagoudar BA. **Economics of Alternative Cropping System in Bidi Tobacco in Nipani (Karnatka).** *Bidi Tobacco Research in North Karnatka*: University of Agricultural Sciences, Directorate of Research, Dharward, Karnataka. February l998.

The Agricultural Research Center in Nipani, District Dharward, Karnataka, carried out trials, at its station, of 8 alternative cropping systems, in black and red clay soil in bidi tobacco growing areas from 1992-1994. The trials indicated that mono-crops of chilli and cotton, and combination crops of soybean + rabi sorghum, groundnut + rabi sorghum, cotton + chilli, gave higher returns, on average, than tobacco mono-crops. Tobacco mixed cropping (with soybeans or with soybeans) also gave higher net returns than tobacco alone. The trials were carried out on a very limited area under optimum conditions; to validate the findings, the trials would have to be done under typical field conditions.

ECON India (1998) MPO: Analytical Report
Anon. **Sharp upswing in Excise Revenue from Cigarettes and Tobacco Products.** *Monthly Public Opinion Surveys,* 43 No. 9, June 1998, pp 21-28.

Questions relating to tobacco were a prominent feature in Parliament during sessions in 1997. The Union Minister of state in Ministry of Finance revealed that in 1995-96 excise revenue from cigarette and tobacco production accounted for 9.85% of Government total revenue collection. Quoting the Report on the Working and Living Conditions of Bidi workers in India prepared by the Labour Bureau (1995), 66% of workers in the bidi industry are women and 1% are children. Tobacco is exported to Russia and CIS countries. Steps are taken by Govt. to enhance exports to Russia and CIS countries include: 1. Exploring possibilities of entering into long term supply contracts with tobacco processing plants in Russia. 2. Permitting stock and sales of tobacco in CIS countries and exports on consignment basis against payments in freely convertible currencies. 3. Encouraging Indian exporters to set up offices in CIS countries. 4. Opening 3 additional auction platforms in Andhra Pradesh to facilitate growers to sell their products early. 5. Participating in trade fairs and exhibitions abroad and arranging buyers-seller meets to enhance tobacco exports. In India, the Bidi industry employed 42.50 lakh workers in the year 1995-96. Bidi workers working in establishments covered by the EPF and MP Act of 1952 get the benefits provided under the EPF scheme 1952 the Employers Deposit Linked Insurance Scheme 1976 and the Employees pension Scheme 1995. In addition to these the Group Insurance Scheme is also being implemented by the labour welfare organization for the welfare of identified bidi workers. Provisions have been

made in the Bidi and Cigar workers (conditions of Employment) Act 1966 to safeguard the interests of bidi workers including women workers. The provision of providing crèche facilities in bidi establishments where more than 50 female workers are employed already exists. Employment of children below the age of 14 years in the process of bidi making is prohibited under the bidi and Cigar workers (condition of employment) Act 1966 as well as the child labour (prohibition and regulation) Act 1986. In 1995-96, cigarettes produced were 8,82,978.60 lakhs bidis - 41,85,301.30 lakhs and 4,338.19 lakhs Kg. of tobacco products were manufactured in India.

ECON India (1998) Shar: Descriptive report
Sharma A. **Tobacco Consumption Control: Role of Public Finance Instruments.** A paper presented at the Project Planning Meeting: Tobacco and Public Finance in Asia organized by the Research for International Tobacco Control in Pattaya, Thailand on 9-13 November l998.
(Indian Statistical Institute, New Delhi, India.)

The paper proceeds under the premise that tobacco consumption has harmful effects on health and hence government aims to reduce its use. It notes that this may be in conflict with the employment, income and revenue generated by tobacco. The paper recognizes that effective public policies to control tobacco involve simultaneously, use of public education, regulatory measures as well as public finance instruments. It restricts its scope to bringing out some of the complex issues involved in the design of tax instruments and their effective implementation in a tobacco producing country. It also identifies some specific research issues that would provide insight into how to design effective tax instruments for reducing tobacco use in a developing country.

ECON India (1996) Ind: Descriptive Report
Indian Market Research Bureau. (1996). **Cigarette and Bidi Industry**- A Comparative Study. February, Calcutta.

(no abstract available)

ECON India (1996) Kar: News report
Karp J. **Bombay, still divided,** in the *Far-Eastern-Economic-Review*, v. 159, Dec. 28 '95-Jan. 4 '96, p 126.

Calcutta-based tobacco-and-hotel conglomerate ITC has named a new chairman, former vice-chairman Yogesh Chandra Deveshwar, but the chasm between British tobacco firm B.A.T Industries, which holds nearly 32 percent of ITC, and four Indian government-owned institutions that collectively control 38 percent has not been bridged. B.A.T. wants to revamp the management system in ITC by separating the roles of chairman and managing director. The British company has blamed the concentration of power at the

top of ITC for allowing the loss-making diversification drive of the former chairman, Krishan Lal Chugh.

ECON India (1996) Mar: Descriptive study with recommendations
Marothia K and Gauraha AK. **Co-operative Management of Tendu leaves: Micro Analysis.** *Indian Journal of Agricultural Economics* Vol.4 October 1996.

This research study evaluated the performance of 5 primary forest products co-operative societies of Raipur district, Madhya Pradesh in managing collection and trade of tendu leaves. Sixty-five per cent of the nation's production of tendu leaves come from Madhya Pradesh. These leaves are used as the wrapper for bidis and a large quantity of the leaves is exported each year to various countries. This cooperative system was set up by the State in 1989 as an alternative to the private contractor system or nationalisation, to increase State revenue and benefit the workers and help them preserve the forest environment. A sample consisting of 135 members, (tendu leaf pluckers), 40 field level workers (nodal officers, checkers, and other middle level workers responsible for inspection and procurement of bundles of leaves from members) and 35 management committee members of five primary minor forest products co-operatives were interviewed during May-June, 1996, that year's collection season. The author describes the 3 tier structure and function of the co-operative system of the non-timber forest products in the State, with the primary cooperatives at the base, the District unions of cooperatives in the middle and the Federation at the apex. The working of the primary forest products co-operatives at primary level is then explained. A large number of members of the managing committee were not satisfied with the overall performance of their societies due to their negligible stake in the overall management. All members interviewed in the 5 societies thought that the management of tendu leaves under the co-operative system benefited them at least in terms of proper wages, training and their entries on collection cards. However problems, like delayed payment of bonus and arrears, were faced by members. The author concluded that the structure of the societies is largely dominated by government nominees, members of the managing committee and other administrative technical managers. He suggested that these problems could be resolved if work could be done by primary minor forest products cooperatives without domination of government officers and management committees. He also suggested that the apex body could limit its role in providing technical, financial, monitoring and legal support as an external agency and in promoting the co-operative structure with involvement of forest dwellers.

ECON India (1996) NSS: Analytical Report
National Sample Survey Organisation. **Report on NSSO 50th Round.** Sarvekshana, Vol XX, No 2, Issue No 69 (Oct-Dec 1996). Government of India publication.

This report describes the data on tobacco use collected in 1993/94 in the 50th round of the National survey of Households in India. It covered about 120,000 households in almost 7,000 villages and 4,656 urban blocks. Four forms of tobacco use were asked about:

smoking, chewing of tobacco, use of snuff, and the use of burnt tobacco powder or paste. The results are reported by regular and occasional use, gender, age and social group, and separately for rural and urban areas. The data show that the percentage of people who regularly use tobacco (in all four forms) appears to have declined since the 1987/88 survey, and to have declined more among women than men. Smoking (cigarettes and bidis) was reported to be the most common form of tobacco use among men, chewing was more common among women. A higher proportion of rural men than urban men use tobacco. The publication reports on inter-State variations, male/female and differences, variations by age and social groups, rural/urban comparisons and quantity and value of tobacco consumption.

ECON India (1995) Eco: News report
Anon, **Battered in India, Augmented title: battle for control of ITC's management,** in *The Economist*, v. 337, Dec. 16, 1995, p 65.

The news item reports on the the yearlong wrangle between B.A.T. Industries, a British conglomerate, and ITC, its Indian tobacco-to-hotels associate, and the implications for foreign investors in India. The battle, which B.A.T. lost, concerned the succession to Kristan Lal Chugh, ITC's chairman and chief executive, whom B.A.T. spent most of 1995 attempting to unseat. B.A.T. pushed for a nonexecutive chairman from outside the company and a separate, preferably British, chief executive. However, B.A.T.'s campaign against Chugh for his alleged mismanagement and financial irregularities only made him a nationalist hero and persuaded India's public-sector financial institutions to back him.

ECON India (1995) Tob: Agricultural costing study
Tobacco Development Journal. **Cost of Cultivation and Net Return from Tobacco Crops in Different States: l995.**

(no abstract available)

ECON India (1993) Bas: Descriptive report
Basheer R B. **The Economics of Tobacco and its Consumption in India**.
(Unpublished) report prepared for South Asia Country Department, Population and Human Resources Division, The World Bank, Washington DC. May 1993, 50 pages, Plus: an (8 page) analytical report of the allocation of rural poor and urban poor consumption expenditure on some essential food and non-food commodities.

The report briefly reviews trends in production of tobacco leaf in India, consumption of tobacco products and associated expenditures, international trade and foreign exchange, government's role in the industry (company holdings, research), labor, tobacco control policies, costs (medical, disease and deaths attributed to tobacco use, opportunity cost of

land use, fuel use, and fires), and other uses of tobacco leaf. A statistical appendix is included.

ECON India (1992) Cha: Descriptive report
Chari MS and Kameswara Rao BV. **Role of tobacco in the national economy: past and present.** In: Gupta PC, Hamner JE III, Murti PR, eds. *Control of Tobacco-related Cancers and Other Diseases*. Proceedings of an International Symposium, TIFR, Bombay, January 15-19, 1990. Oxford University Press, Bombay, 1992, pp 57-64. (Central Tobacco Research Institute, Rajahmundry, India)

The two species of the genus Nicotiana that are cultivated extensively are tabacum and rustica. Different types of N. tabacum are used for making cigarettes, cigars, cheroots, bidis, hookah and snuff tobacco, while those of N. rustica are used for chewing, and as hookah and snuff tobacco. Some tobacco by-products find use in the pharmaceutical industry and as pesticides. Millions of people depend on tobacco-related activities for their livelihood, and tobacco earns large sums in revenue and foreign exchange. Most tobacco is grown in southern and western India. Farmers grow tobacco because it is remunerative, drought tolerant and easy to grow, while substitute crops like cotton, chillies, chickpeas, mustard and coriander are either less remunerative or susceptible to pests. Although tobacco use is harmful to health, it would be impracticable to eradicate or drastically limit its availability. Measures suggested to reduce the health hazards of tobacco are: making tobacco less hazardous by blend modification, introducing effective filters and improving filter ventilation and paper porosity to dilute the smoke. Other avenues that should be explored are economically viable, tobacco-based cropping systems, the potential of tobacco as an oil-seed crop and alternative uses.

ECON India (1992) Pat: Case Study
Patel SK. **Production and marketing of tobacco in India.** Mittal Publications, New Delhi, l992.

This monograph describes the farm economy of tobacco growers; problems with the marketing of tobacco and how they might be remedied; the price spread in traded tobacco, and concludes with policy recommendations.

ECON (1991) Cor: Descriptive report
Corey C. **Tobacco and Health: Behind the Smokescreen.** *Indian Journal of Adult Education*, 52(3),1991;pp 35-43.

This article discusses the domination of US and British tobacco industry in the trans-nationals and how these are trying to break into Asia, in view of the decline in smoking in the developed world. The efforts of the far eastern countries to counter this onslaught by various measures, were in turn countered by U.S. support to trans-nationals with a threat of trade sanctions, under its Trade Act of 1974. The paper deals with other aspects of the

way in which the tobacco industry is prospering, and urges individuals to guard their own interests and say "No" to tobacco.

ECON India (1991) Dos: Analytical report
Doshi RR. **Economics of Tobacco Production and Marketing.** Vishwanil Publication, Poona, 1991.
(Department of Economics, Shivaji University, Kolhapur, Maharashtra, India.)

This research report analyses the costs of producing and marketing bidi tobacco, sales prices and net returns among a sample of farmers in the Nipani tract in Karnataka. Chapter 1: introduction to production, uses and marketing of bidi tobacco in India, and in the study area in particular. Chapter 2 describes the research objectives, hypotheses and methodology. Chapter 3 provides a conceptual foundation for the estimation of the costs of production, explaining the relationship between production costs and market prices, different cost concepts and practical difficulties of using them, and explains how costs are evaluated in the present study. Chapter 4 describes the sample farms: land quality, ownership and cultivation patterns, tobacco varieties grown, cropping intensity, irrigation, bullocks and other assets and average farm yields. Chapter 5 presents estimates of the costs of cultivation per acre, by size of holding, village, and pattern of cultivation. Chapter 6 presents the costs of cultivation estimates per kilogram. Chapter 7 describes the primary market situation for bidi tobacco, covering market structure, functioning, the export market, traders, market regulation, growers' associations and the Government sponsored marketing cooperative. Chapter 8 provides information on the cost of marketing bidi tobacco. Chapter 9 covers prices and net returns: the pricing mechanism, the farm prices realised by growers in the research sample, price variations in 1983/4 relative to 1982/3, net returns, and also discusses growers in deficit. Chapter 10 summarizes and concludes.

ECON India (1990) Dep: Analytical report
Department of Agricultural Economics. **Economics of Tobacco Production in Middle Gujarat (1988-89).** *Research Bulletin* No. 7, December l990, B.A. College of Agriculture, Gujarat Agricultural University, Anand Campus.

An analysis of farm structure, level of input use, costs and return for tobacco production. The report includes a methodology section.

ECON India (1990a) Dep: Analytic report
Department of Agricultural Economics, **Economics of Tobacco Production in Middle Gujarat (1987-88).** *Research Bulletin No.6*: February l990. B.A. College of Agriculture, Gujarat Agricultural University, Anand Campus.

An analysis of farm structure, level of input use, costs and return for tobacco production. The report includes a methodology section..

ECON India (1988) Dep: Analytic report
Department of Agricultural Economics, **Economics of Tobacco Production in Middle Gujarat (1986-87).** *Research Bulletin No.5*: February l988. B.A. College of Agriculture, Gujarat Agricultural University, Anand Campus.

An analysis of farm structure, level of input use, costs and return for tobacco production. The report includes a methodology section.

ECON India (1987) Jai: Crop analysis
Jaisani BG. **Economics of Bidi Tobacco Production in Belgaum District, Karnataka (l985-86).** *Research Bulletin No. l2*. All India Co-ordinated Research Project on Tobacco, Gujarat Agricultural University, Anand Campus, Anand. March l987.

Results of surveys of farmers, reports on farm structure, level of input use, and production costs and returns.

ECON India (1987a) Jai: Crop analysis
Jaisani B.G: **Economics of Tobacco Production in Middle Gujarat (l985-86).** *Research Bulletin No. l3*. All India Co-ordinated Research Project on Tobacco, Gujarat Agricultural University, Anand Campus, Anand, June l987.

Results of surveys of farmers, reports on farm structure, level of input use, and production costs and returns.

ECON India (1985) Cha: Descriptive report
Chaudhry, K. **Economics of Tobacco**. *ICMR Bulletin*, May 1985; 25 (5) 55-60.

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ECON India (Various years) MOA: Statistical report
Ministry of Agriculture, Directorate of Tobacco Development. **Tobacco in India - A handbook of Statistics.** Various years.

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ECON India (Various years) TB: Statistical reports
Tobacco Board (Ministry of Commerce). **Annual Reports.** Various years.

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3. http://w3.whosea.org/tfi/issue_situation.htm

4. http://www.indiancommodity.com/statistic/tobaco.htm

5. http://www.indiainfoline.com/sect/ftob/ch05.html

6. www.worldbank.org >> Countries and Regions >> South Asia

Free abstracts and some full text journal articles are available at:

7. INDIAN MEDLARS: http://indmed.nic.in/imcwebij.html

8. FREE MEDICAL JOURNALS.COM:
http://www.freemedicaljournals.com/htm/spec1.htm
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OC Epi India (1991) Akh: Case-control study

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