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by

Scott Thomas Anderson, M.D.

Acknowledgments

The people of Tzintzuntzan allowed me to interview them, examine them, administer questionnaires, and participate in community life. Anthropologists are increasingly aware of the need to recognize the contributions of indigenous peoples to research (Indígena, Kothari 1997; Brush 1993), and the need to obtain informed consent prior to conducting research (Fluehr-Lobban 1994). In addition to obtaining consent for interviews, examinations, phlebotomy, and radiographs, I attempted to provide medical care and share scientific observations with local medical personnel while in Tzintzuntzan, as well as keeping local anthropologists at the Colegio de Michoacán informed of my study.

My interest in anthropology stems from my undergraduate days at Berkeley. As an anthropology major, I was privileged to study under some of the giants in the field: Sherwood Washburn, Timothy White, Vincent Sarich, J. Desmond Clark, and F. Clark Howell. The lesson I learned, that human beings must be understood as biological entities with a rich evolutionary heritage, shaped my subsequent understanding of culture.

As a graduate student at UCSF, my committee members for the Ph.D. included Professors Joan Ablon, Ph.D., Yewoubdar Beyene, Ph.D. Stanley Brandes, Ph.D. and Robert Kemper, Ph.D.. Professor Kemper served on my committee in spite of being at another institution (Southern Methodist University), and invited me to participate in the biennial census update of Tzintzuntzan which served as raw data in devising a

randomized sample to interview in depth. His support facilitated my ability to gain the trust of Tzintzuntzan's residents, allowing me to rapidly embark upon productive research activities. I am very honored that George Foster, Ph.D., Professor Emeritus at Berkeley, served as my advisor for my field statement on the anthropology of Mexico. His stature as an anthropologist with half a century of research experience in Mexico makes this particularly important. An independent study course from Professor Charles Leslie, visiting Professor Emeritus from the University of Delaware, rounded out my graduate experience. The late Anselm Strauss, Ph.D., also interrupted retirement to teach me in a tutorial session Steve Paul, Ph.D., of the Department of Biostatistics, assisted in developing a randomized proportional stratified sample of elderly patients to study.

The members of the Division of Rheumatology at the University of California at San Francisco tolerated my absences as clinical assistant professor in their department, and assisted me by listening to case reports from the field and offering interpretations. Kenneth Sack, MD and Kenneth Fye, MD deserve mention as esteemed colleagues in this regard, as well as Department Chief Arthur Weiss, MD, who also recommended me for principal investigator status. Lindsey Criswell, MD, MPH provided expertise as both a rheumatologist and public health specialist in advising me on questionnaire choice.

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The UC MEXUS foundation awarded me a dissertation grant which helped to fund this study, and a Small Grant which allowed me to conduct census data later used in the study. The University of California at San Francisco awarded me a Graduate Division Research Grant. I also received an NIH Predoctoral preceptership which assisted me during my graduate career. I am grateful to all of these agencies for supporting my research.

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Abstract

The Tarascan village of Tzintzuntzan, situated on the shore of Lake Pátzcuaro in Michoacán, Mexico, has been studied for half a century by anthropologists George Foster, Robert Kemper, and Stanley Brandes. Building on this rich foundation of cultural insight and census data, I undertook a medically-oriented anthropological study of 50 elderly residents between the ages of 60 and 97 years, randomly selected to reflect the age and gender distribution of the underlying population. Detailed medical interviews, physical examinations , radiographic data, and laboratory studies allowed an organ-by-organ assessment of disease prevalence. Questionnaire administration, life history analysis, interviews with physicians, and participant observation of traditional healers rounded out the methodology of this study. The elderly of Tzintzuntzan are afflicted with a high prevalence of chronic illnesses, ranging from arthritis to heart disease. Belief in humoral theory, and use of non-biomedical healers, are both declining in influence in the community as modern medical care becomes more accepted. Continued integration into social and religious life seems to allow the elderly to persevere with little alienation or loneliness, in spite of poor physical health, tending to contradict the theory that disengagement is an adaptive strategy for aging.

Joan Ablon, Chair

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Chapter 1

Introduction: Anthropology and Tzintzuntzan

At the time of the Spanish conquest of what is now Mexico, the capital city of the Tarascan empire was Tzintzuntzan. The state of Michoacán at that time corresponded nearly exactly to its current boundaries in highland Mexico (Brandes 1988:12), with its name derived from the Nahuatl term for "land of the fish," due to the abundance of seafood in its lakes. Tzintzuntzan, on the southern shore of Lake Patzcuaro, was known to the Aztecs as Uitzitzilan. The name Tzintzuntzan means "the place of the hummingbird," in both the Tarascan and Nahuatl languages (Warren 1985:5), and the village was also the center of the Tarascan empire (Foster 1948,1967a). With a language unlike that of other groups of the region (M Foster 1969), the Tarascans represented a powerful Amerindian kingdom, superseded only by the so called "triple alliance" of Tenochtitlan, Texcoco, and Tlacopan (Warren 1985:xi).

During the period from 1520 to 1530 the Spanish conquerors extended their influence in Mexico, eventually moving to control the highlands of the interior (Toscano 1994:323-324). The conquest of the Tarascan people by the Spaniards reached its sad culmination with the brutal execution of the last *Cazonci*, or traditional Tarascan monarch, Tzintzicha Tagaxoan, who was garroted and burned by the infamous Nuño de Guzmán on February 14, 1530. Warren refers to this as, "the most symbolic act marking the end of the pre-Spanish kingdom of Michoacán and the completion of the Spanish conquest of the region," (Warren 1985:236). During the period from 1519 to 1605 the population of

indigenous peoples in central Mexico declined from an estimated 25.3 million to only 1.0 million persons, with infectious diseases playing a role greater than that of warfare in eradicating local populations (Toscano 1994:350).

In the ensuing four centuries Tzintzuntzan has become increasingly acculturated to the dominant Spanish speaking culture of Mexico. Linguistic anthropologist Mary Foster has written a monograph on the Tarascan language (M Foster 1969), which is now spoken by about 10 percent of village residents, all of whom also speak Spanish. This dissertation, however, will describe the lives of older residents of a community who generally speak Spanish and think of themselves as Mexican rather than Tarascan, though many have Tarascan surnames and are proud of their cultural heritage. Foster notes that as early as 1960 the Tarascan language appeared to be headed rapidly for extinction, with only 11.4% of the population speaking it. Immigration from surrounding areas where indigenous languages remain more common has ameliorated this decline to some extent (Foster 1967a:35).

Tzintzuntzan is in the zone of Mexico known as *tierra fría* , or cold country, 230 miles west of Mexico City, 10 miles north of the lovely lakeside town of Patzcuaro, and along the shore of the lake of the same name (Brandes 1988:10). An aerial traveler flying a straight line between Mexico City and Guadalajara would come close to Tzintzuntzan one third of the way into the flight, needing to climb to 12,000 feet to clear the mountains around nearby Lake Patzcuaro (Foster 1967a). This body of water, one of Mexico's most scenic inland locations, rests 7000 feet above sea level (Brandes 1988:10), though

appearing dwarfed by the massive mountains looking down from above. Tzintzuntzan itself lies just north of Tariaquri, a hill just south of Lake Patzcuaro.

On the bus from Guadalajara, the flat plains of Jalisco unfold a bit tediously as the journey to Tzintzuntzan begins. Soon one enters Zamora, the home of the Colegio de Michoacán, a regional center of anthropological research which regularly hosts conferences on anthropology in Mexico. East of Zamora, conifer forests become more prominent in the mountainous state, with annual rainfall in some vicinities reaches forty inches (Brandes 1988:11). From Quiroga, a bus ride for a peso and a half takes one to Tzintzuntzan in ten minutes, only two kilometers West along the southern border of Lake Patzcuaro. Staying on the bus is a temptation as the road continues to Patzcuaro, famous for its marketplace and panoramic vistas of one of Mexico's most beautiful regions.

Quiroga is larger and more industrial than Tzintzuntzan, devoted to leather goods manufacture and sale, with a small regional hospital where patients may be referred from Tzintzuntzan's small public health clinic. The town owes its name to Don Vasco de Quiroga, who was sent to the region to restore peace after the bloody reign of Nuño de Guzman in the mid 16th century, holding the title of president of the *audiencia* of New Spain which contained Tzintzuntzan (Foster 1967a: 25). Don Vasco is still highly regarded in the region of Lake Patzcuaro, and is said to have encourage greater access to health care for the poor. Eventually he became bishop of the See of the new bishopric centered in Tzintzuntzan. Due to poor water supply and geographic constraints on

expansion, the bishopric was moved to Patzcuaro in 1540, which Foster described as "a catastrophic blow from which Tzintzuntzan could never recover" (Foster 1967a:25).

Tzintzuntzan's streets are laid out in a grid pattern, on either side of a principal highway running from the neighboring city of Quiroga to Patzcuaro. This pattern is typical of New World villages from Mexico to South America (Brandes 1988:12). The Tarascan pyramids, known as *Yácatas* , dominate the vista of the surrounding landscape, standing as silent observers of the rise and fall of a great empire. The atrium, or churchyard, is the main focus of community life (Ibid.:12), bounded by two large churches. La Parroquía, or El Templo, was rebuilt in 1944 after a fire, though its facade dates to the 16th century. La Soledad, a 17th century structure less frequently used for ceremonies, is located across the atrium at an angle from La Parroquía, and holds church bells in its belfry which call the faithful to Mass at either structure.

History of Anthropology in Tzintzuntzan

Tzintzuntzan represents a paradox. On the one hand, it is one of the most thoroughly studied villages in Mexico from an anthropological perspective. On the other hand, we know little about the health of Tzintzuntzeños and what it means to grapple with old age and ill health in rural Mexico. This dissertation attempts to address these questions.

The goal of this work is to describe the elderly people of Tzintzuntzan, using data from traditional anthropological participant observation, interviews, and questionnaires, physical examinations, laboratory tests, and radiographs. I hope to paint a picture in

which the brush strokes are anthropological and the frame is biomedical, looking at the hard edges of deformed joints and bones in the soft light of cultural sensitivity. This approach is perhaps akin to what has been called the "anthropological lens," said to combine both "harsh light" and "soft focus," (Peacock 1986).

What do we already know about rural Mexican culture in general and Tzintzuntzan in particular? Anthropologists have studied Mexico extensively, and Tzintzuntzan already has a place in the pantheon of communities which have enriched our understanding of Latin American rural life. Anthropological inquiry was dominated by interest in peasant society, economics, bilateral (or non-unilateral) kinship systems, urbanization and migration, acculturation studies, and medical beliefs and practices. Traditional healing practices are most relevant to this dissertation, so we will start there.

Medical Beliefs and Practices

An understanding of the prior work on traditional medical beliefs and practices will set the stage for the discussion of Tzintztuntzan in the late 20th century. A brief discussion of peasant society, economics, kinship, urbanization and migration, and acculturation will follow our discussion of medical beliefs and practices, setting the stage for the subsequent discussion of methodology.

Contemporary and historical Mexican popular healing practices are remarkable for the extent to which Amerindian practices and imported Spanish humoral medicine blended together. European medical values were incorporated into local healing behavior in a

greater manner than is seen in Oceania, Africa, and other sites of European domination (Foster 1993).

The indigenous forms of medical treatment are well documented in the *Florentine Codex: General History of the Things of New Spain*, the work of the Franciscan friar Bernardino de Sahagún, which has been reproduced extensively in modern times (Anderson and Arthur 1954; Baird 1993; Dibble and Anderson 1957, 1961, 1963; Edmundson 1974). Sahagún's *Historia General de las Cosas de Nueva España* consisted of 12 volumes of detailed descriptions of the indigenous medical practices observed by the Franciscan friar over ten years of work in Tepeapulco, Tlatelolco, and San Francisco en México (Toscano 1994:356). Due to Felipe II's opposition to publishing "superstitions and the ways of living of these Indians," the manuscript was not published initially, being shipped to Spain and only rediscovered two centuries later in 1777 (Ibid. 1994:357). Providing an unparalleled view of the high degree to which Aztec medicine had been developed, Sahagún's work still represents an important source of historical documentation.

Native American beliefs about disease causation generally conformed to the categories outlined by Clements among non-industrialized people throughout the world, including soul loss in the form of *susto* (Rubel 1977; Rubel et al. 1991), spirit intrusion, foreign body intrusion, and breach of taboo (Clements 1932). To some extent this prevalence of traditional belief categories in Mexico serves to support the *age-area hypothesis*, developed in response to the work of W.H.R. Rivers, that older cultural practices have wider geographic distributions (Rivers 1924). Since contemporary innovations rapidly

find universal geographic distribution (e.g. use of home computers or telephones), this approach to determining the antiquity of belief systems may no longer have much currency.

In Spain at the time of the conquest humoral medicine represented "establishment" medicine among educated persons. The enormous influence of humoral medicine is seen in its continued presence in the required Mexican medical school curriculum well into the 19th century. Popular Spanish beliefs such as *mal ojo*, or evil eye, also made their way into New World medicine and beliefs, but humoral medicine is clearly the most enduring legacy of the conquerors.

A discussion of humoral beliefs is important to understanding Tzintzuntzan and the data in this book. For example, we will see that a patient with classic rheumatoid arthritis in this study attributes his arthritis to the "cold" humoral effect of motor oil on his hands, sustained as a result of years working as a bus operator. This was a literal exposure to cold, rather than a figurative concern with metaphorically cold substances.

Humoral beliefs, usually described in Mexican ethnomedical parlance as Hot-Cold dichotomy, trace their origin back to ancient Greece. In the 8th century A.D. Moslems arrived in the Iberian peninsula from North Africa, bringing humoral medicine with them. It was the medicine of Hippocrates and Galen, modified by Avicenna and other Persian doctors. As such, it became "scientific" medicine not only of Spain, but all of Western Europe (Foster 1994).

In this system the body is viewed as a microcosm of the entire universe. Both consist of four primary elements: fire (hot), earth (dry), water (moist), and air (cold). Good health depended upon the proper circulation of four humors, derived from primary elements (R Anderson 1996:389). These humors where blood (hot and moist), phlegm (cold and moist), yellow bile (hot and dry), and black bile (cold and dry). The *principle of contraria* governed medical care: if one of the humors was depleted, repletion by means of herbs or diet was necessary to restore it, if too much of a humor was present, removal was indicated, often through sweating, vomiting, defecating, or phlebotomy (R. Anderson: 389). Ingham has emphasized the balance of hot and cold in the body as needed for optimization of health in Mexican folk healing (Ingham 1970). Stated explicitly by Foster, "... with humors in balance, an individual is health; when the humoral balance is upset, illness follows" (Foster 1994:4).

In 1930 Redfield first studied humoral medicine in Mexico (Redfield 1930), followed shortly thereafter by Parsons (Parsons 1936). Humoral medicine emerged as the central force in most popular medicine in Mexico. Foster found that this attitude exists beyond medicine; Mexican culture reflected the importance of maintaining equilibrium in the form of social harmony as well (Foster 1967). More broadly put, Currier observed hot-cold in Mexico as reflective of "a symbolic system onto which social anxieties can be projected and within which social desires can be fulfilled" (Currier 1966:261).

As humoral medicine is described in Mexico by anthropologists, foods are assigned both thermal and metaphorical qualities of Hot or Cold: "... foods, medicinal remedies, and other substances are believed marked both by (usually) unchanging Hot and Cold metaphorical qualities ... An excess of metaphorical and/or hot or cold insults, which upset this equilibrium, leads to illness, which is treated by therapies that conform to the 'principle of opposites,' that is, a Hot remedy for a cold illness or a Cold remedy for a hot illness" (Foster 1987:355).

Foster's "Relationships between Spanish and Spanish-American folk medicine" (1953b) was the first anthropological article to argue that Hot and Cold thinking derived from Spanish humoral medicine found in Mexico. Others followed with ethnographic descriptions of Hot and Cold elsewhere in Mexico (Currier 1966, Ingham 1970, Madsen 1955).

Within this theoretical context, certain foods and medicinal items with humoral values deemed Hot or Cold have been documented (e.g. Foster 1994). Under some circumstances Tzintzuntzeños may proscribe consumption of either literal or metaphoric Hot or Cold foods to avoid illness (Foster 1967). Foster finds, however, that there are inconsistencies and contradictions in the application of humoral theory to treating or preventing specific illness. These paradoxical observations are found in variation between individuals and villages in ascription of Hot or Cold to specific foods, and also in a tendency to reason retrospectively towards identification of Hot or Cold status with a food (i.e., if the food is used to treat a Cold humoral state, it must be Hot).

These contradictions represent a "prescriptive fallacy." As Foster explained, "... with rare exceptions anthropologists have assumed that humoral theory is prescriptive, that it guides the *curandera* or mother according to the principle of opposites in her choice of treatment of illness" (Foster 1994:129). More often than not, Foster reasoned, Hot and Cold theory tends to *validate* treatments and dietary practices, rather than guiding decision making (Foster 1987).

Foster found that Mexican health care beliefs represented the culmination, or "end of the road," for Greek and Persian humoral medicine in the New World (Foster 1953b). Mexican anthropologists disputed this view, perhaps motivated by cultural nationalism, arguing that the concept of Hot and Cold is of New World (specifically Aztec) origin (Butt Colson 1983; Lopez-Austin 1969, 1975, 1980). Foster's convincing response to these criticisms included observations that among surviving Aztec populations Hot-Cold is of little importance, and that humoral medicine remained the orthodox, and thus to a large extent Spanish-origin, medicine in Mexican medical schools until the 19th century. Foster also pointed out that Hot and Cold theories existed throughout Latin America, suggesting European, rather than indigenous, origin for these beliefs. Foster argued that this system of medical beliefs is " ... directly descended from classical Hippocratic-Galenic-Arab medicine, and it represents Spanish 'establishment' medicine at the time of and subsequent to the Conquest" (Foster 1987:383). During my sojourn in Tzintzuntzan I observed the pre-occupation with literal cold exposure (wearing heavy clothing to prevent arthritic pain) and metaphoric cold exposure (motor oil on hands causing rheumatoid

arthritis). My overall impression was that metaphoric Hot and Cold theory is dying out, whereas the literal theory is hanging on more persistently.

Much of Foster's documentation of Hot and Cold theory in Tzintzuntzan derives from observations made over half a century of fieldwork, often fortuitously. For example, Doña Natividad, a friend and informant, puts an end to her granddaughter's plans to wade barefoot in water "so the heat won't rise on you" (Foster 1967:189). The displacement of heat in the legs to the thorax and head, precipitated by a cold exposure to the feet which displaces the heat upward, is described by Foster as a well known cause of many febrile illnesses among his informants.

This study will attempt to build on Foster's work through interviews with randomly selected Tzintzuntzeños of both sexes and four different age quartiles above age 60, along with physical examinations of all these subjects and selected laboratory and radiographic studies.

Aging, as viewed by Foster in earlier work on Tzintzuntzan, represents a gradual diminution of body heat (Foster 1967). Thomas Coles' *The Journey of Life: A Cultural History of Aging in America*, offers a similar analytic view deriving from the ancient Greeks: " ... Aristotle defined old age as that period of life when the body's innate heat diminishes. Heat was the essence of life according to Hippocratic medicine, the source being the heart, conceived as a sort of furnace" (Cole 1992:8).

A few traditional health beliefs deserve mention. *Susto*, or soul loss, is consistent with Clement's globally observed fear of losing one's spirit through sudden fear or the malevolent actions of another (Clement 1932). Foster has described it (1987:383), and Rubel's sophisticated analysis has placed the phenomenon in cultural context as an adaptive way of dealing with physical or psychological stress by opting out of normal obligations as an *asustado* (Rubel 1977, Rubel, O'Nell, Collado-Ardón 1991). Oaxacan villagers studied by Rubel may well have been somatizing an emotional sense of social inadequacy brought on by the demands of village life and general ill health. Rubel argued that, "the most fruitful approach to understanding folk illnesses is to seek an interaction between social and biological factors" (Rubel et al. 1991:122).

This integrative approach to understanding illness appealed to me as I performed this study, and I was influenced by Rubel to that extent. It is also similar in some ways to Beyene's work on menopause, which also draws from biological and cultural perspectives (Beyene 1986). I largely found *susto* to be lacking as a belief in Tzintzuntzan, however. I have encountered *susto* only once, in a young woman hyperventilating in an emergency department in the United States. Even in that case, I could only elicit a grudging admission that it *could* be susto, and the patient seemed more comfortable with the diagnosis of hyperventilation syndrome which may be the correlate in the allopathic world. We must recognize that performing medical histories and physical examinations, whether in an emergency department in California or in Tzintzuntzan, is a process which may lead to an underappreciation of traditional beliefs with respect to disease causation. Informants are often reluctant to reveal their

experiences with traditional Mexican beliefs due to respect for biomedicine and a fear of appearing provincial. In this study I attempted to counter this tendency by making observations and interviewing subjects for a year and a half, with trips to the village extending from the summer of 1995 to the end of 1996. Initial visits were informal and occurred every several months, allowing me to get to know the village and to confirm my decision to do research there. After official approval by the Committee on Human Research was obtained in 1996 I went to Tzintzuntzan every month for about two weeks for half a year to conduct formal research with interviews and examinations.

Mal de ojo, or evil eye, is apparently of Old World origin. Foster describes the particular vulnerability of babies to this condition, caused by envy (Foster 1967a). This traditional belief was not observed in my experience, though subjects may have been particularly reluctant to admit to this very traditional belief for fear of appearing old fashioned. An observer of an attractive infant will *dar una nalgada*, or ritually slap the buttock of the baby, to demonstrate lack of envy (Foster 1967). The idea is to avoid envy, to demonstrate lack of envy, all in the interest of preventing *mal de ojo*. One may also "limpiar con blanquillo" (clean with a little white thing), or pass an egg over the body of an afflicted individual, to cure *mal de ojo*. The term *blanquillo* is preferable to *huevo*, slang for testicle. Foster has described such use of euphemisms in Tzintzuntzan, suggesting that areas of potential embarrassment are re-named in this manner (Foster 1966:58). Euphemisms were not needed to soften the terms for old age, death, or corpse, however, suggesting that familiarity with end of life events developed early in childhood. This approach to measuring grief in terms of use of euphemisms may run astray,

however, if it leads us to underestimate the importance of grief and personal loss in the lives of the people of Tzintzuntzan (something I suspect Foster would agree with).

Other folk illnesses well described in the literature on Mexico include *empacho*, a form of intestinal obstruction alleviated by massage, herbal teas, and pulling on the skin of the back (Mull and Mull 1983:735), and fallen fontanel, a depression of the cranial bones of infants caused by dehydration (Kay 1993). Fallen fontanel is usually treated in traditional folk medicine by applying pressure to the palate of the infant in question, a practice Ronald Simmons describes as "simply wrong," in an unusually frank critique of "confirmed cultural relativists," as the condition is in fact a symptom of depleted intravascular volume caused by diarrhea illnesses (Simmons 1993:204). We observed an aggressive effort on the part of the physicians performing social service obligations in the local clinic to provide rehydration salts and information on the physiological causes of volume depletion to mothers of infants, along with instructional material on the importance of sterilizing drinking water. This suggests that times are changing, and confirms my impression that folk beliefs of the sort that fallen fontanel represents are dying out rapidly. It also points out the sophistication of existing practicing health care providers in Mexico, who are trained in a manner largely identical to the training of American physicians and who are by no means "folk" healers.

Chipil , another pediatric condition in which a toddler clings to its mother as a representation of envy of the soon-to-be-born next child, is a folk representation of anemia due to malnutrition, though the illness may be explained emically in terms of

sibling rivalry and the image of limited good. Chipil was not observed in this study of the elderly. *El Chaneque*, the imaginary supernatural being which in the folklore of Veracruz can cause fever and loss of appetite, was also not encountered (García and De García 1959:151).

In summary, Mexico has a rich heritage of traditional health care beliefs and practices, documented from the work of Sahagún (Edmonson 1974; Baird 1993), and influenced by Old World derived humoral medical beliefs (Foster 1987). Anthropological research in the area of explanatory models for illnesses has progressed for decades, and in many cases combines fairly sophisticated physiological and cultural integrative approaches (Beyene 1987, Rubel 1977, Rubel, O'Nell and Collado-Ardón 1991). These studies may soon become of largely historical influence, however, as traditional beliefs decline in importance and biomedicine makes ever greater inroads into Mexican urban and rural life.

Peasant Societies

Empire's Children (Foster 1948) derives from a Mexico geographically isolated from industrialized countries to a greater extent than today. Foster recently noted in a Berkeley conference that the trip to the village took 36 hours in the 1940's. He described a village characterized by cultural conservatism, close ties to agriculture and traditional means of subsistence, and a high level of suspicion of both outsiders and other community residents. Nonetheless, Tzintzuntzan's history is rooted in agrarianism, and a discussion of the concept of peasant life is useful as we undertake a review of contemporary health

care beliefs and practices. Foster's *Tzintzuntzan*, published in the late 60s, was subtitled "Mexican peasants in a changing world," (Foster 1967a), and it made sense through much of this century to think of Tzintzuntzeños in terms of their heritage as *campesinos*. This reality is changing as we enter the next millennium.

What exactly is a peasant? The essence of peasant societies was long ago defined by Kroeber as part-societies with part cultures: "Peasants are definitely rural -- yet live in relation to market towns; they form a class segment of a larger population which usually contains also urban centers, sometimes metropolitan capitals ... They lack the isolation, the political autonomy, and the self-sufficiency of tribal populations; but their local units retain much of their old identity, integration, and attachment to soil and cults" (Kroeber 1948:284).

Redfield's study of Tepoztlán was the first to address the meaning of peasant culture in Mexico (Redfield 1930). For nearly a generation, however, the terms "folk culture" and "peasant society" were confused, as Redfield spoke of "folk" as typical of "the simpler peasant peoples enclaved within the borders of civilized nations" (Redfield 1930:1-2). Enlarging his studies to include description of culture change along a "folk-urban" continuum in Yucatan led to persistent substitution of "folk" for what a decade later would be called "peasant" (Redfield 1934, 1941, 1947), though by 1956 he was obviously swayed to use the term peasant (Redfield 1956). Similarly, Foster's 1953 "What is folk culture?" (Foster 1953) might later have been titled as easily "What is peasant society?"

Foster points out the uniformity of this neglect of the peasant model in his chapter "What is a peasant?" in Diaz, Potter and Foster's *Peasant Society: A Reader*, by arguing that apart from Kroeber's 1948 *Anthropology* text, the word "peasant" appears in the index of no other general texts until those of Keesing and Titiev in 1958 and 1959, respectively (Keesing 1958, Titiev 1959). Both of these authors still confuse peasants with "folk".

Redfield addressed the difference between peasant and tribesman, likening peasants to a tribal people in their "indigenous" characteristics, but seeing them as primarily being characterized in terms of their relationship to a superordinate urban culture (Redfield 1953). The four Yucatan communities he described revealed a "folk-urban continuum" reflecting varying degrees of acculturation to urban life (Redfield 1941). Redfield's synthesis emphasized attachment to the land and tradition as hallmarks of peasant culture (Redfield 1930), but there is clearly more to peasant society than agriculture and rural communities. In my opinion, there is little folk-urban continuum with respect to medical care today, as the "pasante" physician in Tzintzuntzan is from a first class medical school in Guadalajara, and the regional medical centers in Michoacán are similarly well staffed. Access to medical care is limited by financial resources, however, leading to a gradient in the quality of care received which is more economic than geographic.

Foster's analysis, based on his work in Tzintzuntzan, emphasized lack of autonomy and control, arguing that "... the critical common denominator is that peasants have very little control over the conditions that govern their lives. Occupying as they do a very low

socioeconomic level in the states of which they are a part, they find that basic decisions that affect their lives are made from outside their communities, and have always been so made" (Foster 1967b:8).

Foster argued that this powerlessness leads to zealous efforts to garner material or emotional resources in short supply, as outlined in the *image of limited good.* Diaz and Potter's views on *compadrazgo* (fictive kinship in the form of godparenthood) and the *mayordomía* system likewise emphasize the challenges of a peasant life in which " ... peasants also face the problem of relating to a social, economic, juridical, and cultural entity which vastly surpasses the limits of their local worlds. They must come to terms with classes and individuals who have or may have vast powers over them but who also, when properly manipulated, can aid the individual peasant in many life situations" (Diaz and Potter 1967:154).

A conservative outlook on life is also typical of peasant culture, best seen in the reluctance of potters to change any aspect of their production routines (Foster 1967a). Wolf described as a "corporate community" mentality in which "Peasant communities ... show strong tendencies to restrict membership in the community to people born and raised within the boundaries of the community" (Wolf 1967:232). Brandes found that even the conviviality of fiesta celebrations may serve to reinforce fairly conservative moral guidelines of group and individual behavior (Brandes 1984, 1988).

Since the mid-1950s most ethnographies of Mexico have conceptualized peasantry rather than folk society. Prevailing themes include territoriality as the basis of communities (Wolf 1955, 1956), social control, including economic leveling mechanisms within peasant communities such as fiestas and the carguero system (Foster 1965, 1967a,b,c,d, 1969, 1970; Cancian 1965, 1967; Chance and Taylor 1985; Deshon 1963, Rus and Wasserstrom 1980; Brandes 1984, 1988), and, for the past two decades, culture change, values, and urbanization (Keefe 1996; Kemper 1977, 1981, 1996; Lomnitz 1977, 1994).

The work of Foster, Kemper, Brandes, and other researchers in Tzintzuntzan can only be understood within the context of this rich legacy of ethnography directed at understanding peasants in Mexico. As the term "peasant" has fallen into some degree of disrepute as an anachronistic or pejorative term, I will not dwell upon it in this contemporary ethnographic study of Tzintzuntzan. Indeed, young Tzintzuntzeños are no longer peasants, as they listen to American rock music on their radios and contemplate moves to larger cities. George Foster recently observed, "They're really not peasants anymore ... It is hard to call someone a peasant who goes up to Alaska to fish for salmon and returns with twenty thousand dollars," (Foster, personal communication, 1997).

Anthropologists for decades have recognized that traditional peasant culture is under increasingly great pressure to change "... as traditional communal organization gives way to modern civil government," (R Anderson 1965:189), and researchers have documented declining participation in traditional peasant vehicles for cultural expression, such as the *cargo* system, since the early 20th century (Foster 1967a:210; Brandes 1988).

Nonetheless, narrative data from this study will reveal that understanding of the lives of older residents of the village requires insight into what it meant to grow up in an agrarian rural environment of the "peasant" type.

Those in the oldest cohort under study, between age 90 and 97 years old, were born into a world in which Morelia was a full day's walk or donkey ride away, and they remember living the poor and agrarian life of the true peasant. We must recognize this life course perspective in attempting to understand the experiences of the elderly in Tzintzuntzan. Kaufman's narrative analyses of elderly informants in *The Ageless Self* (Kaufman 1986) suggests a fundamental continuity of human self regard and expression as we age. Goffman's symbolic interactionist approach to self presentation indicated that we have a discontinuity of personal presentation reflected in the difference between the "front stage" self we reveal to others and the "back stage" self we reserve for intimate acquaintances (Goffman 1959). As the elderly of Tzintzuntzan wrestle with arthritis, they construct what Anselm Strauss referred to as an "illness trajectory," in which old age is viewed in the context of early childhood experience (Strauss et al.. 1984), in which self-presentation is defined in a consistent way in terms of a childhood experience. Their battles with arthritis and heart disease exist not in the present alone, but in a broader context of the "biographical work" which Strauss defined. Their illness trajectories fly parallel to economic trajectories which reveal overall improvement of status which ameliorates the effects of infirmity.

Economics

The market system has traditionally been central to economic analysis of Mexican villages, with numerous ethnographies documenting the importance of markets (both daily and weekly) in local economies (Foster 1948; Hirabayashi 1993; Parsons 1936; Redfield 1930; Vogt 1969). For example, town gossip often occurs in the market (Parsons 1936:386-478), and this could represent an integral aspect of health care-related behavior. I did observe some role for markets in the experience of dealing with illness among Tzintzuntzeños. Vitamins and herbal medicine could be purchased in Patzcuaro's market, though there was little interest in doing so among most elderly residents of Tzintzuntzan. Market activity was an opportunity for travel, exercise, buying food, and socializing, and so deserves mention in a discussion of aging in Michoacán.

The importance of the religious and civil hierarchical responsibility known as the cargo system (*cargueros*), has been amply documented elsewhere (Foster 1948:195, 1967a:206; Brandes 1988:41). Responsibilities of cargo officials involve sponsoring and financing celebrations in honor of religious figures. This played a role in occupying the time of elderly informants interviewed for this study, contributing to the prestige of elderly villagers who had participated in these activities and giving the elderly an important sense of inclusion in community activities and prestige. For this reason, it is worthwhile to explore the *carguero* system's development as an important part of the life of elderly informants.

The origin of the system of *carguero*, or *mayordomía*, has been contested. Rus and Wasserstrom, based on work in Chiapas, argued, "such hierarchies emerged in the late 19th and early 20th centuries in response to changes in the regional economy that placed new demands upon Indian laborers" (Rus and Wasserstrom 1980:466).

The abuse of Indians as laborers led to the emergence of cargo systems as "ideological resistance" (Rus and Wasserstrom 1980:475), though the result was "ironically, but inevitably" to exacerbate the poor socioeconomic standing of the Indians. Chance and Taylor, based upon a review of the literature on cargo systems in Jalisco, the Valley of Oaxaca, and the highland Sierra Zapoteca of Oaxaca, suggested a dual origin of the cargo system: a civil hierarchy of highland Indian communities in colonial time, and a civil-religious hierarchy that was mainly a post-Independence development of the 19th century (Chance and Taylor 1985). Carrasco suggested that the *cargo* system is best viewed as having ideological antecedents in the life of pre-conquest Aztecs, developing into the current system during the early colonial period of the 16th century (Carrasco 1961:92-493).

Whatever its origins, the *cargo* system reached its pinnacle in the early twentieth century. Even by the time Foster published *Empire's Children* in the post-World War II era, Tzintzuntzan *mayordomías* had been reduced to the point were "only a shell remains of the original form" (Foster 1948:196), an observation confirmed by Brandes more recently (Brandes 1988:41). *Carguero* obligations prevented at least one informant from spending time discussing his chronic arthritis with me (or so he said). This suggests a

continuing activity in cargueros even among the elderly with chronic illness. Beyond the "leveling device" of preventing individuals from accumulating excessive wealth relative to their peers, *carguero* obligations also serve to occupy individuals well into old age, assuring continued integration into community life. We will see that continuing integration into the life of the community contributes to a lower prevalence of depression among the elderly in Tzintzuntzan, in spite of poor overall health.

With respect to economics, the *image of limited good* is relevant to an introduction on Tzintzuntzan and will be discussed briefly here. As outlined by Foster based on his work in Tzintzuntzan (1965a, 1967a), this theory argues that " ... behavior in ... broad areas is patterned in such fashion as to suggest that Tzintzuntzeños see their social, economic, and natural universes -- their total environment -- as one in which almost all desired things in life such as land, other forms of wealth, health, friendship, love, manliness, honor, respect, power, influence, security, and safety *exist in absolute quantities insufficient to fill even minimal needs of villagers*" (Foster 1967a:123, italics in original). Seeking to avoid the envy of others through conspicuous consumption or good fortune is part of this process (1965b).

If Foster's theory is correct, one would expect individuals to assess their own health as being generally average or poor to avoid envy. Review of standardized questionnaire data will indicate that, in fact, Tzintzuntzeños often assess their health as "fair" or *"regular"* in old age. Though this has been anecdotally related to me before, this questionnaire data confirms Foster's *image of limited good* and *equilibrium model*

through formal measures. Describing one's health as "fair" is a way of avoiding envy and avoiding upset of the equilibrium of the village through excessive good health. Foster himself suggested in subsequent epilogues to his book *Tzintzuntzan* that the image of limited good is no longer applicable as Tzintzuntzan becomes increasingly integrated with Mexican culture at large (Foster 1977, 1988). It may be, however, that one vestige of the limited good model of life is a tendency to describe personal health in moderate terms, particularly among individuals who came of age in Tzintzuntzan half a century ago.

The *equilibrium model*, as outlined by Foster, is that "the good society ... conforms to an equilibrium model; security and safety are achieved within the village by maintaining the status quo, by permitting no significant changes in the traditional allocations of Good. Behavior that upsets these traditional allocations, or that merely suggests the possibility of an upset, is viewed as threatening to the community at large" (Foster 1967a:136). Tzintzuntzeños, in Foster's early research years, attempted to maintain the fiction that "Here we are all equal" to avoid upsetting this equilibrium (Ibid.:136). Foster observed a change in this pattern of behavior in later years, noting that an elevation of socioeconomic level throughout the community coincided with diminished concern with upsetting equilibrium by improving one's standard of living (Foster 1977, 1988).

Expensive religious obligations have been postulated by Foster to lead to dispersion of excess wealth on the part of individuals who can afford their financial drains. In so

doing, *cargos* would prevent excessive wealth from diMr.upting the equilibrium of the community.

Cancian's observations among the Tzotzil and Tzeltal Indians in Zanacantan lead him to reject some tenets of the equilibrium model. He found that wealthy families could afford to advance in the cargo system and achieve high levels of prestige, whereas poor families failed (Cancian 1965, 1967). This suggested that there was little leveling through redistribution of wealth and even less equilibrium: "... Zinacantecos, though they will not openly discuss it, actually do perceive cargos in terms of relative prestige" (Cancian 1965:96). Concluding his observations, Cancian wrote, "... the social and economic stratification in Zinacantan is clearly reflected in men's careers in the cargo system. The data on individual careers unmistakably show that men who distinguish themselves socially and economically in early cargo service go on to maintain their position and to increase the distance between themselves and their fellows" (Cancian 1965:114). In place of leveling and equilibrium within a limited good framework, Cancian argued that the cargo system functioned to maintain integration within the community (Cancian 1965:136).

In summary, the *image of limited good* and the *equilibrium model* are theoretical postulates which Foster devised to explain the fundamentally conservative and restrictive environment of the peasant community of Tzintzuntzan. Both theories are relevant as we evaluate the health of elderly Tzintzuntzeños, as study subjects discussed in this dissertation grew up in the pre-World War II era when these values were more widely

shared. The tendency is for these traditional beliefs to be less and less influential, however, and we may well be seeing the demise of limited good and equilibrium models for behavior in the current younger generation of the village. Nonetheless, the elderly tend to sustain values of their youth in old age, as demonstrated by Kaufman's elucidation of the consistency of self-identity in old age (Kaufman 1986). The concept of the *dyadic contract* is equally important, another theoretical construct of Foster's developed in the 1960s (Foster 1967a). Brandes found that, in analyzing fiestas in Tzintzuntzan, the dyadic contract was an "all subsuming feature of social structure in Tzintzuntzan," characterizing it as a "pendulum-like swing" in reciprocal obligations between two people, whether expressed as gifts or favors (Brandes 1988:35). This concept may be useful in evaluating the behavior of alternative healers who may provide care in the village for little or no financial remuneration.

Kinship and *Compadrazgo*

The Spanish ritual kinship system known as *compadrazgo*, or godparenthood, has been developed to an elaborate extent in Mexico, and is well described in the anthropological literature (Foster 1947, 1967a; Mintz and Wolf 1950; Ravics 1967), with more recent works addressing issues of whether urbanization alters these traditional ties (Kemper 1996). A striking aspect of Mexican culture is that the social relationship between godparents, a form of fictive kinship, is a critical social tie in village life. This distinguishes Mexico, and Latin America in general, from societies based more on unilineal kinship, such as those found in Africa. As relatives are central to the experience of growing old and dealing with illness in Tzintzuntzan, a brief discussion of the fictive

kinship system known as *Compadrazgo* is in order. Generally speaking, I observed that non-compadrazgo relatives play a central role in caring for the elderly.

The *compadrazgo* system is based upon the Catholic ritual in which godparents (*padrinos, madrinas*) sponsor individuals for baptism and other religious or social events. The baptized individual becomes the godson or goddaughter (*ahijado, ahijada*) of the godparents. The godparents and the parents of the people being sponsored become "co-parents" (*compadres*, hence the term *compadrazgo*). In Spain, the primary tie usually is that between godparents and godchildren, and family members with whom there are already close ties (e.g. grandparents, uncles, aunts) are often the preferred sponsors.

In Mexico, by contrast, the primary tie becomes that between parents and godparents, the latter more often than not friends, or even employers or other people of higher economic and social status, rather than relatives (Kemper 1982). Most investigators, beginning with Mintz and Wolf in 1950, have interpreted the Mexican reworking of the ritual of *compadrazgo* as a device to build extra-family bonds to support an individual in times of need. For example, compadrazgo relationships may provide women with valuable support networks in a male-dominated culture (Brandes 1988:32). Within this paradigm, friends of equal status are "horizontal" compadres, and people of higher status choser outside of the village produce a "vertical "compadrazgo." Foster's elucidation of the "dyadic contract" of reciprocal interaction between the more and less privileged is an important theoretical contribution to these insights into rural Mexico (Foster 1967a). The disenfranchised will often seek a "vertical compadrazgo" relationship to maximize their

social standing through interaction with more wealthy patron families. One would think that vertical compadrazgo would be critical in seeking resources for health care expenses. Instead, I observed a propensity to seek care from a free clinic or alternative healers, rather than seeking reimbursement for health care expenses from compadres.

The Mexican *compadrazgo* also differs from the Spanish in the quantity of secondary occasions in which ties between godparents and godchildren are reinforced. Thus a sponsoring *padrino* or *madrino* of a graduating student will be sought to hold a tin crown over the head of the child, in front of the altar, while an assistant to the priest prays briefly, a ritual known as the "compadrazgo of the crown" (Foster 1948:263). After the ceremony, which may last five minutes or less, the padrino is expected to buy a small present for the child whom he may never see again.

Whatever the form of *compadrazgo*, formality is supposed to characterize the relationship, with the formal *usted* used when *ahijado* addresses *padrino*, and with godparents addressing each other as *compadre* or *comadre* rather than by name. As is often the case with ethnographic data, there is a disparity between the ideal behavior and what is actually observed. For example, Foster never observed an *ahijado* kneeling and kissing the hand of his godfather, though such deference is generally described as proper behavior (Foster personal communication 1996). The compadrazgo is discussed in almost every monograph on Mexican village life, and in a number of articles, of which the most useful are Diaz and Potter (1967), Foster (1948, 1967a, 1969), Mintz and Wolf (1950), Ravics (1967), and Young and Garro (1994).

During my research on chronic illness in Tzintzuntzan the closest ties between individuals under study and family members appeared to involve blood relatives rather than *compadres*. That is to say that the importance of *compadrazgo* appeared limited in the face of acute or chronic disease. Usually relatives were present as I interviewed or examined subjects. Other research suggests that the *compadrazgo* system persists after migration to urban environments (Lewis 1965), and that the *compadrazgo* is an enduring and flexible Mexican social institution (Lewis 1965, Kemper 1982). More research over subsequent decades will be needed to chart the course of kinship institutions in an increasingly urban and industrialized Mexico.

Urbanization and Migration

Tzintzuntzeños are increasingly linked to urban environments through direct travel, commerce, tourism, or family networks. Recent ethnographic studies of urbanization and migration have painted a picture of a rapidly changing and urbanizing community with close ties to relatives in major Mexican cities and the United States (Kemper 1977, 1981, 1996; Kemper and Royce 1979).

The elderly, however, seem less inclined to travel to cities. Most have been outside of Tzintzuntzan, to Mexico City, Guadalajara, or to work as *braceros* in the United States. The informants in this study live and remain in Tzintzuntzan on a regular basis, and generally expressed no interest in traveling to America. Exceptions included Doña Micaela, George Foster's famous informant, who has traveled with American

anthropologists extensively in the States. Knowledge of urban environments is variable among the elderly residents I interviewed. Some had worked in their youths as *braceros* in California or Washington states, others had never left the immediate environment of the village. Nonetheless, the inroads of urban culture inform their aging experience.

Contact with urban dwellers, such as the *pasante* physician in the clinic, has led to increasing acceptance of advanced medical technology such as vaccinations, radiographs, and intravenous fluids. This tendency toward increasing adoption of biomedicine was observed in the post World War II era by Foster and other anthropologists, and appears to be rapidly progressing. For example, a septic patient with an obstructive prostate carcinoma traveled first to the hospital in Quiroga, and ultimately was hospitalized in a state hospital near Patzcuaro. An understanding of the literature on urbanization and migration in Mexico is therefore important as we seek to understand what it means to grow old in the changing village of Tzintzuntzan.

The themes of urbanization and migration, though related, are conceptually distinct. Urbanism and urbanization can be studied (and sociologists often do so) without reference to the countryside. This was the case for early anthropological investigation (Lewis 1952, 1959; Butterworth 1962, 1972; Arizpe 1975; Kemper 1977; Lomnitz 1977; Cornelius and Kemper 1978; Kemper and Royce 1979), and more contemporary research as well (Hirabayashi 1993; 1981, 1996;, 1994; Kemper 1981, 1996; Lomnitz 1994).

Central issues explored by anthropologists deal with the experiences of villagers in cities: how they find work and shelter, what new social and economic ties they form, how their behavior changes. The concept of anomie in cities, which goes back as far as ancient Greece, has informed a body of work attempting to determine whether moving to cities leads to declines in traditional cultural values and social cohesion. Lewis found that "urbanization without breakdown" was a common occurrence (Lewis 1952). This was in response to Redfield's earlier suggestions that urban experience leads to collapse of traditional rural peace and happiness (Redfield 1941).

Lewis found that immigrants to Mexico City from Tepoztlán, though they often revealed alterations in behavior in the city (e.g. displaying religious ornaments differently), generally remained happy, religiously devoted, and maintained traditional values and beliefs. Similarly, Kemper's work on the persistence of compadrazgo in the city among Tzintzuntzeños who have migrated to the city revealed that compadrazgo persists as a viable and flexible institution, but tends to be increasingly governed by secular as opposed to religious themes (Kemper 1979).

Kemper found an improvement in standard of living after Tzintzuntzeños moved to Mexico City. The importance of gaining a toehold in the urban environment, by living with relatives and friends, and of maintaining contact with the village (through brief trips and communication) also emerged from Kemper's work (Kemper 1977, 1996). Keefe also found the concept of a declining family structure among Mexican American urban

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migrants is a "myth", noting that the presence of extended family structure in cities militated against breakdown (Keefe 1996).

Rotating credit associations in which community dwellers pool cash and redistribute it by lottery, also known as *tanda*, are an important method of acquiring capital needed to make major purchases or start small businesses (Davis 1968; Kemper 1977; Kurtz 1973; Velez-Ibamez 1983). This institution reflects a distrust of banks among villagers, even in urban environments.

Lewis elaborated a "culture of poverty" theory which remains an important part of the history of the study of urbanization and its effects on individuals of rural extraction living in the city, particularly Puerto Ricans in New York (Lewis 1959, 1966). Though recent investigators have criticized this analysis as being hegemonic, and imputing a lack of morality to the socially disadvantaged (Goode and Eames 1996:407), it remains an important part of the history of the study of urbanization. In Tzintzuntzan, some features observed by Lewis were present, such as alcoholism, inability to save money, and distrust of government. Anomie, depression, and a sense of hopelessness were not commonly seen, however. Strong familial, community, and religious ties seemed to represent a bulwark against despair and alienation among the elderly. Even alcoholism, prevalent among middle aged males, generally did not lead to isolation from the community. This contrasts with an urban experience of Lewis's migrants. (Lewis 1959, 1966).

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In important respects, however, the culture of poverty was not present. I observed no lawlessness, little inclination to be dependent upon the government for help, no illicit drug use beyond alcohol, and no direct evidence of domestic violence (though a history of violent treatment was reported by at least one elderly woman). The elderly of Tzintzuntzan were warm, gracious, welcoming, and generally well supported by concerned extended families. This did not translate into good health, as we shall see in subsequent chapters, but it does suggest a more supportive and less alienated cultural milieu than that observed by Lewis in his work in urban migrants to New York from Puerto Rico.

In conclusion, though in this work we will confine our analysis to seeking to understand the experience of elderly Tzintzuntzeños in their village environment, a full explication of the aging process in Michaocán must derive from an appreciation of the ongoing effects of urbanization and migration.

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Acculturation

Understanding acculturation as a theoretical construct which shaped prior anthropological research in Mexico is important as we move to examine the health and aging process in Tzintzuntzan. Though no longer as influential a concept in a world of jet liners and the internet, acculturation theory heavily influenced the intellectual development of George Foster, who studied under Herskovits at Northwestern as an undergraduate. Foster's mentor studied the acculturation process extensively, particularly in African populations (Herskovits 1926,1938, 1952, 1955.1967). It is a concept worth discussing briefly, as

culture change through acculturation is an ongoing process today as Tzintzuntzeños seek to maximize their health status by choosing between bonesetters and physicians. The trend I observed is towards increasing adoption of Western medicine as an acculturation process.

Until the 1920s, anthropologists viewed their role as largely confined to describing indigenous societies worldwide, prior to contact with Westerners. George Foster, for example, had to go against the prevailing trends in the Anthropology Department at the University of California at Berkeley when he elected to study rural Mexico rather than the vanishing American Indian tribes of California which Alfred Kroeber preferred to have his students research, as Foster revealed in a recent informal lecture on his life at Berkeley in 1996.

By the end of the first quarter of the twentieth century, however, anthropologists increasingly found it impossible to ignore the ways in which societies changed as a consequence of contact with industrialized cultures. "Acculturation" was the term adopted by American anthropologists to describe the processes whereby cultural influences from outside were integrated into societies. The "Memorandum for the Study of Acculturation" set the tone for this analysis, suggesting that acculturation was a complex process often leading to "smoothly functioning cultural whole which is actually an historic mosaic" (Redfield, Linton, and Herskovits 1936:152).

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Since the senior author of the Memorandum drew his theories from Mexican research in Tepoztlán, it is not surprising that Mexican data played an important role in acculturation studies. Tax enlarged upon this work in his edited volume dealing with Latin American acculturation processes (Tax 1952). As such, brief mention of the importance of acculturation in Mexican ethnography is useful as we preface our inquiry into aging in Tzintzuntzan. Redfield's *The Folk Culture of Yucatan* (1941), especially in Chapter IV, "Spanish and Indian: the Two Heritages," explores the melding of Spanish and Indian elements to form Yucatecan culture of the 1930s. Elsie Clews Parsons in *Mitla: Town of the Souls* (1936) similarly attempts to isolate the contributions of Zapotecan culture of the two historical traditions.

Acculturation influenced Foster's work as he documented the increasing influence of urban culture on traditional rural Mexico from the time of *Empire's Children* (1948) to the time of his later works such as *Tzintzuntzan: Mexican Peasants in a Changing World* (1967a), a work which specifically examines the effect of the image of limited good and equilibrium theory on village responses to efforts to undertake civic projects such as constructing roads and clinics.

Beals' study of acculturation process among Indians in Mexico in the *Handbook of Middle American Indians, Volume Six* (Beals 1967), is a basic source for acculturation studies in Mexico, developing a historical perspective based on Indian-Spanish contact from the 16th century to the current era (Beals 1967). Foster's *Culture and Conquest*, perhaps the last great work on acculturation, represented his attempt to determine which

elements of culture are of Spanish origin, which are indigenous, and the mechanism of rejection or acceptance (Foster 1960).

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Chapter 2: Methods

This dissertation will first describe the prevalence of chronic and acute disease, then moving on to a broader analysis of cultural factors which influence how growing old occurs in Tzintzuntzan. Early life experiences, improving socioeconomic standing, and extended families will emerge as factors rendering aging a more tolerable experience, even in the face of major illnesses in most older persons. Beginning with a description of health status (both objective and subjective) of Tzintzuntzeños, as defined by detailed interviews, examinations, and questionnaires, seemed the best way to approach the riddle of growing old in Tzintzuntzan. I chose to look at what health problems are "out there" in the community, and how the inhabitants report their health status, and only then moved on to speculations regarding cultural factors influencing this process. This represents an approach influenced by scientific rationalism and biomedical training. No doubt, the conceptualization of what illnesses exist in the community would be radically different had this study been undertaken by a health care practitioner from a non-allopathic tradition, such as Ayurvedic or traditional Chinese medical practice. It is this eclecticism of experience which lends dynamism to medical anthropology as a field.

This approach is consistent with what James Peacock recently referred to as "effective synergy" between what he calls "reflective practice" and "connected research" (Peacock 1997:14). It reflects my own pragmatic concern that medical anthropology's greatest potential exists as a "hands on" field in which theory flows from observation. This is not a new idea, of course. Since World War II anthropologists have been involved in the medical field, including Caudill's notion of "applied anthropology" and Paul's study of

obstacles to improving public health in developing countries (Caudill 1953; Paul 1955, 1958). Dunn's discussion of mosquito vector control incorporates an appreciation of behavioral factors deriving from an anthropologist's perspective (Dunn 1983).

As we move from the biomedical foundation to the anthropological structure above we will employ additional data derived from participant observation of alternative healers, detailed narrative analysis using my own questionnaire, and also unstructured conversations and experiences recorded by notebook, tape recorder, and video camera in the classic anthropological sense (Figure 1).

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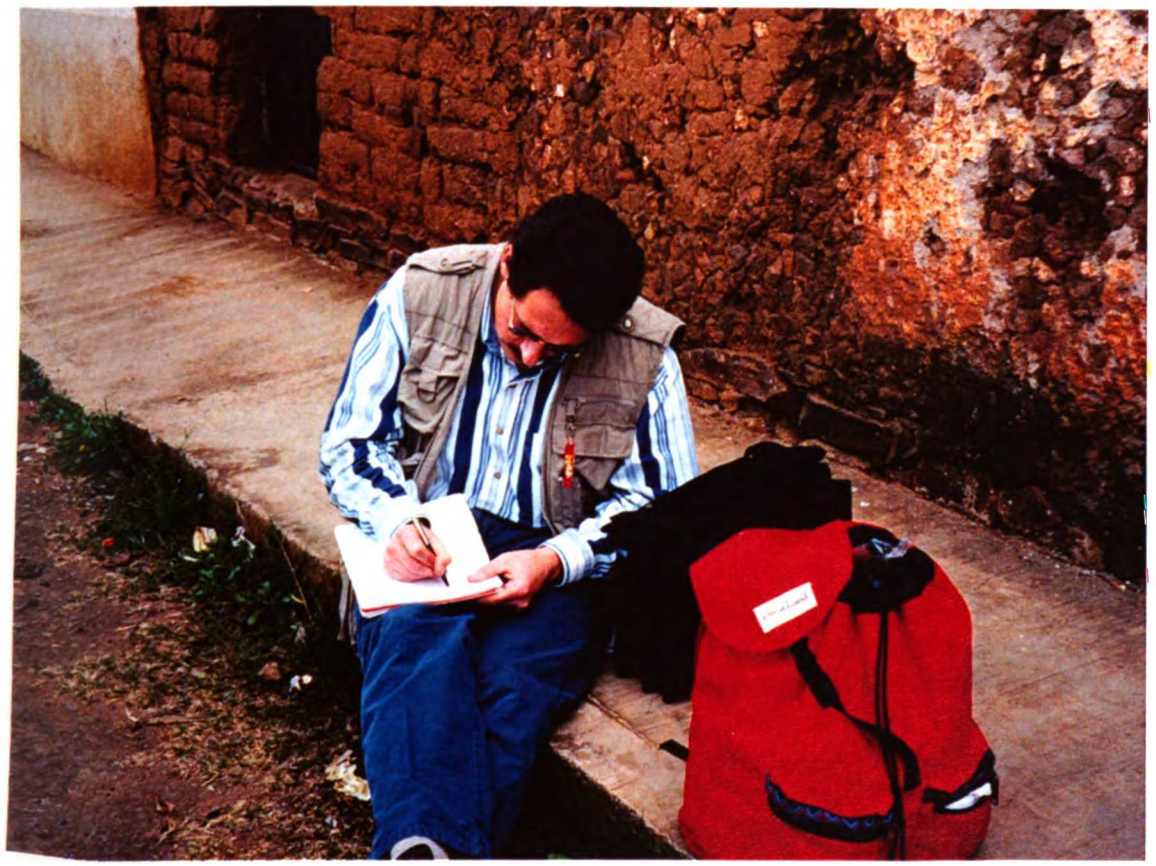

Figure 1. Debriefing results of interviews and examinations (Photo by Camille Castro)

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I first visited Tzintzuntzan in 1995, and returned to participate in a census update in August of 1996 with Professor Robert V. Kemper of Southern Methodist University. Using the detailed demographic data derived from this, I then worked closely with a Ph.D. statistician (Steven Paul 1996, personal communications) to develop a randomized proportional sample of elderly inhabitants to select for study. The 50 subjects were drawn from 4 quartiles of men, and 4 quartiles of women. Each quartile subsumed a 10 year age period, i.e. from 60 to 70, 70 to 80, 80 to 90, 90 to 100 years old (though the oldest informant in the oldest quartile was 97 years old). Distribution of subjects among these 8 categories was proportional in age and gender distribution to the demographics of the underlying population. Stated differently, the number of men versus women, and the relative distribution of the population by age, was mirrored in the set of 50 I identified.

Participant observation of alternative healers treating acute musculoskeletal conditions rounded out my research methodology, along with unstructured time spent observing and participating in village life. Beyond the 50 individuals randomly selected for detailed study, I felt the need to identify rheumatoid arthritis patients, as this is the most serious of the fairly common rheumatological diseases affecting joints. As I found no rheumatoid arthritis patients in Tzintzuntzan itself, I sought these patients from the town of Quiroga, two kilometers away, and identified one man and one woman in their 60s. They grew up around Lake Patzcuaro in circumstances very similar to that of Tzintzuntzeños, and thus I decided that it would be reasonable to include them in the non-randomized aspects of this study in order to gain some insight into the experience with rheumatoid arthritis in Mexico (the most serious commonly encountered inflammatory form of arthritis).

These 52 individuals were interviewed in traditional anthropological manner, with an unstructured format geared towards learning about their lives and experiences. Beyond this, they were also administered four standardized medical questionnaires (validated in Spanish). Key informants, to be discussed in later chapters, were re-visited and interviewed with the help of an additional questionnaire designed to address specific issues related to the aging experience.

Pseudonyms are used to disguise the identity of study participants. Exceptions are physicians and alternative healers, who are generally proud of their work and identities. This approach is consistent with the concern for privacy manifested by prior researchers, who also have attempted to balance respect for privacy with a desire to recognize individuals who are proud of their identities and contributions to research. For example, Kemper and Royce explicitly examined whether to use pseudonyms in a recent article devoted to ethical dilemmas in research in Mexico, drawing from their studies in Tzintzuntzan and Juchitán, respectively:

> "Unlike some scholars, we have not attempted to disguise the communities where we work. Tzintzuntzan and Juchitán have played distinctive and important role in Mexican history, and their people would have been disappointed had we hidden their identities" (Kemper and Royce 1997:480).

Medical issues are inherently very private, with a greater potential to cause embarrassment or fear of discrimination if disseminated improperly. Therefore, I chose to zealously guard the identity of those interviewed for assessment of health problems. Photographs of body parts and radiographs generally do not allow identification of individuals so studied. Healers (including one bonesetter whose knee radiographs are shown), generally were proud to be identified by name, and so were not disguised. I believe this was an ethical and appropriate compromise, in keeping with the standards set by prior researchers. Above all, by disguising the identity of formal study participants, those subject to physical examination, I maintained my obligation to guard privacy under the Committee of Human Research protocol which governed my research.

Laboratory tests were obtained when appropriate to confirm diagnostic impressions or to screen for illness, and radiographs of the chest or arthritic joints were obtained as well. The radiographs were compared to previous films when available. The result is a description of the health of the elderly of Tzintzuntzan which I believe is fairly detailed from a biomedical point of view. This approach has been described as *evidence-based medicine*, to distinguish it from "relying predominantly on anecdotal and personal experience ..." (Tugwell and Boers 1997:348).

My view is that an understanding of the prevalence of allopathically-defined illness cannot come about through casual observation. A methodologically sophisticated and detailed examination is necessary. Let us consider, for example, a recent article in which Lorenza Menegoni described the health of the Indians of Yochib of Chiapas. Though a

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valuable addition to the medical anthropology literature in some respects, it raises methodological questions:

> "The medical profile of Yochib is characterized by a high incidence of infectious and parasitic diseases. According to the monthly records of the local clinic as well as my own observations, the most prevalent problems are respiratory infections, followed by gastrointestinal infections and parasites. Children more than adults are affected by respiratory infections and diarrheal diseases. Other frequent illnesses in Yochib include skin infections, rheumatic diseases, and trachoma. Given the community's overall poor conditions, there are no marked differences in illness patterns among socioeconomic groups" (Menegoni 1996:387).

This description at first glance appears sound, but detailed inspection suggests methodological problems from which we can learn. Menegoni confuses two quite disparate concepts:*prevalence* and *incidence*. The former refers to the number of people who have a disease *at a given time* (DM Anderson 1994:1351). Thus the *point prevalence* may be expressed as the number of people with a disease per unit population on one day, the *period prevalence* define the number of diseased persons per unit population over a month or year period, and the *prevalence rate* (PR) may represent a multiple of this used to make a very small fractional figure more meaningful when dealing with rare diseases (Halperin 1994:31):

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$$PR = \frac{\text{Total number of cases present in a population at a specified time}}{\text{Number of persons in the population at the time}} \times 1000$$

For example, the point prevalence of rheumatoid arthritis is about 1% among people in the United States, i.e. one out of a hundred people have rheumatoid arthritis (Firestein 1997:851), leading to a prevalence rate of about 0.01 x 1000, or 10. That is considered a fairly common disease, thought not as prevalent as atherosclerotic coronary artery disease, for example, which kills half the U.S. population, with a prevalence of over 50 percent among some elderly populations. As most of the conditions I will describe in this dissertation were found to be prevalent in at least one of 50 informants, I will describe prevalence in raw fraction form, e.g. .01 or 1%.

Incidence of disease, by contrast, is defined as the number of new cases developing in a population over some specified period of time, usually one year (DM Anderson 1994:829). As is the case with prevalence, an incidence rate can be expressed from these data (Halperin 1994:31):

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$$\text{Incidence Rate} = \frac{\text{Number of new cases in a population during prescribed period}}{\text{Number of persons at risk of developing disease during same period}} \times 1000$$

Prevalence is related to incidence, as the number of persons with a disease depends upon how many people get the disease. It is also a function of time, as diseases with low incidence can become prevalent if people live a long time with their illnesses, as is the case with many chronic illnesses of the elderly. This can be expressed in a simple equation:

Prevalence = Incidence x Duration

Thus the incidence of systemic lupus erythematosus ranges from 1.8 to 7.6 cases per 100,000 people per year on average (Lahita 1997:1028). Prevalence rate data, multiplied by 1,000, is more useful in making rare diseases manageable numerically, which is not an issue in an assessment of overall health. As this study represents the survey of health of the elderly of Tzintzuntzan at one point in time, I will not address disease incidence, concentrating instead on prevalence. Perhaps a longitudinal study in the future may be undertaken to address incidence rates for disease among the elderly.

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The importance of differentiating the incidence and prevalence of conditions is more than academic. Rheumatological diseases, the area of my principal expertise as a practicing physician, may be highly prevalent, but in the case of most conditions have a relatively low incidence. That is to say that people get rheumatoid arthritis infrequently, but live on with the condition for decades leading to a prevalence which is fairly high, around one percent. By contrast, upper respiratory infections have a high incidence, but are short lived and may have a low prevalence. For example, influenza season results in a high rate of sick leave among municipal workers in Helsinki, but they typically return to work after only 4.9 days of absence, typical of a disease which may have high incidence but low long term morbidity (Kumpulainen, Mäkelä 1997).

Menegoni reports that "the medical profile of Yochib is characterized by a high incidence of infectious and parasitic diseases ... the most prevalent problems are respiratory infections, followed by gastrointestinal infections and parasites" (Menegoni 1996:387). Are these conditions both highly prevalent and of high incidence? We are not told. We are told that Menegoni's observations are based on "the monthly records of the clinic as well as my own observations." How useful is this data base? Clinic records in the Centro de Salud of Tzintzuntzan are patchy and inadequate for a study of the prevalence of diseases. Are the records better in Chiapas? If so, we need to see the evidence, which is not provided. In Tzintzuntzan, for example, parasitic infection appears to be highly prevalent as evidenced by the universal eosinophilia (high numbers of specialized white blood cells involved in fighting parasites) observed in blood smears. Isolating parasites

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would have been even better, but this was not feasible given the constraints of limited funding and laboratory availability.

Menegoni's data are suspect for other reasons. Most physician encounters are geared toward the "chief complaint" which brings a patient to a physician. They are not generally comprehensive exams intended to derive accurate data on disease prevalence. For example, gingivitis and dental loss, high frequency hearing loss, cerumen impaction leading to deafness, early cataracts, osteoporosis, mild dementia, and sun damaged skin are all pathological conditions which are prevalent among the elderly and which have adverse health consequences (U.S. Senate Special Committee on Aging 1991). All of these conditions are highly prevalent in Tzintzuntzan, as we shall see in this dissertation. Yet such chronic conditions would typically not be mentioned in a problem-oriented clinic note written by an overworked *pasante* physician. Stated differently, absence of evidence is not evidence of absence.

Menegoni closes her observations by stating that skin infections and rheumatic diseases are "frequent," and that there are "no marked differences in illness patterns among socioeconomic groups." Here we see incidence and prevalence data replaced by the term "frequent," which is problematic. For example, in the United States we know that atopic dermatitis may approach 10 percent prevalence defined in terms of individuals carrying the diagnosis, largely due to a relapsing course which leads patients and physicians to report it as present over a period of many years (Brehler, Hildebrand, Lager 1997). Thus, it is "frequent" in the sense that it has a high period prevalence if people are examined

repeatedly over a year or two, though it may have a low point prevalence during quiescent periods, and its incidence may also be variable.

Beyond this, Menegoni uses terms which are nonspecific. By skin infections, does she mean acute cellulitis, erysipelas, necrotizing fasciitis, or simply acne vulgaris? They are all specific diagnoses, and have specific prevalence and incidence patterns. Similarly, rheumatic diseases is a vague and non-specific terms. Does she mean the annoyance of osteoarthritis or the near certain fatality of untreated Wegener's granulomatosis?

Finally, how does she know that there are no marked differences illness patterns among socioeconomic groups? Pincus has found socioeconomic status to be a major predictor of prognosis among rheumatoid arthritis patients in the U.S. (Pincus 1986). If the situation is different in Mexico, then we need data to support this contention. Menegoni provides no detailed methodology to explain how she derived her patient population. There is no mention of a randomization process, or of patterns of patient refusal among those who may have chosen not to participate.

In summary, if one wishes to do a methodologically sound analysis of health status among villagers, one must bear a few points in mind. It is important not to confound prevalence with incidence. One must randomly choose the population of study, and not rely on second hand medical clinic records or casual observations. Unfortunately, though I have used Menegoni as an example in this section, she is not alone. Nancy Scheper-Hughes's description of the health complaints of rural Brazilians, which does not

distinguish between specific diagnoses and general medical complaints, is not based on objective findings (Scheper-Hughes 1985). Similarly, Frake's description of the skin diseases of the people of Mindanao, which exists in entirely emic terms with no clinical correlation's, is similarly lacking in data allowing an accurate appraisal of health status (Frake 1961). This "ethnosemantic" approach has been described as one that "... assumes that culture consists of, among other things, shared cognitive consensus's about the nature of the universe in which a society finds itself" (Landy 1977:183), though Landy qualifies his praise by pointing out that combined emic-etic approach which correlates clinical observations with local nomenclature would shed more light on indigenous beliefs regarding illnesses (Landy 1977:184). I agree with Landy, and would go a step further. A dermatologist might well have been a valuable consultant for Frake in developing his exhaustive formulation of disease classification terminology among the Eastern Subanun people. Is it really possible to study skin disease scientifically without any knowledge of whether *selimbunut*, or "spreading sore" lesions, correspond to contact dermatitis or secondary syphilis?

Though anthropologists need not be physicians to address issues of disease prevalence, they must at least be willing to work collaboratively with physicians when appropriate. Though this approach places allopathic medicine in a privileged position, to some extent, it seems to me that we are lost if we struggle with emic disease classification systems, as Frake and Scheper-Hughes do, but have no concept of whether diseases being described have pathophysiological correlates which we can appreciate in our own culture. We need to have some idea of what is out there in a culture, be it rheumatoid arthritis or

tuberculosis, before we can understand what traditional explanations for joint pain, fever and cough mean. This is the approach I used in formulating the methodology of this study.

D'Andrade described the trend towards rejection of objectivity and science in anthropology as an effort to substitute a "moral" field for an "objective" field, and decried such an approach as potentially harmful to the field (D'Andrade 1995), and Wiley also argued for rigor in data analysis (Wiley 1992). The view of "practice" as divorced from and therefore inferior to what is construed as pure "theory" may represent a false dichotomy. Peacock recently lamented this trend in his essay, "The future of anthropology," and argued for a model of anthropological theory which leaves room for pragmatic experience as a catalyst for cognitive insight:

> Theory and practice have diverged as theory has abstracted itself beyond any use in practice, and practicing anthropology is spurned an nontheoretical, theoretically outmoded, or intellectually uninteresting. Yet in other disciplines, practice has been the catalyst for theory; think of psychoanalysis, which is a theory growing out of practice. This clinical mode is generally a good model for synergy ... The two spheres -- theory and practice -- have perhaps exhausted their isolation. The time is ripe for effective synergy: reflective practice and connected research (Peacock 1997:13-14).

To a large extent, medical anthropology may be viewed as being in a comparable position to cultural anthropology in the 19th century. At that time "arm chair" descriptions of traditional cultures by anthropologists, such as Frazer's *Golden Bough*, were considered methodologically sound (Frazer 1911). Participant observation developed as an improvement over relying on second-hand reports of missionaries and government officials. The work of researchers who demanded more precise and accurate observations changed the field. Franz Boas's work among the Arctic Amerindian cultures (Boas 1896), Malinowski's work among the Trobriand Islanders (Malinowski 1922, 1927), and later the work Margaret Mead (Mead 1928) in Oceania are important examples.

Participant observation led to the development of functionalism, culture and personality, and psychological anthropology. Medical anthropology is in the 19th century today with respect to medical observations. We often rely on casual observations, second-hand reports, and non-randomly chosen anecdotal observations to determine the medical aspects of the cultural-physiological continuum which we seek to bridge. We must take the *medical* side of medical anthropology more seriously by demanding research methodologies which accord primacy to accurate and dependable observations of the disease processes we seek to understand. To do otherwise results in theoretical constructs based upon data which are not only incomplete, but often inaccurate and misleading.

In Tzintzuntzan, I sought to address these methodological concerns directly. My goal was straightforward: to assess the *prevalence* of acute and chronic disease among the elderly of Tzintzuntzan. Although this is simple and not very creative, this approach

seems necessary to assess the health status of traditional peoples. Certain principles guided my choice of methods:

1) Select a randomized sample of people for detailed examination and questionnaire administration.
2) Select a sample proportionally represented by gender
3) Select a sample proportionally represented by age
4) Conduct detailed medical and anthropological histories, physical examinations, and appropriate laboratory and radiographic tests.
5) Administer selected questionnaires validated in Spanish which allow better understanding of the impact of chronic disease on the health of the community.
6) Administer anthropological questionnaires and conduct unstructured interviews.
7) Perform traditional anthropological participant observation.

With these observations in mind, let us examine, step by step, the methodology employed in this study.

<u>Randomization in manner proportional for gender and age (steps 1 through 3)</u>

Using the data obtained from the 1996 update of the census of Tzintzuntzan, it was determined that there were 340 people over the age of 60 in the community. Based upon the feasibility of finding and examining a person in the village, it was determined that a randomized sample of 50 persons would be selected for detailed review and examination.

The number 50 was chosen for several reasons. It was felt that in order to obtain 50 subjects with an estimated rate of refusal or non-availability of 50 percent, that we would need to randomize 100 people. This seemed an easy number to work with mathematically, and large enough to allow a reasonably representative selection of the village to be randomized, i.e., approximately one third of the elderly. We believed that fewer than 50 persons would represent a sample too small to be adequate for estimations of disease prevalence. Greater than 50 would be too large to realistically be examined by a single physician with limited resources and other anthropological obligations.

The population was broken into four age group quartiles, representing ages 90-99, 80-89, 70-79 and 60-69 years old. This corresponded to census birth date intervals ranging, respectively , from 1897-1906, 1907-1916, 1917-1926, and 1927-1936. The age of 60 was represented as a starting point because of the rapid increase in the prevalence of chronic illnesses beyond this age (particularly arthritis). Table 1 shows the breakdown of the elderly in these quartiles by gender distribution, with four number codes derived from the census data described above, presented graphically in Table 2. The reader will appreciate that as the population ages, the number of people alive diminishes, an expected observation. Nonetheless, the existence of 340 people over age 60 years in a village of about 3,500 people as itself worth noting. As recently as the year 1900, only 4% of the United States population was over age 65 in the United States, a figure that has risen to 14% at present (Hall 1997). A population of Tzintzuntzenos over age 60 which represents nearly 10 percent of the village population suggests fairly decent longevity for a village with little advanced medical care. An alternative explanation is the propensity of the

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young to emigrate to major cities in Mexico or the United States looking for employment, leading to disproportionally elderly population in the village. There is evidence to support a trend towards such emigration (Kemper 1971, 1976, 1977, 1979a, 1981, 1996), and the age distribution may suggest a somewhat better survivorship of the elderly due to emigration of the young.

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Table 1: Population of Tzintzuntzan over age 60, by age quartiles and gender distribution. Four digit numbers correspond to census identification. Age groups represent ages 60-69, 70-79, 80-89, and 90 to 99.

age	Males	Females
90-99 (DOB '97-'06)	0950	4123
	0657	3883
	2759	3713
	3945	1692
	2385	3571
	0244	1699
	1122	0822
		2132
		1269
	total = 7	total = 9
80-89 (DOB '07-'16)	2351	4018
	2829	3324
	1737	1404
	0234	3306
	1827	1648
	3552	1864
	3329	4909
	0507	3670
	0543	3928
	1069	3351
	1233	3666
	3577	1774
	0528	5108
	1829	4533
	0619	3902
	2220	0102
	0462	2254
	2545	4527
	1763	4969
	0438	4479
	0505	4495
	4826	5016
	0701	3184
	3304	4957

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	2444	0120
	2200	0548
	4301	0373
	3540	
	total = 28	total = 27
70-79 (DOB '17-'26)	2234	5201
	4914	0741
	1751	4585
	5198	0813
	1861	0953
	1701	0223
	0529	2188
	1333	1625
	4872	0985
	0508	3890
	1818	4842
	1481	4883
	0578	3633
	3050	1268
	1523	3667
	1293	1716
	0241	5015
	2318	3684
	2478	4125
	3321	4538
	2714	1762
	5153	1185
	4636	4536
	2263	0175
	4577	1545
	3080	1898
	0826	2146
	4656	3671
	2727	1489
	2377	4375
	1985	4429
	1061	1175
	1080	4984
	4801	3708
	2877	2367
	2154	1874
	4191	2414
	2016	1168
	1801	1278
	3820	0691

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	2798	4014
	3836	3735
	2682	2159
	1557	4831
	4144	4938
	3599	
	0612	
	1335	
	5056	
	total = 49	total = 45

60-69 (DOB '27-'36)	0807	1509
	3423	0765
	4539	3198
	4919	4676
	1354	3824
	3128	0931
	2029	3408
	0392	0133
	1060	4178
	2047	1427
	2888	1717
	3483	1903
	2264	0740
	3901	3315
	1071	4055
	4690	0011
	2745	2956
	3357	3316
	0255	0833
	3065	2773
	3647	4063
	2138	0866
	4886	2702
	2129	4665
	1712	1750
	4848	4629
	2359	3803
	0978	2589
	2700	1435

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3938	1100
3584	3863
1580	2999
1012	2744
0672	1899
4635	3916
1918	2364
3019	0199
2415	0834
1764	0359
2583	1906
2944	0074
3058	1403
1477	0719
0437	3212
4406	2474
1972	5033
4450	4219
0052	2484
2828	0533
2857	1439
1339	0730
1838	3798
4372	0384
0177	3860
4029	3390
0030	2831
1127	0628
1791	0469
2514	3314
3402	3231
4939	2505
0289	2789
2883	4134
2209	3281
2766	4206
3034	2862
4760	3526
3725	2358
1137	0960
2709	3869
4829	3946
3971	1003
4107	0498
3569	4943
1126	1411

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2212	1707
2806	0927
3581	4405
0358	1443
0259	2011
4749	2572
	0634
	0796
	3242
	3973
	4677
	1401
	2111
	1589
	1283
	2130
	0854
	0211
	3964
total = 81	total = 94

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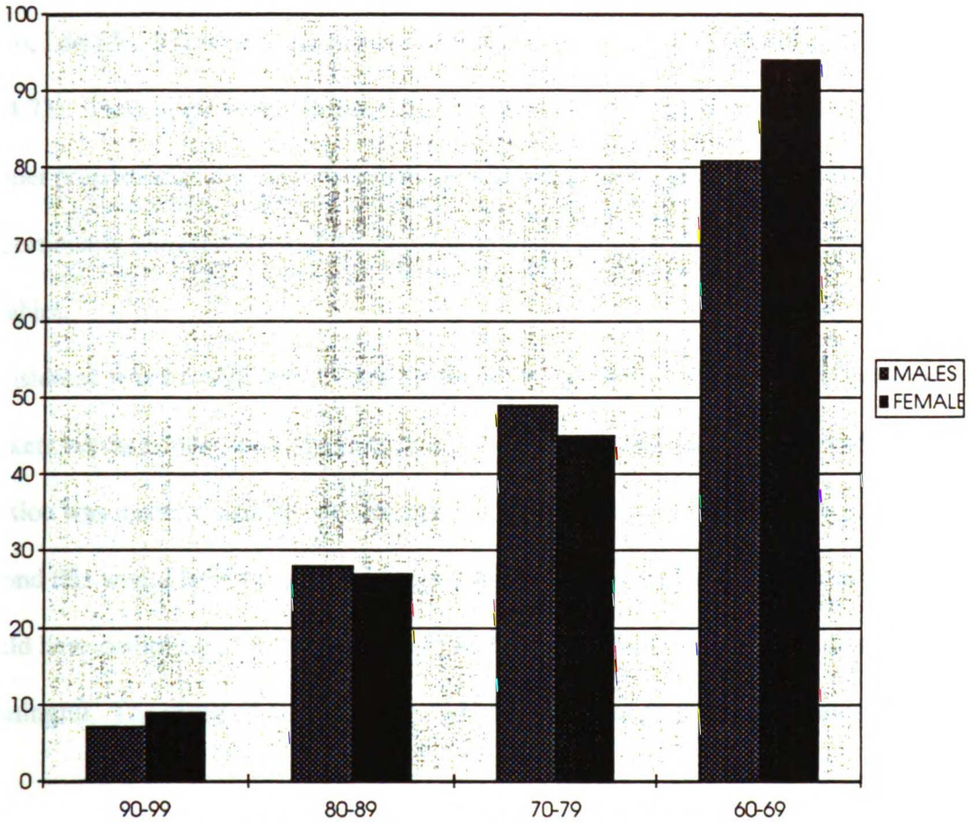

TABLE 2: BREAKDOWN OF 340 ELDERLY POPULATION MEMBERS BY AG GENDER (DATA LISTED IN RAW NUMBERS OF PERSONS .

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After extensive consultation with a Ph.D. statistician (Paul, personal communication 1996), I decided to obtain what Bernard refers to as a *stratified random sample* (Bernard 1994:73). The sample would be stratified by age quartiles, and also subdivided in a manner proportional to gender distribution, with the random sample selected being proportionally representative of the population under study with respect to these two variables.

I considered whether similarly to stratify for other variables, such as income percentiles, smokers versus nonsmokers, those born in the village versus those from outside, etc. The decision was made to stratify only for age and gender because an attempt to stratify beyond this would have fragmented the population into too many small groups and thus would have complicated data analysis by yielding observational numbers too small to be meaningful. The result of our efforts would be a *stratified proportional random* sample.

In order to perform the stratification we first entered four digit numbers into a Macintosh Powermac 6100/60 computer, generating table data with eight groups, one each for each of the four age quartiles in both sexes (Table 1). The data presented in Table 1 represents the entire population of Tzintzuntzan over age 60. These data can be broken down into four categories as represented in Table 3.

Table 3: Breakdown of 340 elderly population members by age and gender (data listed in raw numbers of persons and in percentage of total sample chosen)

Age (In years)	Males: Number (Percentage)	Females Number (Percentage)
90-99	7 (2)	9 (3)
80-89	28 (8)	27 (8)
70-79	49 (14)	45 (13)
60-69	81 (24)	94 (28)
TOTAL	165 (48)	175 (52)

In Table 3 this breakdown is presented in terms of the percentage of the elderly population, defined as those greater than age 60, subsumed by each of the eight categories. Our goal would be to derive a randomized sample of 50 subjects and 50 alternates which reflect this overall percentage breakdown.

Table 3 allows us to solve problems of age and gender stratification (problems #2 and #3) as follows: A randomized sample of 100 informants would be generated which contained 2 males between age 90 and 99, 3 females between 90 and 99, 8 males between age 80 and 89, 8 females between age 80 and 89, 14 males between ages 70 and 79, 13 females between ages 70 and 79, 24 males between ages 60 and 69, and 28 females between ages 60 and 69. It is interesting that the analysis of age distribution by sex revealed almost no difference in numbers of men and women for each ten year quartile group. The reason for this absence of the expected survival benefit among females is unclear. Migration of mature women to other communities after marriage is a possible explanation, leading to a relative abundance of older men who remain behind in the village. Another possible explanation is a relatively high death rate among older women due to chronic diseases. More research is needed to address the relative lack of gender disparity in survival among elderly residents of Tzintzuntzan, as this study was not designed for that purpose.

From this sample of 100 elderly subjects a smaller sample of 50 informants would be obtained by randomly selecting 50 percent of the sample of 100 within each category. Rounding up or down would be done in an effort to maintain the closest possible accuracy of representation. For example, fifty percent of the 3 females over age 90 in the

randomized sample of 100 represents 1.5 females in this group. This was rounded up to 2 because there are more women than men in this age group.

The resulting samples of 50 and 100 were obtained using the SPSS Statistical Program random number generator to generate roster numbers corresponding to the four digit identification numbers in Table 1. Seven roster numbers (numbers 1 through 7) were generated for males between age 90 and 100, and 9 roster numbers (number 1 through 9) for the corresponding females. I then generated 2 random numbers for the male cohort in this age bracket, and 3 for the females. These roster numbers were then circled on the initial roster of ID numbers in Table 1 to provide a randomized proportional stratified sample of 100 subjects. Of these 100 subjects, a second set of roster numbers was assigned and sub-randomized to generate a list of 50 percent of the initial list within each sub-category, giving us 50 subjects among the initial circled 100. These subjects were asterisked, in addition to being circled. We thus generated a randomized proportional sample of 50 subjects and 50 alternates, proportional for age and gender to the overall elderly population.

We approached the 50 circled and asterisked individuals in accordance with the University of California at San Francisco Committee of Human Subjects approved research protocol to be discussed below. For every patient who was unable or unwilling to participate in the study, an alternate was chosen. We approached 63 subjects in order to reach our goal of 50 subjects. The ID #s, age, gender, and reason for refusal of the 13 subjects who did not participate is listed in Table 4.

The presence of 13 non-participants represents a 26 percent rate of non-participation among individuals randomly selected for this observational trial. The majority of non-participants had moved or were not home on multiple visits. Only one patient refused. It is possible that the non-participants were healthier than participants and thus more likely to migrate outward, thus introducing a bias towards greater pathology among study participants, but this seems unlikely.

LIBRARY

Table 4: Reasons for non-participation among randomized subjects chosen who eventually did not participate in the study.

ID #	Age Group	Gender	Reason not included
0234	80-89	male	moved to Tijuana
3329	80-89	male	moved to Quiroga
3599	70-79	male	moved to U.S.A.
1278	70-79	female	died
3946	60-69	female	moved to Patzcuaro
0740	60-69	female	moved to U.S.A.
2047	60-69	male	moved to U.S.A.
1838	60-69	male	moved to U.S.A.
3315	60-69	female	refused to participate
2254	80-89	female	not home, 5 visits
0392	60-69	male	moved to U.S.A.
3080	70-79	male	not home, 3 visits
1401	60-69	female	not home, 4 visits

LIBRARY

Conduct a Detailed Medical and Anthropological History, Appropriate Laboratory Studies, and Radiographs (Step 4)

There is no substitute for actually palpating an osteoarthritic knee if one wishes to diagnose osteoarthritis of the knee (Figure 2). In their textbook *Clinical Examination of the Musculoskeletal System* Buchanan, Ceulaer, and Bálint argue for the primacy of history taking in establishing a diagnosis, particularly in rheumatological disease:

> "An unhurried, detailed history and careful physical examination are perhaps the most important diagnostic aids that the family and hospital practitioner have in establishing a diagnosis or rheumatic disease. In approximately 40% of patients, only a symptomatic diagnosis, such as myalgia or lumbago, can be made. In the remaining 60% of patients, a more definitive pathologic diagnosis should be possible, such as systemic lupus erythematosus or gout" (Buchanan, Ceulaer, Bálant 1997:XI).

Figure 2. Examining osteoarthritic knee in study participant's home (Photograph by Camille Castro).

The primacy of a detailed history and thorough physical examinations guided my evaluation of the 50 subjects selected for this study. These examinations included the most commonly employed components of a complete history and physical examination, as outlined in *A Guide to Physical Examination and History Taking, Sixth Edition* (Bates, Bickley, Hoekelman 1995), as summarized in the following sections.

CHIEF COMPLAINT (CC):

Asking a subject, "Do you have any health problems which are bothering you now?" was the approach I took in this study as an initial step of the medical interview. I softened the potential negativity of this standard biomedical approach by beginning all interviews with non-medical conversations about the weather, village life in general, and other "small talk." A typical answer to the "chief complaint" question would be "sore throat" or "back pain." Used properly, the chief complaint represents a jumping off point for more detailed discussion of health and well being.

HISTORY OF PRESENT ILLNESS (HPI):

A narrative summary of the events surrounding an acute or chronic illness for which a patient is seeking care, a good HPI should tell a story. Onset of the problem, location and quality of pain, severity of pain, precipitating factors, other manifestations of disease and "pertinent negatives" (lack of fever in osteoarthritis to distinguish it from a septic joint, for example) round out an HPI (Bates, Bickely, Hoekelman 1996:3).

PAST MEDICAL HISTORY (PMH):

Past medical history is an inventory of all prior significant health conditions requiring medical care, presented as a straightforward list without narration or extensive comment.

PAST SURGICAL HISTORY (PSH):

Abbreviated PSH, it is just like the PMH except that it represents a list of surgeries. Prior pregnancies, births, and abortions are also listed here, though I did not inquire about abortions due to the sensitivity of the issue.

CURRENT MEDICATION (Meds):

Abbreviated "Meds," this is a list of all current medications with dosages and frequency of administration. Proprietary names or non-proprietary (either Motrin or ibuprofen) may be used. I also inquired about herbs, vitamins, minerals, borrowed medicines, and traditional remedies. Ideally, a patient should bring all medications in a bag for direct inspection.

ALLERGIES:

A list of medications causing allergic reactions in the past. Often patients will consider an adverse reaction, such as stomach upset with aspirin, an allergy. Strictly speaking, such a reaction is adverse but not mediated by the immunological response of histamine release by mast cells or anaphylaxis (cardiovascular collapse) which characterizes a true allergy to a drug (such as penicillin). Usually the words "NKA" are written, meaning "no known allergies."

FAMILY HISTORY (FH):

FH is list of illnesses which have occurred in parents, grandparents, and to a lesser extent siblings. This is important, because a family history of heart disease, for example, is a major risk factor for the development of myocardial infarction.

PSYCHOSOCIAL HISTORY (SH):

Though undoubtedly brief by anthropological standards, this is a physician's effort to describe the career, life experiences, and health habits of a patient. In the hurried environment of the emergency room it may be a brief note detailing alcohol, cigarette, and drug use. Some physicians give surprisingly detailed histories. For example, in a patient of mine on whom I consulted in the CCU recently, a consulting cardiologist outlined in several paragraphs the marital problems, work experiences, social support network, and feelings about life support of a terminally ill patient, based on a long term professional relationship. It extended to commenting on whether a separated husband was sufficiently involved in the patient's life to make a decision regarding life support. In Tzintzuntzan I elaborated upon the social history in keeping with anthropological interest in the life of the individuals and its effect on illness experience, though this was often reflected in interviews at other times than at the examination date.

REVIEW OF SYSTEMS (ROS)

The "ROS" is a safety net device, which is designed to prevent overlooking significant pathology. It involves inquiring specifically about every organ system to avoid missing information not elicited in the HPI. Typically, I begin with the Head, Eyes, Ears, Nose and Throat and run down a list of typical complaints: "Headaches?... Blurred vision?... Hearing problems or ringing in the ears? ... Runny nose or stopped up nose? .... Chronic sore throat?... etc. I continue this for cardiovascular, lungs, abdomen, reproductive,

genitourinary, skin, joints, nervous systems, and also inquire non-specifically about weight loss, night sweats, or chills.

Seven subjects were selected for detailed laboratory and radiographic evaluation to determine precise diagnoses in selected patients with specific rheumatological diseases. The selected subjects are listed in table 5. In addition to these seven subjects from the initial random study, two other non-study participants were identified as having classic rheumatoid arthritis and later x-rayed and phlebotomized. These subjects were chosen because they had evidence of arthritis on initial evaluation, and because in my clinical judgment as a rheumatologist, carefully selected radiographs and blood tests would be useful in making a specific diagnosis. This represented a part of the study which was intentionally not derived from randomization. I chose to order tests only when clinically indicated, i.e., when there was a significant likelihood of finding pathology, in order to minimize expenses (blood tests and radiographs were the most expensive part of the study), and I also chose to limit radiation exposure to cases where a diagnostic imaging study would lead to accurate diagnosis of a condition and better medical care, as I felt it would be unethical as well as expensive to perform screening radiographs on the whole population with the attendant increased risk of malignancy (though that is very small with a single radiograph).

Table 5: Patients Studies radiographically and by laboratory analysis. LS=lumbosacral, R=right, L=left, CBC=complete blood count, ESR=erythrocyte sedimentation rate, Wintrobe method, UA=urinanalysis, chem 6=serum chemistry values for sodium, potassium, chloride, carbon dioxide, glucose, creatinine, blood urea nitrogen.

Subject	ID#	radiographs	labs
Leticia Cortez	4495	hands	chem 6, CBC, ESR
		LS Spine	UA
		R shoulder (AP internal	
		and external rotation)	
		views	
Nicolas Chavalas	1827	hands	chem 6
		shoulders	CBC
		feet	ESR
			UA
Jaime Montañez	2377	hands	chem 6
		LS spine	CBC
		hips	ESR
		knees	UA
			RF
Linda Reposa	1774	C spine	chem 6

		T spine	CBC
		hands	ESR
			UA
			Ca++
			P04--
Francisco Geraldo	3910	hands;	Chem 6
		CXR PA,	CBC
		Lateral;	UA
		LS spine	Ca++
			PO4--
Alfonso Cataldo	0950	hands, T spine, C-spine,	CBC
		Knees	ESR
			UA
			Ca++,
			P04--

In determining which subjects should be radiographed or subjected to blood tests, I needed to consider not only research interests, but the need to provide ethical care to the patients. Specifically, I needed to consider the radiation exposure and discomfort of phlebotomy, and consider as another issue the benefits of improving therapy by being able to make a specific diagnosis. Radiation risk was considered justified in the few patients I chose to x-ray, in light of the potential benefits of superior treatment of specific conditions, which I also undertook at no charge to the patients. As such this part of the study was not randomly undertaken, and may have introduced a selection bias. Nonetheless, I believe that it offered useful data which was obtained in keeping with the stringent requirements of the Committee on Human Research protocol under which I was operating.

Among the seven chosen subjects from the table, all agreed to arrive at the main plaza at 8:30 a.m. on Wednesday October 23rd, 1996, to be transported to Quiroga. Of the six patients personally approached, all appeared either at the plaza or in Quiroga (two mistakenly went to the plaza in Quiroga (Felix Geraldo and Alfonso Cataldo). One patient who was advised to come to the plaza did not arrive because he was approached indirectly through his wife and was occupied with duties related to *carguero* activities (Alberto Perez Espinosa, ID #1827, Pt #4). One patient, Alfonso Cataldo, went directly to the clinic in Quiroga and did not have blood tests performed due to an intercurrent illness (urosepsis secondary to obstructing prostate carcinoma). He eventually required transfer to another facility for urosepsis and prostate carcinoma and did not have laboratory studies performed.

Questionnaire Data (step 5)

Four questionnaires were chosen for administration, all validated in Spanish (Gonzalez et al. 1995), and focusing on chronic illness (especially arthritis) as a life experience. The Stanford Health Assessment Questionnaire (HAQ), Disability Scale (Fries et al.. 1980), the Arthritis Self Efficacy Scale as modified by Gonzalez from Long et al. (Gonzalez et al.. 1995, Long et al. 1989), the Medical Outcome Study (MOS) Health Perceptions Scale (Ware et al. 1992), and the MOS Pain Severity Scale (Sherbourne 1992) were administered to all 50 core informants, as well as the two rheumatoid arthritis patients I sought to study beyond the random sample subjects. These questionnaires are reproduced in Tables 6 through 9. They address an individual's perceived health in the setting of arthritis, the extent to which arthritis and other chronic illnesses interfere with a feeling of being able to live and work, overall view of one's own health, and the extent to which chronic pain troubles a person.

Table 6: Stanford Health Assessment Questionnaire (H.A.Q.) Disability Scale (Fries JF et al. 1980, González et al. 1995).

Habilidades Físicas

Physical Abilities

Lea las siguientes pregusntas sobre sus habilidades fisicas, por favor marque la respuesta que mejor describa sus habilidades usuales durante la **semana pasada.**

Read the following questions about your physical abilities. Please check the ***one*** *response that best describes your usual abilities over the past week:*

(Insert these response categories after each question)

Sing ninguna dificultad	**Con alguna dificultad**	**Con mucha dificultad**	**No puedo hacerlo**
Without ANY difficulty	*With SOME Difficulty*	*With MUCH difficulty*	*UNABLE to do*
---	---	---	---

¿Actualmente puede Ud.:

Are you able to:

Vestirse y arreglarse

Dressing and Grooming

Vestirse, incluyendo amarrarse los zapatos y abrocharse (abotonarse)?

Dress yourself, including tying shoelaces and doing buttons?

Lavarse la cabeza?

Shampoo your hair?

Levantarse

Arising

Levantarse de una silla que no tiene brazos?

Stand up from an armless straight chair?

Acostarse y levantarse de la cama?

Get in and out of bed?

Comer

Eating

Cortar su comida con cuchillo y tenedor?

Cut your food with a knife and fork?

Levantar hasta su boca una taza o vaso lleno?

Lift a full cup or glass to your mouth?

Caminar

Walking

Caminar al aire libre en terreno plano?

Walk outdoors on flat ground?

Subir cinco escalones (gradas)?

Climb up five steps?

Higiene

Hygiene

Bañarse y secarse todo el cuerpo?

Wash and dry your entire body?

Bañarse en la tina del baño? (bañadera o bañera)?

Take a tub bath?

Sentarse y levantarse del inodoro (excusado)?

Get on and off the toilet?

Alcanzar

Reach

Alcanzar y bajar algo que pese 5 libras, de una altura sobre su cabeza?

Reach and get down a 5 pound object from just above your head?

Agacharse para recoger ropa del piso?

Bend down and pick up clothing from the floor?

Agarrar

Grip

Abrir la puerta del auto (carro)?

Open car doors?

Abrir frascos que han sido abiertos?

Open jars which have been previously opened?

Abrir y cerrar las lavves del agua (los grífos)?

Turn faucets on and off?

Actividades

Activities

Haccer sus compras?

Run errands and shop?

Subir y bajar del auto (carro)?

Get in and out of a car?

Hacer sus tareas domésticas (quehaceres) o trabajar en el jardín?

Do chores such as vacuuming and yard work?

Por favor marque cualquier ayuda o aparato que Ud. usa regularmente para estas actividades:

Please check any aids or devices that you usually use for any of these activities:

Bastón

Cane

Aparato para caminar (andador)

Walker

Muletas

Crutches

Silla de ruedas

Wheelchair

Aparatos o instrumentos para vestirse

Devices used for dressing

Utensilios hechos especialmente para

Built up or special utensils

Silla hecha especialmente para Ud.

Special or built up chair

Aparatos con extensión para alcanzar

Long-handled appliances for bathroom

Asiento elevado para el inodoro/excusado

Raised toilet seat

Abridor de frascos que han sido anteriormente abiertos

Jar opener for jars previously opened

Asiento para tina de baño (bañera)

Bathtub seat

Aparatos con extension para el baño

Long-handled appliances for reach

Agarradera para la tina del baño (bañera)

Bathtub bar

Otro (especifíque)_____

*Other (specify)*_____

Por favor marque las categorias para las cuales necesita regularmente ayuda de otra persona:

Please check any categories for which you usually need help from another person:

Vestirese y arreglarse

Dressing and grooming

Comer

Eating

Levantarse

Arising

Caminar

Walking

Higiene	Agarrar y abrir cosas
Hygiene	*Gripping and opening things*
Alcanzar	Hacer compras (quehaceres) y
Reach	tareas dometicas
	Errands and chores

This is the Stanformd health Assessment Questionnaire (HAQ) Disability Scale

Score by category, choosing the highest score for any of the questinos within that category

0= sin singuna dificultad (without any difficulty)

1=con alguna dificultad (with some difficulty)

2- con mucha dificultad (with much difficulty)

3= non puedo hacerlo (I cannot do it)

Each of the eight categories is scored by this basic rule; however, if any AIDS or DEVICES and/or HELP FROM ANOTHER PERSON are checked for that category, the score is adjusted upward to 2. If the basic score is already 2 or 3, the score remains unchanged.

The categories and their respective aids and devices are as follows:

Vestirse y arreglarse: aparatos para vestirse

Levantarse: silla especial

Comer: utensilios especiales

Caminar: bastón, aparato para caminar (andador), muletas, silla de ruedas

Higiene: asiento elevado para el inodoro, asiento para la tina de baño, agarradera para la tina de baño, aparatos con extensión para el baño

Alcanzar: aparatos con extensión para alcanzar

agarrar: abridor de frascos

If "other" aid or device is written in, choose the appropriate category to adjust the score. If a clear category cannot be determined, count the device but do not adjust the score of any category.

The scale score is the mean of these eight categories' scores. A lower score means less disability.

The aids and help categories are tallied separately. These are individual items that are not part of the disability score.

Scoring, summarized in Gonzalez et al., is as follows:

Score by category, choosing the highest score for any of the questions within that category, as follows:

0= sin ninguna dificultad (without difficulty)

1= con alguna dificultad (with some difficulty)

2= con mucha dificultad (with much difficulty)

3 = no puedo hacerlo (I cannot do it)

Each of the eight categories is scored by this basic rule. If, however, any *aids or devices* and/or *help from another person* are checked for that category, the score is adjusted upward to 2. If the basic score is already 2 or 3, the score remains unchanged.

The categories and their respective aids and devices are as follows:

Vestirese y arreglarse: aparatos para vestirse

Levantarse: silla especial

Comer: utensilios especiales

Caminar: bastón, aparatos para caminar (andador), muletas, silla de ruedas

Higiene: asiento elevado para el inodoro, asiento para la tina de baño, agarradera para la tina de baño, aparatos con extenisión para el baño

Alcanzar: aparatos con extensión para alcanzar

Agarrar: abridor de frascos

If "other" aid or device is written in, choose the appropriate category to adjust the score. If a clear category cannot be determined, count the device but do not adjust the score of any category.

The scale score is the mean of these eight categories' scores. A lower score means less disability.

The aids and help categories are tallied separately. These are individual items that are not part of the disability score.

Table 7: Modified Arthritis Self Efficacy Scale (Long K, Shoor S, Holman HR 1989).

Confianza al Hacer Cosas

Confidence About Doing Things

En las siguientes preguntas nos gustaría saber cómo el afecta el dolor de la artritis y qué piensa usted de sus habilidades para controlar su artritis. En cada una de las siguientes preguntas, por favor marque el número que mejor corresponda al nivel de seguridad que siente en este momento de que puede realizar las siguientes actividades.

In the following questions we would like to know how your arthritis pain affects you and what you think about your abilities to control your arthritis. In each of the following questions, please mark the one number that corresponds best to your level of certainty that you can now perform the following activities.

(Insert this scale after each question.)

|---------|---------|---------|---------|---------|---------|---------|---------|---------|

1 2 3 4 5 6 7 8 9 10

Muy inseguro/a — Muy seguro/a

Very uncertain — *Very certain*

1. ¿Qué tan seguro(a) se siente usted de poder reducir bastante su dolor?

How certain are you that you can decrease your pain <u>quite a bit?</u>

2. ¿Qué tan seguro(a) se siente usted de poder evitar que el dolor de la artritis no le permita dormir?

How certain are you that you can keep arthritis pain from interfering with your sleep?

3. ¿Qué tan seguro(a) se siente usted de poder evitar que el dolor de la artritis no le deje hacer las cosas que quiere hacer?

How confident are you that you can keep the physical discomfort of your arthritis pain from interfering with the things you want to do?

4. ¿Qué tan seguro(a) se siente usted de poder regular su actividad para mantenerse activo(a) sin emperorar (agravar) su artritis?

How certain are e you that you can regulate your activity so as to be active without aggravating your arthritis?

5. ¿Que tan seguro(a) se siente usted de poder evitar que la fatiga (el cansancio), debido a su artritis, no le permita hacer las cosdas que usted quiere hacer?

How confident are you that you can keep the fatigue caused by your disease from interfering with the things you want to do?

6. ¿Qué tan seguro(a) se siente usted de poder ayduarse a si mismo(a) a sentirse mejor si se siente triste?

How certain are you that you can do something to help yourself feel better if you are feeling blue?

7. ¿Comparándose con otras personas con artritis como la suya, ¿qué tan seguro(a) se siente usted de poder sobrellevar el dolor de artritis durante sus actividades diarias?

As compared with other people with artritis like yours, how certain are you that you can manage arthritis pain during your daily activities?

8. ¿Qué tan seguro(a) se siente usted do poder sobrellevar la frustración debido a su artritis?

How certain are you that you can deal with the frustration of arthritis?

The score is the mean of these eight items, which include six of the original Self Efficacy Pain and Other Symptoms scales and two new additional items, #3 and #5.

The score is the mean of these 8 items, which include six of the original Self-Efficacy Pain and Other Symptoms scales and two new additional items, #3 and #5. Please note that the SE Function subscale was not used in this validation study.

Table 8: MEDICAL OUTCOME STUDY (MOS) Health Perceptions Scale (Ware, Nelson, Sherbourne, Stewart 1992). Single item only, with score represented by the number corresponding to self-reported health.

Salud General

General Health

1. Generalmente, Ud. diría que su salud es (Por favor, marque **solamente una** respuesta)

In general, would you say your health is: (Please check only one response.)

Excelente */Excellent*.....1

Muy Buena */Very Good*.....2

Buena */Good*.....3

Regular */Fair*.....4

Mala */Poor*.....5

Single item only, which is part of the MEDICAL OUTCOME STUDY (MOS) Health Perceptions Scale

Table 9: This is the MEDICAL OUTCOME STUDY (MOS) Pain Severity Scale, modified slightly (Gonzalez 1995). The first 5 items are first transformed to a 0-100 scale. The mean of the 5 transformed items is then calculated. Lower scores mean less pain. From Sherbourne (1992).

Dolor

Pain

1. Por favor marque en la escala el número que mejor describa la intensidad de su dolor en **PROMEDIO** durante la **última semana:**

*Please circle the **one** number that best describes your pain on the **average*** over the **past week:**

									XX
								XX	XX
							XX	XX	XX
						XX	XX	XX	XX
					XX	XX	XX	XX	XX
				XX	XX	XX	XX	XX	XX
			XX	XX	XX	XX	XX	XX	XX
		XX	XX	XX	XX	XX	XX	XX	XX
		XX	XX	XX	XX	XX	XX	XX	XX
	XX	XX	XX	XX	XX	XX	XX	XX	XX

0	1	2	3	4	5	6	7	8	9	10
Ningún dolor (*No Pain)*										El dolor más fuerte imaginable (*Pain as bad as it could be*)

2. Por favor marque en la escala el número que mejor describa la intensidad de su **PEOR** dolor durante la **última semana:**

*Please circle the **one** number that best describes your pain at its **worst** over the past **week:***

										XX
									XX	XX
								XX	XX	XX
							XX	XX	XX	XX
						XX	XX	XX	XX	XX
					XX	XX	XX	XX	XX	XX
				XX	XX	XX	XX	XX	XX	XX
			XX	XX	XX	XX	XX	XX	XX	XX
		XX	XX	XX	XX	XX	XX	XX	XX	XX
	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX

XX	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
0	1	2	3	4	5	6	7	8	9	10

Ningún dolor (*No pain*) El dolor más fuerte imaginable (*Pain as bad as it could be*)

3. Durante la **última semana**, ¿con qué freciemcoa (o qué tan seguido) ha tenido Ud. dolor? (Si ha tenido distintos tipos de dolor, conteste describiendo sus sentimientos de dolor en general.)

*During the **past week***, how often have you had pain? (If you have had more than one type of pain, answer by describing your feelings of pain *in general.*)

Nunca/*Never*..... 1

Una o dos veces/*Once or twice*..... 2

Pocas veces/*A few times*..... 3

Seguido (a menudo)/ *Very often*..... 4

Muy seguido (muy a menudo)/*Very often*..... 5

Todos los días o casí todos los días..... 6

4. ¿Cómo describiría usted su **dolor del cuerpo** durante la última semana?

How much bodily pain have you generally had during the past week?

Ninguno/*None* 1

Muy leve (muy suave, muy ligero)/*Very mild* 2

Leve (suave, ligero)/*Mild* 3

Moderado/*Moderate* 4

Severo (fuerte)/*Severe* 5

Muy severo (muy fuerte)/*Very severe* 6

5. Cuando tuvo dolor durante la **última semana**, ¿cuánto tiempo duró normalmente? (Si ha tenído distintos tipos de dolor, conteste describiendo sus sentimientos de dolor en general.)

When you had paoin during the ***past week***, how long did it usually last? (If you had more than one type of pain, answer by describing your feelings of pain in general.)

No tuve ninguno/*Didn't have any* 1

Unos pocos minutos/*A few minutes* 2

De unos minutos hastauna hora/*Several minutes to an hour* 3

Varias horas/*Several hours* 4

Un día o dos/*A day or two* 5

Más de dos días/*More than two days* 6

Anthropological Questionnaire (Step 6)

I developed my own questionnaire to supplement unstructured open ended anthropological interviewing which was performed with all subjects. This questionnaire consisted of ten questions designed to draw out subjects on issues related to their life experiences and cultural expectations of aging. This questionnaire is reproduced in Table 10. In addition to the formal questionnaire data described above, a specific effort was made to explore various themes in interviewing subjects. These included the importance of *hot and cold* belief systems of disease causation, and also use of alternative healers and criteria for choosing alternative healers.

Table 10: Anthropological Questionnaire

Question Number	Content
1	What was a typical day in your life like as a child, a middle-aged person, and as an old person?
2	What was the happiest age of your life?
3	What do you think is the cause of growing old?
4	What causes arthritis?
5	How do you decide whether to see a physician or an alternative healer such as a curandero or huesero?
6	What illness do you fear the most?
7	Is it difficult to grow old?
8	What was the most memorable experience of your life?
9	What do you look forward to in life?
10	Are you happy with your life at present?

Perform traditional anthropological participant observation (step 7)

As part of my effort to approach research in a methodologically precise manner, I have emphasized in detail the mechanism of selecting, interviewing, and examining subjects, along with questionnaire techniques (standardized and anthropological) and use of radiographs and laboratory tests. This does not by any means detract from the importance of traditional anthropological participant observation in this research project. I sought to observe traditional healers, participate in being treated by them (Figure 3), and to spend time in homes, streets, markets, and churches observing and participating in village life. Such qualitative aspects of the fieldwork experience do not easily lend themselves to methodological description, but will emerge in subsequent chapters.

Figure 3. Participant observation of a bonesetter adjusting the cervical spine (photograph by Camille Castro).

Chapter 3: Physical Examinations, Radiographs, and Laboratory Data

Tzintzuntzeños were in poor overall health, based on results of physical examinations I performed. Health status is defined here in a consciously etic sense of multi-organ system objective pathology as documented by physical examination, radiographs, and laboratory tests. In emic terms many informants considered themselves to be in "fair" health, in spite of findings ranging from advanced cataracts to cirrhosis to heart failure.

Most subjects considered themselves to be in at least fair health, as we will see in the questionnaire analysis. Before embarking on that discussion, however, I believe it is imperative that we discuss in objective biomedical terms exactly what pathology was observed. All organ systems were involved, and the physical examination was comprehensive and not limited to musculoskeletal complaints. Breast, pelvic, and rectal examinations were omitted, as they were deemed too intrusive, especially given the examination environment of a crowded household with many onlookers (Figure 4). This probably resulted in an under-diagnosis of breast pathology, benign prostatic hyperplasia, cervical metaplasia, and other pathology. One subject with an obstructive prostate carcinoma underwent a rectal examination in a local hospital before being treated for acute urosepsis. He was found to have a large obstructing carcinomatous mass, and transferred to a regional hospital near Patzcuaro for catheter drainage, intravenous fluids, and antibiotic therapy.

Figure 4. Examining an elderly study participant in a crowded household (Photo by Camille Castro).

The case of Joséita Chavez, is illustrative of the range of pathology typically observed, and the manner in which observations were recorded, dictated, and ultimately transcribed to maintain the highest level of accuracy possible in recording disease prevalence. The following is a transcription from field observations. Appendix 2 is a medical glossary for terms which may not be immediately apparent to some readers.

History and Physical Examination

CHIEF COMPLAINT: Knee pain

History of Present Illness: 68 year female with history of two falls on the right and left knee. She complains of pain in both knees. She has a scar on her right leg from previous falls. She has morning stiffness lasting 30 minutes. The patient also complains of some sleepiness, and notes decreased sensation of the right hand which awakens her at night. She shakes her hand and this relieves the numbness. She also complains of localized back pain. She has a history of chronic nasal discharge which resolved recently, but still has sore throat with cough productive of scant sputum. Bilateral varicose veins also trouble this elderly woman.

PAST MEDICAL HISTORY: Negative for hypertension, diabetes, tuberculosis, cancer.

PAST SURGICAL HISTORY: Negative. G6, P6, A0 (6 pregnancies, 6 deliveries, no abortions or miscarriages).

MEDICATIONS: None

ALLERGIES: Penicillin

FAMILY HISTORY: Negative for rheumatological disease

PSYCHOSOCIAL HISTORY: Does not smoke or drink. Proprietor of a local store. She sells pottery which her family makes in a kiln, as well as straw artifacts for tourists. She is not involved in the actual production of the pottery. No history of depression.

REVIEW OF SYSTEMS: Negative except as described above.

PHYSICAL EXAMINATION:

GENERAL: Obese elderly female in no acute distress

VITAL SIGNS: BP 118/68, Pulse 70, Respiration 12/minute

HEENT: Left eye pterygium. Bilateral arcus senilis. Edentulous. Oropharynx injected with white plaque-like exudates. Sinuses non-tender with good transillumination. Turbinates without excessive secretions or inflammation.

NECK: No jugular venous distention, no thyromegaly. Shotty anterior adenopathy. No meningismus.

CV: Regular rate and rhythm, S1, S2, no S3 or S4, without murmur, rub, gallop

LUNGS: Coarse bibasilar rhonchi to auscultation with clear apices and no dullness to percussion, E to A changes, or fremitus

ABDOMEN: Obese, non-tender, with no organomegaly and normoactive bowel sounds.

EXTREMITIES: Hands without synovitis, nodules, interosseous wasting, or other deformities. Left distal radius deformity consistent with prior Colles' fracture left knee cool without effusion with anterior cruiciate ligament laxity by Lachman's test and no other ligamentous laxity noted. Minimal anserine bursa tenderness right knee. Bilateral tibial osteophytes by palpation with right knee anterior

abrasions and scars with diffuse crepitus and full range of motion. Negative McMurray's test bilaterally. No enthesopathy.

BACK: Decreased lordotic curvature without paravertebral spasm. Minimal paralumbar tenderness. Negative straight leg raising. Negative Patrick test.

SKIN: Facial elastosis and irregular pigmentation

NEUROLOGICAL High frequency hearing loss, bilateral, sensorineural by "rustle" test. Remaining cranial nerves (II through XII) grossly intact. Deep tendon reflexes 2+ and symmetric in upper and lower extremities, Babinski's reflex absent, Romberg test negative, no intention tremor, strength and sensation intact. Right hand positive Phalen's maneuver and negative Tinel's test.

Impression:

1) Streptococcal pharyngitis
2) Purulent bronchitis
3) Sinusitis, resolved
4) Status post left radius Colles' fracture
5) Osteoarthritis of the knees, bilateral, with left knee ligamentous laxity.
6) Osteoarthritis of lumbosacral spine
7) Right carpal tunnel syndrome
8) Edentulous
9) Pterygium
10) Arcus senilis
11) High frequency hearing loss

12) Facial elastosis due to solar damage

13) Obesity

14) Anserine bursitis, left knee.

Plan

1) Trimethoprim//sulfamethoxazole twice a day for 5 days.

Ideally this woman should have been treated with erythromycin, an alternative to penicillin which attacks streptococcal organisms causing pharyngitis and also treats *Mycoplasma* and other atypical bacteria causing bronchitis. Trimethoprim/Sulfamethoxazole, a combination of two antibiotics, is not ideal but was all I had available in my bag. Similary, a 5 day course is sub-optimal, and runs the risk of selecting for resistant infectious organisms. On balance, however, it seemed the best option at the time for a woman with bronchitis and pharyngitis whom I had to treat. Perhaps in retrospect I might have sent the woman to Quiroga for antibiotics, but this did not seem practical at the time given her reluctance to travel. These dilemmas highlight the difficulty of doing field work on a shoe string budget away from the conveniences of a modern medical setting.

Several cases were selected for radiographs and laboratory tests. Before turning to the next chapter's summary of the health status of the 50 informants, I will review the radiographic and laboratory tests undertaken in some subjects, and their significance for the health of Tzintzuntzan's elderly community.

Radiographs

Summaries of the major condition being evaluated for each subject, expressed in terms of the *differential diagnoses* of a condition, are summarized in Table 11. The purpose of presenting these data is to explain my reasoning in obtaining specific radiographs. Table 12 reveals the conditions diagnosed once the films were obtained. I reviewed the films, and impressions confirmed with other sources, as noted in the acknowledgment section. The summary data above represent the overall impression emerging from these combined opinions. Few discrepancies emerged. Perhaps the only one was Francisco Geraldo, whom I considered to have features of hypertrophic pulmonary osteoarthropathy, but who was felt by four of seven rheumatologists at U.C.S.F. to not have this condition.

Table 11: Patients studied radiographically: Differential diagnosis and reasons for specific studies ordered. OA=osteoarthritis, LS=lumbosacral, C=cervical, T=thoracic, CA=cancer.

Patient	ID #	Differential Diagnoses	Reason for x-rays, labs
Leticia Cortez	4495	OA hands and LS spine, osteoporosis thoracic spine, rotator cuff tendinitis	confirm impression, rule out hyperparathyroidism, inflammatory arthritis
Nicolas Chavalas	1827	OA hands, shoulders, feet	Confirm impression, rule out inflammatory arthritis
Jaime Montañez	2377	Possible RA hands, OA LS spine, hips, knees	Confirm with radiographs, RF
Linda Reposa	1774	Osteoporosis with compression fractures	Confirm, rule out hyperparathyroidism
Francisco Geraldo	3910	HPOA hands, OA knees and LS, chronic bronchitis or lung CA	Confirm impression and rule out treatable malignancy or bronchitis

Patient	ID#	Differential Diagnosis	Reason for x-ray's, labs
Alfonso Cataldo	0950	OA hands, C spine, knees, osteoporosis, T spine with compression fractures	Confirm impression

Table 12: Radiographic findings of patients studied. DIP's = distal interphalangeal joints, CMC's = carpometacarpal joints, AC = acromioclavicular joints, DDD = degenerative disc disease, CXR = chest radiograph, COPD = chronic obstructive pulmonary disease.

Patient	Hands	Feet	Back	Other
Gonzalez, Antonio	RA, advanced	RA, advanced		Knees reveal minimal RA changes
Vegas, Monica	RA, advanced			
Cortez, Leticia	OA involving DIP's, CMC's		LS spine OA, SI joint OA	Right shoulder AC joint OA, prominent supraspinatus insertion consistent with impingement syndrome
Chavalas, Nicolas	OA with marked involvement	OA of MTP's		Possible loose body in shoulder

	of IP of thumbs, DIP's			
Cataldo, Alfonso	OA with osteophytosis and DIP narrowing	Subchondral cysts and joint space narrowing consistent with OA. Possible osteonecrosis	Thoracic spine osteopenia and compression fractures. Cervical spine advanced OA	
Reposa, Linda	Mild OA of DIP's		Thoracic spine osteopenia and compression fractures. Cervical spine osteoarthritis	
Geraldo, Francisco	Osteoarthritis of DIP's		LS spine OA, DDD with	Osteopenia, kyphosis, and

		osteopenia and L5 compression fracture	increased AP chest diameter on CXR consistent with COPD and osteoporosis
Gomez, Jorge		LS spine OA with scoliosis	
Villarreal, Guillermina			Trimalleolar fracture of distal tibia
Montañez, Jaime	PIP, DIP subluxations and erosions consistent with EOA	LS spine OA with L5-S1 DDD	Knee osteophytosis consistent with OA, tricompartmental

Labs

Tables 13 through 22 outline the laboratory test results on the patients selected for analysis of blood and urine. These data derive, as mentioned above, from patients with classic rheumatological conditions. Five patients had non-rheumatoid arthritic problems, and derived from the randomized sample of 50 initially studied. Two additional subjects, Antonio Gonzalez and Monica Guillermina Vegas, were patients with classic rheumatoid arthritis selected for evaluation because of the importance of rheumatoid arthritis as the most highly prevalent crippling arthritis in the United States.

A detailed discussion of the specific laboratory tests will serve to alert us to trends in the health evaluation of these key informants. This in turn will serve as a jumping off point for discussing cultural factors which influence disease progression. The interpretation of these parameters is derived largely from major internal medicine textbooks (Wilson et al. 1994; Wyngaarden and Smith 1988; Bennett, Plum 1994). For each test additional specific articles may be cited to refine the analysis.

Laboratory tests ideally should be evaluated for *reproducibility*, or the precision or inherent error due to equipment or human imperfection, and for *accuracy* , or obtaining a value which reflects the true level being measured (Ravel 1995:3). In order to run tests rapidly and without deterioration of the blood samples due to storage or heat, I ran laboratory tests in a medical technology laboratory in an adjoining town, Quiroga. The technician was a licensed medical technologist, recognized by practicing physicians in the

community. I believe that reproducibility and accuracy of laboratory tests was adequate. A lack of random variation in one lab test (mean corpuscular volume), however, leads me to be suspect that quality control measures in place in United States were lacking.

Normal range for a blood or urine test is defined as within two standard deviations of the normal value, placing 95% of subjects within the normal range (Ravel 1995:3). This is somewhat arbitrary, as it results in five percent of people being surveyed being defined as abnormal with respect to any laboratory value. Increasing the normal range to three standard deviations from the norm would increase the *specificity* of an abnormal test (i.e., increase the chance that an abnormal lab value is a significant indicator of disease), but at the cost of decreasing the *sensitivity* of the test (i.e., decrease the chance of finding disease when present by a screening laboratory test). Thus, the decision to make two standard deviations the cut-off for defining "normal" is a compromise between sensitivity and specificity (Ravel 1995:3). For these reasons "reference range" is preferable to "normal range," as the interpretation of a test requires a clinical correlation, and as "normal" people may happen to have isolated abnormal tests (Ravel 1995:3). This is particularly true if many tests are ordered on many people, increasing the likelihood of picking up people in the 2.5% of the population above the "normal" range, and 2.5% of the population below the "normal" range for at least one test. For example, if a standard 12 test chemistry panel is ordered in a typical outpatient laboratory blood test, 46% of people tested will have at least one result fall outside of the normal range (Ravel 1995:5). Such tests are referred to as "false positives" if the patient is healthy with an abnormal

test result, and "false negatives" ensue if a test is reported as normal in the setting of a health problem which one would expect to cause an abnormal value.

In light of these issues, why test blood and urine at all? The reason is simple: in spite of the shortcomings of falsely abnormal tests being picked up, a standard screening test of blood for complete blood count and serum chemistries, and a urinalysis, can yield valuable insights into the health of a population. By selectively screening only seven patients with known rheumatological diseases, I intentionally investigated the blood tests of a cohort of individuals with increased possibility of having abnormalities, such as the anemia seen in chronic diseases. By intentionally checking blood values on a group of sick individuals, I increased the *predictive value* of an abnormal test such as anemia. Why is this?

The predictive value of an abnormal test depends on the prevalence of a disease state. Thus if a test has a sensitivity of 95%, only 1.9% of patients with an abnormal result will have a disease if the prevalence of the disease is only 1 in 1,000, but 68% of patients with an abnormal laboratory result will have disease if the prevalence of the underlying disease is 10% (Ravel1995:1). In other words, the astute clinician will order screening tests if he thinks that they are likely to yield abnormal results which may be meaningful, by only ordering those tests on individuals in whom there is a high likelihood of suspecting that an abnormality will be present.

A discussion of the high number of abnormal laboratory results seen in the elderly Tzintzuntzeños we examined will illustrate this point. Let us now turn to a discussion of

the individual laboratory results observed in this population to illustrate how laboratory tests can be a useful part of the puzzle of sorting out the health of a population, and inferring cultural issues which might impact that health. Normal values for laboratory tests are derived from the University of California Clinical Laboratory Manual (UCSF 1996), with a few derived from the John Muir Medical Center laboratory manual where UCSF's values were not appropriate or available (John Muir Medical Center 1996).

Complete Blood Counts

The complete blood count (CBC) represents an examination of a peripheral blood smear, stained with a process known as "Wright staining," and mounted on a glass slide. It is one of the most important tests in clinical medicine, allowing identification of anemia, polycythemia, infection, autoimmune disorders, and bleeding disorders. Often the findings are indicative of a general disease category, such as the low hemoglobin and hematocrit values seen in anemia. More specialized tests, such as a thick smear evaluation for the protozoal organism *Plasmodium falciparum* which causes malaria, allow specific diagnoses to be made. Internists, family practitioners, surgeons, and hematologists/oncologists rely on complete blood counts daily in evaluating patients, due to the wide range of data one can acquire from a couple milliliters of blood (Hillman, Ault 1995; Hoffman et al. 1995, Jandl 1996). Hematologists tend to reduce much of physiology to its reflection in the CBC:

> "Blood is a complex suspension of specialized cells, most of which are swept along throughout their limited lives by the streaming plasma. As they plunge

through the bloodstream, blood cells supply most of the basic energy, nourishment, host defense, and custodial services needed to sustain the life of the organism. This surging, cell-filled liquid is a metaphor for life itself" (Jandl 1996:1).

The CBC measures major cellular components of blood. In addition, there are myriad chemical compounds such as clotting factors (Furie and Furie 1995), fibrinolytic agents which dissolve clots (Lijnen, Collen 1995), immunoglobulins (French 1997), cytokines, interleukins and growth factors (Rossenwasser, Borish 1997), complement proteins (Ghebrehiwet 1997), and lipid mediators resulting from the oxygenation of fatty acids known as leukotrienes and prostanoids (Nasser, Lee 1997). These compounds, and others, are critical in mediating both the homeostatic mechanisms of good health and the inflammation of disease, though they are not easily measured in the field. I mention them to point out that the CBC is critical, but not the complete story when it comes to understanding blood. Indeed, to be a specialist in blood associated diseases, one must complete a fellowship lasting two years after a three year internal medicine residency. Hematology textbooks explore all of these compounds in detail (Kaplan 1997, Frank et al. 1995).

The autoiummune disease which causes arthritis in the elderly frequently reveal abnormalities on complete blood count. For example, the American College of Rheumatology revised criteria for the diagnosis of systemic lupus erythematosus include hematological disorders among the eleven listed parameters. Included are a) hemolytic

anemia with reticulocytosis, b) leukopenia (WBC count less than 4,000/mm3 on two or more occasions), c) lymphopenia (lymphocyte count less than 1,500/mm3 on two or more occasions), and d) thrombocytopenia (platelet count less than 100,000/mm3 in the absence of drugs known to depress platelet counts), along with non-hematological parameters such as nephritis and central nervous system disease (Schur 1997:4; Wallace, Metzger 1997:1320; Lahita 1997:1030). All of these are readily available from a few drops of venous blood, and the entire complete blood count is now performed by automated machines or by directly inspecting the cells under a microscope within a few moments.

The erythrocyte sedimentation rate (ESR), a non-specific test for inflammation, is another critically important test in rheumatology. It is elevated in inflammatory states, such as active rheumatoid arthritis and rheumatic fevers. Some conditions, such as sickle cell anemia, can cause abnormally low sedimentation rates. It is another inexpensive test which is derived from the CBC and which allows evaluation of the health status of the patient. Let us turn to the more complete list of the CBC values studied among the patients of Tzintzuntzan, and we will see that information on the health of these inhabitants emerges from these data. Table 13 summarizes the CBC results for subjects studied, including white blood cell count (WBC), red blood cell count (RBC), hemoglobin level (Hgb), hematocrit (HCT), erythrocyte volume (Evol), platelet count (PLT), and erythrocyte sedimentation rate (ESR). Table 14 summarizes the same data for two rheumatoid arthritis patients studied, both of whom fall outside of the randomly selected sample. These individual tests will be further discussed below.

Table 13: CBC results (excluding differential counts) random sample members with rheumatological diseases. WBC= white blood cell count in cells/mm^3, RBC = red blood count in mm^3, HgB = Hemoglobin concentration in grams/deciliter, HCT = Hematocrit, E.Vol. = Mean corpuscular erythrocyte volume, PLTs = platelet count per mm^3, ESR = erythrocyte sedimentation rate by Wintrobe Method (mm/h). See text for additional discussion of significance.

Patient	WBC	RBC	Hgb	HCT	EVol	PLTs	ESR
Cortez, Leticia	9,700	9,100,000	12.7	38	95	279,000	2
Chavalas, Nicolas	6,500	4,700,000	14.6	45	95	168,000	4
Geraldo, Francisco	7,700	4,900,000	15.6	47	95	172,000	2
Montañez, Jaime	8,000	4,900,000	14.8	47	95	295,000	2
Reposa, Linda	7,600	4,600,000	14.4	44	95	200,000	3

Table 14: CBC results (excluding differential counts) two classic rheumatoids. Key is as described in Table 13.

Subject	WBC	RBC	Hgb	HCT	EVol	PLTs	ESR
Gonzalez, Antonio	5,000	4,710,000	14.0	45	95	125,000	18
Vegas, Monica	9,900	4,210,000	12.0	40	95	187,000	Not done

White Blood Cell Count (normal levels 3.4 - 10.0 x 10^9 per liter of blood)

White blood cells (WBCs) are immunologically competent cells which fight infection and mediate inflammatory responses. There are different kinds of white blood cells, reflected in what is called the *differential white blood cell count*, which was obtained on all of the elderly subjects tested for this study. Increase in the overall level of WBCs may occur in various diseases including infections and malignancies. A decreased WBC count may be seen in primary disorders of leukocyte function or in response to diseases or toxins (Coates, Baehner 1995). The specific type of WBC found to have high or low absolute or relative values assists the clinician in sorting out an abnormal CBC. The major types are polymorphonuclear leukocytes (PMNs), lymphocytes, monocytes, eosinophils, and basophils. The cell type reflects specialized functional characteristics, and aberrations from the normal distribution can reflect disease states (Coates, Baehner 1995:769). The differential white blood cell count for the elderly Tzintzuntzeños studied is presented in tables 15 and 16.

Table 15: Differential white blood count values. N= neutrophils, Eo=eosinophils, Bas=basophils, L=lymphocytes, M=monocytes, Bnd=bands, Seg=segmented polymorphonuclear leukocytes, Juv=juvenile white blood cells, My=myelocytes, Abn=abnormal white blood cells.

Subject	N	Eo	Bas	L	M	Bnd	Seg	Juv	My	Abn
Cortez, Leticia	79	1	0	19	1	0	79	0	0	0
Reposa, Linda	63	5	0	31	1	1	62	0	0	0
Chavalas, Nicolas	48	8	0	42	2	0	48	0	0	0
Geraldo, Francisco	76	5	0	19	0	0	76	0	0	0
Montañez, Jaime	69	3	0	28	0	1	68	0	0	0

Table 16: Differential white blood count values rheumatoid arthritis patients. Key is as described in Table 15.

Subject	N	Eo	Bas	L	M	Bnd	Seg	Juv	My	Abn
Gonzalez, Antonio	59	1	0	38	2	0	59	0	0	0
Vegas, Monica	56	9	0	34	0	1	55	0	0	0

None of the CBCs revealed high white blood cell counts. This argues against acute viral or bacterial infection in the subjects studied. This must be stated cautiously, however, as elderly patients are sometimes immunologically compromised on the basis of age and may not mount a high white blood cell count in response to infection. The differential white blood cell count will give us more insight than the absolute level of white blood cells. Individual components of the differential white blood cell count will now be discussed, along with implications for understanding the health of the community. We will find a pattern suggestive of chronic disease, parasitism, and perhaps increased resistance to acute viral illnesses.

Neutrophils and Bands (Normal 40 to 70 percent of white blood cells for neutrophils, 0-3 percent for bands)

Inflammation is the most frequent condition associated with neutrophilic leukocytosis (Ravel 1995:59). As mentioned earlier, neutrophils function primarily through engulfing invading microorganisms by enveloping them in moving arms called *pseudopodia*, subsequently killing the invaders by discharging toxic cytoplasmic granules (Smellen 1995:779)

The reference neutrophil percentage among white blood cells is between 40 and 70 percent of the total. Among our subjects, Leticia Cortez was found to have a 79% neutrophil count. This is suggestive of acute bacterial infection. In fact, I treated her for an acute urinary tract infection. Her differential CBC count also showed a low percentage of *bands*. These are immature neutrophils released from the bone marrow into

the circulation in response to an infection, so called because they typically exhibit a cell nucleus which is not segmented yet, consistent with lack of maturity, and which thus appears as a solid band of dense material when viewed on Wright stain, rather than as a series of clumps of smaller nuclear components (Bainton 1995). The low band count argues against a fulminant bacterial infection causing acute sepsis.

Francisco Geraldo also had increased percentage of segmented polymorphonuclear leukocytes, at 76%, consistent with infection. In fact, on examination he had evidence of chronic bronchitis, and treatment with a corticosteroid inhalation medicine (Azmacort) ameliorated his chronic bronchitis to some extent.

Nicolas Chavalas had a relatively low PMN percentage at 48%. He had no evidence of acute infection. The reason may have been a relative increase in eosinophils, discussed below, with a corresponding decrease in the percentage of neutrophils.

In summary, the differential white blood cell counts of selected elderly Tzintzuntzeños suggests a fairly high prevalence of neutrophilia, consistent with chronic bacterial infections. Pulmonary and urinary tract infections were documented. This is corroborative evidence in support of poor overall health among the elderly, as few older patients typically have chronic infections in the United States, where heart disease and cancer are the principal causes of death. These patients were chosen for the presence of arthritic disorders, however, which may predispose this subset of subjects to infections, a potential confounding variable, though this seems unlikely in a cohort with non-

inflammatory arthritic processes that do not typically cause significant immunocompromise.

Monocytes (Normal 2-10 percent of white blood cells)

These cells are mononuclear (one nuclear center), and have the potential to develop into macrophages which envelop invading organisms in a manner similar to that seen with PMNs (Ganz, Lehrer 1995:875-878). Their levels typically hover around 10 percent or lower. Levels were 2% or less in subjects tested. This is a bit lower than one would anticipate.

The most likely explanation is chronicity of bacterial infection, or displacement by other cell types such as eosinophils, which will be discussed below. As mentioned in the discussion of polymorphonuclear leukocytes, we observed high neutrophil counts in Cortez and Geraldo, without increases in bands, suggestive of chronic rather than acute bacterial infections of the bladder and lungs, respectively. The low monocyte count tends to support this observation, that the elderly of Tzintzuntzan have chronic bacterial and perhaps parasitic infections, but fewer acute infections. It may again reflect a history of multiple.

antigen exposures in childhood with increased resistance to infection in old age, though this is a somewhat speculative interpretation.

Lymphocytes (normal 20-40 percent of white blood cells)

Lymphocytes function to secrete immunoglobulins to fight infections. Immunoglobulins *opsonize* bacteria, a process of coating the outside wall of the cell, rendering them recognizable to PMNs by bonding to their surfaces. This facilitates phagocytosis, killing the invaders. Normal lymphocyte counts range from around fifteen to 40 percent of the peripheral smear cells. Immunoglobulin production is also critical to fighting viral infections such as poliomyelitis and hepatitis, and vaccines to fight these conditions typically work by stimulating immunoglobulin production by lymphocytes.

The data from Tzintzuntzan reveal fairly unimpressive lymphocyte counts. This finding argues against acute lymphocytic leukemias (ALL). One is left with the impression of an elderly population with relatively few acute viral illnesses. Why?

One explanation may have to do with poor public sanitation and crowding. Concepts of personal space are culturally mediated, and Tzintzuntzeños appear to congregate regularly in small houses and courtyards. Such an environment favors exposure to most endemic viruses repeatedly in the younger years. Older patients may be spared from recurrent epidemics due to these exposures and their memory B cell lymphocyte function. In other words, the elderly may be resistent to many viral illnesses by virtue of prior exposures. Lines of evidence supporting this observation include observed clinical findings and discussions with the physicians who served in the *Centro de Salud*, though I suggested in Chapter 2 that second-hand information is always suspect.

During my sojourn in Tzintzuntzan, I observed a cluster of cases of acute bronchitis among young children. They were *acutely* ill rather than suffering from the chronic low grade cigarette induced cough of Francisco Geraldo. On some occasions, secondary bacterial infection had occurred, requiring the use of antibiotics. Discussing my observations with the clinic physician, I was told that cases of poliomyelitis still occurred among unvaccinated rural populations in the surrounding hills. In short, both within and outside of the village viral infections among the young appeared quite common, generally respiratory in nature, but possibly even more serious. I observed no evidence of poliomyelitis, and specifically no cases of the wasting of an isolated limb. This does not exclude poliomyelitis from endemic status in the remote areas, however, especially since only a minority of poliomyelitis sufferers are left with a significant neurological deficit. I also observed few acute viral infections among the elderly. When they were ill, it was typically with a chronic bacterial bronchitis caused by smoking cigarettes, or a chronic low level urinary tract infection caused by low levels of free water consumption. One does not generally gain long term immunity to these types of infection through repeated exposures, especially if an underlying problems predisposing to infection are not addressed.

In conclusion, lymphocyte counts were normal in the elderly of Tzintzuntzan whom I studied, even with a cohort selected for rheumatological disease. The most likely explanation may be a high prevalence of viral infections in childhood. Indeed, detailed interviews of the elderly painted a picture of childhood's characterized by deprivation and ill health, consistent with this hypothesis. We know that poor nutritional status

predisposes to infections in children, and that the young frequently succumb to infections during famines.

The lymphocyte data may suggest that in spite of numerous health disadvantages, the elderly of Tzintzuntzan may reap some benefit from living their entire lives in a congested and insanitary environment. This is, oddly enough, a notion which has been embraced by some physicians in industrialized societies. Lynn Payer's work on the cultural differences between European and American physicians uncovered a tendency for French physicians to believe that exposure to an insanitary environment can strengthen the immune system (Payer 1996). The French, according to Payer, viewed Americans as being excessively preoccupied with public sanitation issues, and believed that some exposure to dirt would strengthen what the French call the *terrain*, or what Americans might refer to as one's *constitution*. It may be that the French have a point, and Tzintzuntzan may provide some data to support their view. On the other hand, the overall poor health which we observed, and the prevalence of eosinophilia, suggest that the price one pays for this presumed exposure to infectious antigens may be greater than the benefit.

Eosinophils (normal range 1 - 6 percent of white blood cells)

For every eosinophil in the blood, 100 to 500 are in extravascular tissue (Wardlaw, Kay 1995). This is because eosinophils typically are immunologically active, migrating into soft tissues to fight infections. Normally 0-5% of the peripheral blood smear consists of eosinophils. Worldwide, the number one cause of increased eosinophil counts in the

peripheral smear is parasitic infection, especially with helminthic worms (Wardlaw, Kay 1995; Garcia Brukner 1997; Leech, Sonde, Root 1988). One and a half billion people worldwide harbor worms in their intestines. The majority of humans infected with worms "tolerate parasitism without apparent symptoms," (Olds 1988:69). This capacity for worms to parasitize without killing the host may be why nematode infections are "... among the most prevalent communicable diseases of mankind ... " (Despommier, Gwadz, Hotez 1995:1).

Perhaps a post-modernist critique of biomedicine could even be made suggesting that parasitism by worms is a natural state for *Homo Sapiens*, since the majority of people on the planet live with nematodal infestation. A similar argument was made in a course I attended with respect to the hematuria seen in *Schistosomiasis*, a condition in which parasitic organisms infest the bladder, causing chronic bleeding into the urinary tract. While recognizing that this argument can be made, I find it hard to accept. I do not believe that anyone, anywhere, would chose worm infestation if given the choice to be free of worms. Secondly, worms *do* cause significant morbidity and mortality, albeit in a minority of infected individuals. For example, *Ascaris* worms can reproduce to the extent of causing a dense mass of large worms which completely obstruct the intestines, leading to death if not evacuated surgically. Heavy worm loads can cause marked anemia, fatigue, and even myocardial infarction due to inadequate oxygen supply to the heart. As a physician, I view worms as undesirable parasites which should be eradicated when found in human hosts.

The most common intestinal worms in humans are roundworms. Also known as nematodes, these unsegmented helminths with bilateral symmetry range in size from a few millimeters to well over one meter in length (García, Bruckner 1997:219). Lifespans vary from months to over 30 years for *Strongyloides stercolis* worms (García, Bruckner 1997:220). The most well-known are worms of the genera *Ascaris* (García, Bruckner 1997:219) *Strongyloides*, and *Trichinella* (García, Bruckner 1997:248). Dogs, which are widespread in Tzintzuntzan, carry the nematode *Toxocara canis*, which can infect humans and lead to penetrating infection of internal organs, called *visceral larva migrans* (Ravel 1995).

Eosinophil elevation in the differential cell count in Tzintzuntzan was widespread, suggesting strongly that many of the elderly harbor nematode infections. Eosinophil counts were greater than five percent in two patients, Nicolas Chavalas, and Monica Vegas. In the case of Chavalas, no other condition which might explain the increased eosinophil count was found, leading me to conclude that parasitic infection was the most likely cause. He appeared chronically sleepy and weak, but was not anemic. This suggests a level of accommodation between the patient and his nematodes.

This is somewhat speculative, as a definitive diagnosis would require microscopic examination of a stool specimen for parasites and eggs of parasites (ova and parasite analysis), which I could not undertake in the field. Other causes of eosinophilia include polyarteritis nodosum (a form of vascular inflammation), sarcoidosis, hematologic malignancies such as Hodgkin's disease, chronic myelocytic leukemias, and eosinophilic

leukemia, scarlet fever, brucellosis, allergies, and adverse reactions to drugs (Wardlaw, Kay 1995). None of these were evident in Nicolas Chavalas. He lacked the swollen lymph nodes or increased white blood cell count seen in lymphomas, leukemias, and many infections such as brucellosis (transmitted in unpasteurized milk), so parasites appear to be the most likely cause.

The case of Monica Vegas is more complex. We know that a variety of rheumatological diseases present with high eosinophil counts, including rheumatoid arthritis, the Churg-Strauss syndrome (eosinophilia, asthma, and vasculitis), eosinophilic fasciitis, eosinophilia myalgia syndrome, and a so-called toxic oil syndrome seen in Spain among consumers of contaminated rapeseed oil in the 1970s (Wardlay, Kay 1995; Harris 1997:906). Rheumatoid arthritis is the most likely cause of this patient's eosinophilia. It is a fundamental tenet in medicine that, when possible, one should attempt to make as few diagnoses as possible to minimize the number of assumptions one makes as a clinician. In fact, Monica Vegas exhibited the typical features of a rheumatoid patient with eosinophilia due to rheumatoid arthritis, including myalgias and active synovitis. She lacked the hepatic enlargement and serositis often seen with eosinophilia in RA (Harris 1997:906).

All of this leads me to wonder. Could Vegas have had both parasites and rheumatoid arthritis? I think that this is a real possibility. Three non-rheumatoids sampled, in addition to the two with eosinophilia describe above, had borderline high eosinophil levels at 5 percent. One practical aspect of sorting this out has to do with treatment. If

Vegas's eosinophilia is due to helminthic infection, high dose corticosteroids (often used to treat arthritic "flares") might be contraindicated. With infection by *Ascaris* worms, a condition called *Loeffler syndrome*, characterized by pulmonary infiltrates and eosinophilia, can result from migration of the worms into the lungs, especially in a host who is further immunocompromised on the basis of administration of prednisone (Wadlaw, Kay 1995). One would not want to precipitate a potentially life threatening Loeffler syndrome in a rheumatoid arthritis patient with worms by suppressing the immune system excessively, as might occur if one used prednisone in high dose to diminish the inflammation of arthritis.

In summary, eosinophil levels were suspiciously high in a large number of the elderly residents tested in the field. Though many causes exist for this, the most likely is chronic nematode infestation. The presence of marginal sanitation, manifested by dogs or domestic cattle in the streets, for example, is consistent with this view (Figure 5). Rheumatoid arthritis may have played a role in one patient.

Figure 5. Donkeys in the main street of Tzintzuntzan.

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Basophils (normal range 0 - 1 percent of white blood cells)

The human basophil is the least common blood granulocyte. It is related to other granulocytes (PMNs and monocytes), but often completely absent from the peripheral smear due to a prevalence of only 0.5% among circulating leukocytes (Galli, Dvorak 1995:805). Most cells are confined to extravascular tissue (Lichtman 1995:852). Basophils represent the source of most histamine in the blood, which is released in allergic reactions (Galli, Dvorak 1995:808). The precise functions of basophils are obscure, but they are thought to play a role in fighting parasites (Galli, Dvorak 1995:808). Basophil counts may be increased in ulcerative colitis, juvenile rheumatoid arthritis, and chronic myelocytic leukemia (Lichtman 1995:853).

No basophils were seen among the seven patients on whom CBCs were obtained. There are several possible ways to interpret this. First, this could simply be a normal finding in view of the rarity of basophils on peripheral smears. I doubt this because with seven smears one would expect to see at least one basophil. More likely is that the laboratory technologist did not look carefully and overlooked one or two basophils. At any rate, the finding of lack of basophilia is fairly unremarkable. It does suggest a lack of certain uncommon conditions among these few elderly people. It does not exclude parasitic infection, as parasites typically cause eosinophilia, as mentioned earlier, and not basophilia.

Juvenile White Cells and Myelocytes (should be absent from peripheral smear)

These are progenitors of mature white blood cells, even less mature than the bands which may normally be found in small numbers in the peripheral circulation. They represent arrested cells from the maturation pathway which should occur in the bone marrow prior

to release of cells into the circulation (Baintain 1995). Their presence in the peripheral blood smear is an ominous finding, typically seen in overwhelming infections and acute leukemias (Quesenberry 1995).

No juvenile white blood cells or myelocytes were observed. This is a useful finding in excluding the most severe infections and cancers of the bone marrow among the subjects studied. It also suggests that these elderly villagers are tough and do not immediately succumb to infections, but we must be cautious in speculating too much regarding the absence of a rare abnormality among a small number of sampled patient blood smears.

Abnormal White Cells (normally absent from peripheral smear)

Abnormal cells are seen in chronic myelogenous leukemia and other blood derived cancers of the elderly (Lichtman 1995). Their absence is reassuring, as abnormal cells in the differential count of an elderly person may portend a dismal prognosis. Beyond this observation, it is difficult to generalize too much from such a small sample of people.

Red Blood Cell Count (normal 4 - 5.2 x 10^{12}/l), Hemoglobin (normal 12-15.5 g/dl, Hematocrit (normal 36-46)

Red blood cell count represents the absolute number of red blood cells per cubic milliliter of serum. Hemoglobin concentration measures the concentration of the oxygen carrying compound of red blood cells which carries blood to tissues. Hematocrit represents the ratio of packed red blood cells to overall blood volume in a centrifuged specimen of blood. All three tests are indicated to be screens for anemia, or lack of sufficient oxygen carrying cells and hemoglobin in the blood. They will be discussed together.

A mild anemia is present in only subject Leticia Cortez, with the other elderly members of the community maintain low normal hemoglobins and hematocrits, suggesting fairly decent nutritional status and low parasitic loads. Red blood cell count is similarly unimpressive. Overall, there was little significant anemia. This is consistent again with chronic equilibration with any parasites present, or low parasitic load.

Mean Corpuscular Volume (nl 78-98 fL)

Mean corpuscular volume (MCV) represents the volume of an individual red blood cell. It is increased in certain conditions, notably vitamin B-12 deficiency and folate deficiency, even in the setting of an overall low level hemoglobin and hematocrit. This is a so-called megaloblastic anemia. Iron deficiency and inherited disorders of hemoglobin amino acid structure known as thalassemias can create a low MCV. Among our subjects, every patient had an MCV of exactly 95, as reported by the regional laboratory in Quiroga.

The persistent MCV of 95 suggests laboratory error by virtue of complete lack of any random variation. If the anemia described is indeed normocytic, i.e. associated with a normal corpuscular volume and neither microcytic nor macrocytic, that would be consistent with either iron deficiency or the anemia of chronic disease and would militate against a diagnosis of either folate or B12 deficiency (macrocytic) or congenital hemoglobinopathy (generally macrocytic). A complete evaluation of anemia usually

requires a bone marrow biopsy to assess the iron storage and red blood formation process, which was obviously not feasible.

Erythrocyte Sedimentation Rates (Normal for males 0-10 mm/h, female 0-15 ml/h, higher in the elderly)

Erythrocyte sedimentation rate (ESR) is measured by observing the distance erythrocytes will sediment from a tube of well mixed venous blood allowed to stand for one hour. There are two methods of determining ESR: the Westergren method and the Wintrobe method (DM Anderson1994:1423). The increasing rate of fall of the erythrocytes observed in inflammatory states such as rheumatoid arthritis is due to an increased level of plasma proteins such as fibrinogen and immunoglobulins, which decrease what is known as the *zeta potential* of the red cells. The zeta potential is the tendency for red blood cells to repel each other due to similar electric potentials. When it is minimized by the presence of surface proteins the red cells come together in stacks similar to stacks of coins, called *rouleaux*, falling more precipitously through a tube, causing a higher sedimentation rate (Ibid:1423). A zeta sedimentation ratio might be a better test than the ESR by virtue of adjusting for the presence of anemia (Ibid:1424), but this test is not in widespread clinical use. Thus ESR is an inexpensive test for inflammatory states which is sensitive, but nonspecific (being elevated also in cancer, infection, pregnancy, and other states).

A feature which stands out is the unusually low erythrocyte sedimentation rates found. This laboratory parameter represents the speed with which red blood cells isolated from a

blood sample descend in a thin capillary-like test tube. ESR is a sensitive but non-specific measurement of inflammation. In other words, ESR is elevated in a number of pathological conditions such as acute infection, malignancy, or arthritic inflammatory processes, but it is impossible to determine the category of disease responsible from an analysis of the ESR. Normally ESR rises with age in healthy subjects, with the average male ESR being no higher than one half the chronological age, expressed in years, and with the female ESR being no higher than one half the chronological age plus ten years divided by two (i.e. women are allowed a slightly higher sedimentation rate). Low sedimentation rates are seen in a few conditions, such as sickle cell anemia (not present in these subjects).

The low ESR is of more than academic interest. In the case of subject Jaime Montañez, the low ESR was helpful in excluding a diagnosis of rheumatoid arthritis. This gentleman's deforming arthropathy was somewhat more severe than typically seen in osteoarthritis, and he had a high rheumatoid factor. The low sedimentation rate was more consistent with OA than RA, and along with radiographic data suggested that RA should be excluded. The clinical impression should generally guide interpretation of laboratory tests:

> "The major point about interpreting serological data that cannot be overemphasized is that such data acquire meaning in association with clinical findings. No serological test by itself constitutes a diagnosis" (Reichlin 1996:35-36).

The uncommonly low ESR values observed may be due to a number of factors. First, conduction of the ESR by the Wintrobe method may have caused spuriously low readings. Second, there may be a local laboratory bias towards low values. Third, there may be something about the environmental or cultural milieu of rural Mexico which leads to improved health and lower sedimentation values. This seems doubtful in view of the high prevalence of chronic diseases observed. I favor the Wintrobe explanation, but it would be difficult to ascertain this definitively. Carrying blood from the village to the United States or Guadalajara would entail such a time delay that the sedimentation rate would be unreliable, which is in large part why I chose to use local laboratory facilities.

Platelet Count (normal 140-450 x 10^9/L)

All subjects studied exhibited normal platelet counts, between 140,000 and 450,000 per cubic milliliter. Platelets function in the blood to prevent bleeding by clumping together at sites of vascular damage. Purpura, or hemorrhage into the skin, is the hallmark of platelet abnormality, whether due to decreased absolute levels or dysfunction of circulating platelets (Ravel 1995:105). Low counts are most commonly due either to peripheral destruction of platelets by an enlarged spleen or due to immulogical disturbances such as are seen in systemic lupus erythematosus (SLE). Indeed, thrombocytopenia (low platelet count), constitutes a major finding justifying the diagnosis of SLE in the appropriate clinical setting (Schur 1996:4). Paradoxically, the low platelet count seen in lupus may be associated with a propensity to form blood clots,

leading to fatal obstruction of the vessels in the lung in the case of pulmonary embolus, or causing miscarriages and thrombophlebitis in other patients (Urowitz, Gladman 1996).

Another reason to screen for platelet abnormalities in the elderly of Tzintzuntzan is that elevated platelet levels can be an "acute phase reaction" of early infection. In other words, platelet count sometimes rises before the expected rise in WBC levels. The elderly in particular may be unable to generate the typical leukocytosis seen in infection due to impaired immunity. Thus, the normal platelet count values were helpful in excluding infection, malignancy, or autoimmune conditions such as idiopathic thrombocytopenic purpura or thrombotic thrombocytopenic purpura. Moreover, the normal platelet count supports the earlier observation I made that these elderly patients appear to have chronic low level infections such as bronchitis and urinary tract infections rather than acute viral illnesses which might create an acute phase reaction such as an elevated platelet count.

Serum Chemistries

Chemistries are listed in Tables 17 and 18. These represent serum levels of various elements and compounds with physiological significance in the assessment of health status. Any patient seeking health care screening in the United States by a primary care physician would likely be screened for these tests prior to beginning any treatment regimen involving drugs. For example, an elevated creatinine indicates renal insufficiency, and so would contraindicate the use of aspirin-like drugs which may further weaken the kidneys. Discussion of serum chemistries will allow us to make observations

regarding the nutritional status and dietary preferences of the elderly in Tzintzuntzan. As noted earlier, we must recognize that we are dealing with a non-randomly selected sample when it comes to laboratory tests, and that therefore we must be cautious in generalizing our observations to the entire elderly population of the village.

Table 17: Serum chemistry values non-rheumatoids. Glu=glucose, Urea=blood urea nitrogen, Creat=creatinine, Na+=serum sodium ion level, Cl-= chloride level, Ca++= serum calcium level, P04=phosphate level.

Subject	Glu	Urea	Creat	Na+	K+	Cl-	CA++	PO4-
Cortez, Leticia	103	39	1.25	131	3.5	101		
Chavalas, Nicolas	64	27	0.98	124	3.1	96		
Montañez, Jaime	76	33	1.1	118	3.5	97		
Geraldo, Franciso	81	24	0.88	133	3.3	98		
Reposa, Linda	125	34	1.2	133	3.7	93	9.0	2.9

Table 18: Serum chemistry values rheumatoid arthritis patients. Key for table abbreviations identical to table 17.

Subject	Glu	Urea	Creat	Uric Acid	SGPT	SGOT	AP	Bili Tot	Bili Dir	Bili Ind.
Vegas, Monica	68	27	1.0	3.9	4	6	22	0.59	0.35	0.24
Gonzalez, Antonio					8	9	32	0.63	0.30	0.33

Glucose (normal level 50-200 mg/dl after eating, less than 140mg/dl fasting)

Glucose is a sugar molecule which provides energy for aerobic metabolism. Discussion of glucose levels will allow us to gain insight into dietary patterns and changes resulting from urbanization and acculturation of elderly members of the community of Tzintzuntzan. Though levels were not outside the normal range, some borderline hypoglycemia was detected and will be discussed.

If glucose serum levels are too low, altered levels of consciousness may ensue, or even coma. This is rarely seen, even in starvation, but can be seen when an insulinoma is present. This endocrine tumor of the beta cells of the pancreas secretes insulin, causing *Whipple's triad* of fasting hypoglycemia, symptoms of hypoglycemia, and immediate alleviation of symptoms with intravenous infusion of glucose. Symptoms of hypoglycemia include sweating, tremor, headache, weakness, and hunger. Though a rare condition present in only eight persons per 10 million population, insulinoma is still the second most common functioning tumor of the glandular islet cells of the pancreas, after the Zollinger-Ellison syndrome (Kaplan 1998), and generally would be considered if *Whipple's triad* is observed. Multiple medical conditions ranging from infection to kidney failure to alcoholism can also cause hypoglycemia, with Whipple's triad manifesting (Service 1988; Service 1996). Serum glucose measurement is a screen for these conditions.

One borderline case of hyperglycemia was identified, that of Nicolas Chavalas, whose glucose serum level was 64 mg/dl, in the low normal range. Given the rarity of

insulinoma, it is worthwhile to ponder what more common conditions may have contributed to Chavala's low blood sugar level. His continuous ingestion of highly sweetened soft drinks, behind the counter of the store he owned, is helpful in this analysis. It suggests that he was symptomatic to some extent, and alleviated his symptoms to some extent by ingesting glucose, which is consistent with the Whipple's triad picture seen with physiologically significant hypoglycemia. Let us consider the differential diagnosis of hypoglycemia in Nicolas Chavalas.

First of all, it may be normal for Nicolas Chavalas to run a low glucose. This should be acknowledged before considering other explanations. As mentioned in the introduction, the more laboratory tests that are run, the greater the likelihood of a "false positive," or an abnormal result with no clinical significance. Nonetheless, NE Chavalas was weak and listless, and I tend to think that his overall poor health contributed in some way to a low blood sugar reading. How?

Chavalas had a urinary tract infection and was on sulfa-containing antibiotics. This can cause low serum glucose levels as a well documented complication (Flier 1996:1279). Another possibility is ethanol abuse. Like most older men, Chavalas denied current alcoholism, but admitted to a history of heavy drinking. Could he still have been drinking? Alcohol induces hypoglycemia if the imbiber fasts concomitantly, due to depletion of the glycogen stores in the liver which ultimately are broken down into glucose in most fasting states (D Foster, Rubenstein 1998). Alcohol contributes to hypoglycemia in a more pernicious manner, however, by inhibiting gluconeogenesis, the

process by which the liver manufactures glucose in the fasting state after glycogen is depleted. Ethanol (drinking alcohol) accelerates conversion of oxaloacetate to malate in the liver. This diminishes the amount of oxaloacetate in the hepatocyte which is available for conversion to phosphoenolpyruvate, fructose, and ultimately glucose (Ibid.).

Another possible explanation for the low glucose of N Chavalas is what has been termed *idiopathic reactive hypoglycemia.* This condition is characterized by symptoms of hypoglycemia 2-5 hours after eating, relieved by ingestion of carbohydrates (Flier 1996). The ingestion of soft drinks throughout the day would support this diagnosis. As we will see below, the advent of soft drinks is a relatively new phenomenon in the village which is associated with prestige and may have deleterious consequences. Mild hypoglycemia can be blown out of proportion by the over zealous internist. The Mayo Clinic's authority on hypoglycemia recently addressed this: "It cannot be reiterated too emphatically that symptoms should not be ascribed to hypoglycemia unless the plasma glucose level is indeed low" (Service 1993:269). NE Chavalas also had evidence of general ill health with probable atherosclerotic coronary artery disease. This would also militate against idiopathic reactive hypoglycemia, as Service again discussed:

> "Patients who are hypoglycemic as a result of large nonpancreatic tumor, severe liver disease, sepsis, congestive heart failure, adrenal crisis, *etc.*, do not require extensive evaluation for the cause of hypoglycemia" (Service 1993:270).

Nonetheless, we found one patient with a borderline low serum glucose level, and the most likely explanation is idiopathic reactive hypoglycemia, possibly mediated by changing dietary patterns resulting from urban influences on a rural Mexican community. Other explanations may involve chronic ill health due to heart disease or the effect of antibiotics. The lesson I learn from this exercise is that laboratory tests are a clinical tool which must be employed within a broader framework correlated both with clinical status and cultural issues.

Much more salient as a public health issue is diabetes mellitus, the most prvalent endocrine disease in the U.S. (D Foster 1998). The prevalence of diabetes in the United States, as estimated by the National Diabetes Data Group, is 6.6%, though Pima Indians in the United States have a prevalence of 40 percent (Ibid.). An astounding 11.2% of Americans have impaired glucose tolerance (Ibid.). The presence of Tarascan Indian ancestry in the majority of my informants made screening for diabetes interesting as a way of determining whether a high prevalence of diabetes in the Pima Indian manner could be detected. A look at Table 27 reveals that, independent of blood screening which I performed, 4 of the 50 randomly selected informants reported taking pills for non-insulin dependent diabetes mellitus, corresponding to a prevalence of about 1 percent in this population. Given the scarce utilization of health care resources I observed, however, this was almost certainly an underestimate of the true prevalence of the disease.

Primary diabetes mellitus refers to the disease as an idiopathic entity not attributable to an underlying secondary disease state. Primary diabetes mellitus is subclassified as insulin-

dependent (IDDM) or Type I, versus Non-insulin dependent (NIDDM, type 2). IDDM often occurs as a result of autoimmune disturbances which cause loss of pancreatic function in the teen years, usually in non-obese individuals, leading to complete dependence on insulin to prevent diabetic ketoacidosis and death. By contrast, NIDDM, or Type 2 disease, often occurs in obese middle aged people, and may be due to resistance to the effects of insulin. Since Type 1 diabetes, usually with onset in the juvenile years, would usually preclude survival into old age without careful management with insulin injections, I expected to find type 2 disease in this elderly population.

Secondary diabetes refers to disease caused by pancreatic injury from alcoholism or stone, hormonal abnormalities, and other rare conditions (D Foster 1998). For the purposes of this analysis of the health of Tzintzuntzeños, Type 2 diabetes was of greatest concern, or perhaps secondary diabetes from alcoholism. Plasma glucose was a reasonable screen to exclude these conditions.

Fasting glucose levels above 140 mg/dl on at least two separate occasions are usually required to make the diagnosis of diabetes. A less commonly employed approach is the glucose tolerance test in which 75 gm of glucose is ingested orally, and diabetes is diagnosed if the blood sugar level reaches 200 mg /dl at 2 hours after ingestion and on at least one other occasion over a two hour period of blood sugar monitoring during the test. Diabetes is typically classified as primary or secondary.

The importance of diabetes mellitus as a health problem stems from the effects of persistently high glucose levels on nearly every organ of the body. On average, 15 to 20 years after the diagnosis of diabetes most patients develop complications that cause morbidity and premature mortality. These include circulatory problems such as heart disease or peripheral vascular disease, kidney failure, nerve damage (neuropathy), and foot ulcers leading in many cases to infections and limb amputations. Diabetes is the most common cause of blindness in 30 to 65 year old persons, occurring twenty times more frequently than in non-diabetics, and leading to blindness in 10 to 14% of type I diabetes patients (Sherwin 1996:1273). The mechanism is retinal damage caused by diMr.upted blood flow.

Rheumatological complications of diabetes are also important, which is another reason I screened for the disease. Diabetics may have a higher prevalence of osteoarthritis, though the presence of the confounding factor of obesity makes interpretation of this observation difficult (Caterson et al. 1980). Obesity associated with diabetes also predisposes to hyperuricemia and gout (Buchanan KD 1972). Diabetes is probably a risk factor for osteoporosis, though well controlled prospective studies proving this are still lacking. We do know that patients with diabetes excrete more urinary calcium, which may contribute to osteoporosis. (Raskin et al. 1978).

The diabetic hand syndrome occurs in three quarters of type II diabetics, causing thickening and decreased mobility of the hand (Starkman HS et al. 1986). Dupuytren's contractures, also more prevalent in diabetics, cause fibrosis of the deep tissue of the

palm of the hands, preventing full extension of the fingers. The so called shoulder-hand syndrome of diabetes involves a combination of flexion contractures of the shoulders with painful vasomotor abnormalities seen in a condition called reflex sympathetic dystrophy (Lequesne et al. 1977). Little shoulder disease was seen, as will be discussed later, due to ergonomic factors.

The nerve damage associated with diabetes can lead to a Charcot arthropathy, or neuropathic joint, in which the diabetic foot becomes destroyed by a combination of severe arthritis, osteoporosis, and fractures, possibly mediated by a decrease in pain reception causing repetitive inadvertent trauma to the foot. It can be painless due to lack of nerve function (Sinha et al. 1972), though complete lack of pain is atypical (S Anderson 1990). Diffuse idiopathic skeletal hyperostosis is a skeletal disease seen often in diabetics, characterized by flowing osteophytes in the thoracic spine with intact intervertebral disc spaces (Resnick et al. 1978). Though I did not see this condition, also known as Forestier's disease, on the spinal radiographs I obtained as part of this study, its association with diabetes confirms the need to screen for diabetes in Tzintzuntzeños with musculoskeletal complaints.

Reviewing the glucose measures in Tables 17 and 18, we see that of the five patients with rheumatological disease who were screened, none had diabetes. Patient Linda Reposa had a glucose of 125 mg/dl. This represents a possible borderline increase for a fasting sample, but does not qualify for a diagnosis of diabetes (less than 140 mg/dl). The mean glucose among the five non-rheumatoids screened was 89.8 mg/dl. The one rheumatoid

on which a glucose was obtained was 68mg/dl, a normal value. The second rheumatoid did not have the test run due to laboratory error. Rheumatoids may have diabetes as a result of treatment with prednisone, a potent anti-inflammatory agent which can raise glucose levels.

Before turning to cultural factors influencing this low prevalence of diabetes, it is first important to recognize that such a small sample is significant only as an anecdotal observation of the health of these six informants. Overall, about one percent of the population admitted to diabetes, consistent with data from non-Hispanic populations in the U.S. Obesity, the main factor leading to adult onset diabetes, was not highly prevalent in our sample. Only one of the 50 subjects was morbidly obese. Nine appeared moderately obese (Table 27). Thus 20% of our sample was obese. This compares to a prevalence among the elderly in the United States of about 50 percent. It should be noted that obesity was defined as being greater than 20 percent above ideal body mass index. Morbid obesity was defined as double ideal body mass index. This was estimated by inspection and palpation of body fat in extremities, with obesity recorded as present or absent. Weight determination would have been a better methodology, but it was not employed secondary to field environment constraints.

Confirming the impression that obesity and obesity-associated diabetes were prevalent in low numbers was the low prevalence of the typical diabetes-associated arthritic conditions described above. Review of Tables 23 and 24 reveals no clear evidence of diabetes-associated rheumatological diseases. There is a high prevalence of osteoarthritis

of the knees and osteoporosis, both seen in higher numbers in diabetes, but not in numbers beyond what one would expect to see in any population between ages 60 and 97 years of age. I observed no diabetic retinopathy. No evidence of proteinuria or acetone in the urine, both seen in diabetic kidney disease or uncontrolled diabetes, were seen in the small sample of individuals studied. Does the culture of Tzintzuntzan influence this?

I would suggest that two cultural factors caused low prevalence of obesity and diabetes among this population: exercise and diet. Exercise was not an activity embarked upon intentionally among these elderly Mexican villagers, but it was a part of daily life. Elderly Tzintzuntzeños walked to all destinations within the village. This contrasts markedly with the typical retirement community exercise patterns I have observed in my own practice in suburban California. Among the privileged classes in our culture, exercise is often a defined activity scheduled for a few hours a few days a week, at best. Thus the elderly retiree generally remains at home, but golfs or walks three days a week. The baseline lifestyle is sedentary. Exercise is a contrast to normal activity, often scheduled at the behest of relatives or the family physician.

By contrast, consider the case of our oldest informant, Alfonso Cataldo. As a somewhat demented and arthritic 97 year old, he would almost certainly be institutionalized in our culture. His urinary incontinence, caused by an obstructive bladder carcinoma, would make life in the community an embarrassment to family and unacceptable socially in the U.S. Incontinence causes social isolation and depression among the elderly affected with this condition, which may affect up to a quarter of elderly women in the United States

(Nigro 1977). But in Tzintzuntzan, Alfonso survives without being segregated from his peers. His care is divided between his daughter, son, and a half dozen grandchildren. He spent his days wandering from home to home within a half mile radius. His poor hygiene is not addressed in an aggressive manner. Instead, it is ignored with the observation "He does everything for himself," and there is no apparent concern over it (perhaps in part because of a lifestyle which is largely conducted outdoors in gardens, courtyards, and streets where odors can dissipate). He also eats small snacks throughout the day. Generally, he is offered tortillas, beans, and other unrefined and unsweetened foods, high in complex carbohydrates and low in the pure sugar compounds which can lead to obesity and diabetes. He is assisted in eating them by solicitous relatives who serve him cut-up portions or soups requiring little mastication.

The result of Don Alfonso's care pattern was salutary in many respects. He was well nourished. He was not lonely. He exercised daily, walking perhaps two miles a day. He was not obese. There was no evidence of the deep vein blood clots seen in elderly patients confined to wheelchairs or beds. On the other hand, he did suffer from poor hygiene and complained of aches in his knees, leading him to wrap home-made braces, constructed of cloth handkerchiefs, around each knee. Don Alfonso did not necessarily view his lifestyle as optimal, however. For example, he happily accepted a ride in an automobile. His lifestyle, rather, seemed to impose good health upon him due to economic underdevelopment, just as our affluent lifestyle in the United States often seems to impose obesity and diabetes upon our elders. As such, the issue of weight management and general conditioning stands out as an area in which Tzintzuntzeños

emerge better off than their U.S equivalents, for whom obesity is an emerging epidemic (Halstead 1997, Manson et al. 1994, Lerman 1997). By contrast, Tzintzuntzeños seem to suffer compared to U.S. populations in other areas, such as skin condition, vision, and dental health.

In summary, blood glucose levels and self-reported diabetes prevalence suggest that diabetes is not highly prevalent in Tzintzuntzan compared to other populations with significant Amerindian genetic admixture, though formal studies with larger samples would be necessary to confirm this impression. Physical activity (not for exercise but due to necessity), moderation in diet, and lack of highly sweetened and refined foods may contribute to this lack of diabetes. The case of blood glucose illustrates how health assessments require sensitivity not only to biometric parameters, but to the socioeconomic and cultural factors influencing their expression. We have seen this convergence of culture and physiology in the examples of blood sugar depression due to idiopathic reactive hypoglycemia in NE Chavalas, and in the relative lack of diabetes in the majority of the elderly due to traditional dietary and activity patterns.

Blood Urea Nitrogen (BUN), normal level 10-24 mg/dl

Blood urea nitrogen (BUN) is a measurement of nitrogenous waste in the body, as measured in a serum sample Acute renal failure is manifested by a rising BUN, often in association with creatinine (Brady, Brenner 1998). When BUN is elevated in the setting of a normal creatinine, it may represent volume depletion (dehydration), particularly when it occurs in the setting of an acute decrease in renal output of urine.

The causes of an elevated BUN are multiple, however, ranging from "prerenal" conditions such as heart failure to "postrenal" conditions such as obstruction of the urinary tract by stones or cancer. The kidney itself may fail in conditions such as systemic lupus erythematosus, in which two thirds of individuals afflicted suffer kidney disease as a result (Balow, Boumpas, Austin 1996). As such the test for BUN is a screen for overall health of the kidneys, genitourinary system, and circulation (Coe, Bremmer 1998). As a rheumatologist, I was particularly interested in screening the BUN levels of the elderly patients since 25 to 50 percent of patients with lupus erythematosus are observed to have renal involvement which is clinically significant (Wallace and Metzger 1997:1330).

Given the importance of blood urea nitrogen as an indicator of adequate fluid intake, renal function, and as a marker for rheumatological diseases causing vascular inflammation, what do the clinical data from Tzintzuntzan indicate? Normal BUN levels are between 15 and 35 mg/dl, but as BUN reflects urea synthesized by the liver as a catabolism product of proteins and amino acids, it may be variable with diet and fluid intake (Dennis 1988:523). The BUN levels among the five non-rheumatoids tested ranged from 24 to 39. Only one informant had a level above 35, Leticia Cortez with a BUN of 39. The one rheumatoid tested had a BUN of 27. What does this mean culturally and biologically?

BUN levels among subjects tested were consistently high normal or elevated, and no one had the levels from 5 to 15 often seen in elderly patients in our own country with decreased lean muscle mass and thus less urea production. This not because Tzintzuntzeños are obese or muscular in old age. We discussed above the relatively slight habitus of most of our elderly informants. Indeed, that Leticia Cortez was very thin might be expected to have a low BUN with adequate fluid intake. The reason for her elevated BUN was probably cultural. Specifically, what we are seeing reflected in BUN levels is a rejection of water as a viable fluid for consumption among the elderly. I observed and interviewed Leticia Cortez on numerous occasions in her store on the main street of Tzintzuntzan. Though it was hot and stuffy inside, she did not drink much water. Instead, she chose the soft drinks available from the trucks which sold to her store after roaring through town. She proudly offered these drinks to her American anthropologist visitors as an indication of her success and adoption of modern ways. We discussed this same problem with respect to diabetes earlier.

Soft drinks did not exist in her youth, but she had embraced the spirit of the "Pepsi generation" in her old age. Her intake of water consisted of bottles containing 355 cc of water and about 150 calories worth of high fructose corn syrup or sucrose. We know that these sugar molecules are digested and absorbed through a process of hydrolytic cleavage of the larger molecules into smaller constitutive molecules, absorbing water molecules in the process and thus eliminating free water from the overall intake process. As a result, Leticia Cortez's water intake was inadequate, though she drank all day. Increased

insensible water loss due to a hot environment and warm clothing exacerbated the problem.

Why did Leticia Cortez engage in persistent ingestion of colas to the exclusion of water, tea or other beverages which would have ended her dehydration and prevented urinary tract infections? She had not experienced soft drinks as a child in the 1930's. Since that time, a massive advertizing campaign for soft drinks had led to an enormous increase in per capita consumption of colas in Mexico. Leticia Cortez came to view soft drinks as a preferable drink of the elite upper classes, and embraced them in her old age as a relative economic well being allowed her to do so. The decreased thirst perception which accompanies age led to diminished reliance on free water consumption during this time.

The hypothesis that Leticia Cortez suffered from a prerenal azotemia mediated by soft drink consumption was borne out by other clinical and laboratory findings. Clinically, she was dehydrated with poor skin tone and dry oral mucosa. She also had a low energy level and chills, and her urine analysis revealed the urinary tract infection one so often finds in elderly females with inadequate water intake. Even with antibiotic therapy, her malaise persisted. Her blood glucose was normal at 103 mg/dl, eliminating diabetes mellitus as a cause for her volume depletion and poor urinary output. Her urine sediment revealed none of the red blood cell or white blood cell casts (collections of cells) seen in lupus erythematosus. Her creatinine was high-normal at 1.25.

Cortez's case is a classic example of the deleterious effects of the cultural hegemony attendant to international trade, the media age, and aspiration to the American way of life. Her case also illustrates, I believe, how a combined anthropological and biological synthesis can allow us to tease out this process, and perhaps suggest interventions. For example, Doña Mariana appeared better hydrated, and had adopted a naturopathic predilection for herbal teas at the behest of an influential physician in the community.

Yet even among Doña Mariana and the majority of her peers, the consumption of free water seemed to be rejected, and consumption of other prepared beverages was preferred, especially fruit juices. This represented in large part, I believe, a rejection of water as unclean and suspect. This belief has been reinforced to some extent by public education efforts by physicians at the public clinic, who provide information regarding prevention of diarrheal illnesses (boiling water, for example). In summary, BUN levels tend to be high in Tzintzuntzan due to both traditional and modern influences tending to lead to minimal ingestion of free water with resultant pre-renal azotemia (elevation of blood levels of BUN due to volume depletion, rather than due to kidney failure).

Creatinine (normal 0.1 to 0.7)

Creatinine is a metabolic solute which rises in concentration gradually as kidney failure occurs. When serum creatinine rises, clearance of creatinine and blood urea nitrogen by the kidneys decreases. In severe cases, the levels of both compounds are so elevated that hemodialysis or peritoneal dialysis is necessary (Carpenter and Lazarus 1998).

Creatinine is also higher in individuals of larger body muscle mass, such as robust young men.

Overt renal failure is usually preceded by a long asymptomatic period of "compensation" in which creatinine and BUN levels rise modestly in the absence of clinical evidence of kidney failure (Brenner, Hostettter, Hebert 1998). The pathological correlate of renal failure is destruction of the glomeruli of the kidney which ordinarily filter blood to remove toxins and maintain acid-base balance. When chronic renal insufficiency progresses into end stage kidney failure the patient may develop lethargy, somnolence, confusion, seizures, metabolic acidosis, and death (Brenner, Hostetter, Hebert 1998).

Screening serum creatinine levels therefore tells us whether elderly Tzintzuntzeños have overt kidney failure, early compensated renal insufficiency, or normal kidney function. It may also allow us to infer whether these patients would tolerate oral medications to treat arthritis. The typical non-steroidal anti-inflammatory drugs (NSAIDS) which are the major weapon in the rheumatologist's arsenal against arthritis may inhibit prostaglandins in the kidney which have a protective effect, thus increasing serum creatinine levels and contributing to the development of renal insufficiency.

Creatinine also may be effected by hypertension and diet. Prolonged uncontrolled hypertension often leads to an elevation of serum creatinine levels due to nephrosclerosis caused by increased hydrostatic pressure on individual glomeruli. A diet high in protein may cause a chronic hypersecretory state for the kidneys as they excrete amino acid breakdown products, ultimately leading to elevated creatinine and renal insufficiency.

Bearing these issues in mind, let us turn to the creatinine levels observed in our small cohort of Tzintzuntzeños.

The mean creatinine serum concentration among the five non-rheumatoids tested was 1.08 (mg/dl), with a high value of 1.25 and a low value of 0.88 mg/dl. This is in the high-normal range, suggesting some chronic renal insufficiency among the elderly tested. The highest level, 1.25 mg/dl, was seen in Leticia Urbano Cortez, the same woman with the elevated BUN of 39 mg/dl. This is a high normal value for a slight elderly female, suggesting that her chronic prerenal volume depletion, mediated by inadequate free water intake, may be contributing to an early chronic renal insufficiency state.

The single rheumatoid arthritis patient tested, Monica Vegas, had a normal to slightly elevated creatinine of 1.0 mg/dl. This suggests that she did not suffer from renal vasculitis sometimes associated with rheumatoid disease, and that she had not developed toxicity due to NSAID use, as discussed earlier.

The overall picture of creatinine is consistent with a culture with little overt renal failure, though some mild increases in creatinine consistent with normal aging. I observed that the elderly generally confined their diets to rice and beans with minimal consumption of beef, pork, chicken, or fish. This was due to economic constraints; rice and beans were cheaper. This less abundant diet, combined with a relative lack of obesity and associated muscle mass needed to support body weight, may contribute to lower levels of kidney failure.

Low renal failure rates are also borne out by results of the physical examinations. This is important in light of the small sample chosen for blood testing. I observed few cases of peripheral edema and no cases of the "uremic frost" seen in end stage kidney failure, and encountered no patients on dialysis (in part a reflection of survivor bias; renal failure patients would almost surely die rather than be considered for costly interventions such as dialysis or transplant).

In summary, the creatinine data, combined with broader physical examination observations, suggests that there is a low prevalence of end stage kidney disease among elderly residents of Tzintzuntzan. The reason may be a diet low in animal protein combined with an overall low caloric intake. It may be that Tzintzuntzeños, by virtue of growing up in economic deprivation, may be reaping the benefit of having healthier kidneys in old age. Most of the informants recalled periods of inadequate dietary intake in childhood, consistent with this hypothesis. Stated differently, Tzintzuntzeños may be protected from some of the less salubrious effects of an affluent lifestyle.

Sodium (normal range 135-145 mm/dl)

Serum sodium levels were uniformly low among all patients sampled. The normal level is from 135 to 145 mg/dl, and the highest level among the five non-rheumatoids analyzed was 133 mg/dl, with a mean level of 127.8 mg/dl. One informant, Jaime Montañez, had a level of 118 mg/dl. This degree of hyponatremia (low serum sodium level) might cause cerebral edema, convulsions, and death if it were to develop acutely, suggesting that it

was a chronic problem. The low sodium levels were the single most dramatic laboratory finding observed in Tzintzuntzan, and presented a complex differential diagnosis challenge worthy of further discussion.

Sodium is the principal extra cellular cation (positively charged ion) of the human body, and its tight control by a complex mechanism of absorption and renal excretion is critical to life. Hyponatemia, or low serum sodium level, is the most frequent clinically observed electrolyte disorder (Gross et al. 1996). Oversecretion of anti-diuretic hormone (ADH, also called vasopressin) by the posterior pituitary gland is often the underlying cause, leading to excessive re-absorption of free water by the kidney and a dilutional effect lowering effective sodium concentration. There is also a hyponatremic syndrome known as Cerebral Salt Wasting Syndrome (SCWS) in which sodium is lost in the urine without volume expansion being present, usually due to antecedent central nervous system trauma, but this is much less common (Uygun et al. 1996).

In primary excess of ADH, the condition is known as the *syndrome of inappropriate anti-diuretic hormone secretion* (SIADH). Secondary vasopressin excretion is observed in cirrhosis, heart failure, and volume contraction (Gross et al. 1996). In the first kind of hyponatremic syndrome, creatinine and BUN levels tend to be low due to volume expansion. In the second type BUN and creatinine levels tend to be elevated because of circulatory disturbances (Gross et al. 1996). This is of practical importance, because the treatment of SIADH involves restriction of water intake, diuretics, and in severe cases

hypertonic saline solution administration, whereas so-called "baroreceptor hyponatremia" involves treatment of the underlying condition.

In acute hyponatremia, treatment involves correcting the low sodium levels with infusion of hypertonic saline to prevent seizure, respiratory arrest, or coma. Outside the hospital, hyponatremia is usually chronic and better tolerated, and correction may be undertaken with hypertonic saline administration or oral urea administration with the goal only partially correcting the situation, i.e. elevating the sodium no more than 10mEq/dl in 24 hours. More rapid correction can cause neuropathological complications leading to death, i.e. central pontine or extrapontine myelinolysis.

Given this understanding of the frequency of hyponatremia, we need to turn to the issue of what was going on in our patients, particularly Jaime Montañez, who had the most marked hyponatremia. This 74 year old gentleman denied hypertension, heart disease, or diabetes, but admitted to a history of alcohol abuse. As is the case with many elderly Tzintzuntzeños, his alcoholism was a major problem until he quit drinking abruptly in late middle age due to concerns about deteriorating health. On examination, he had evidence of multiple chronic medical conditions.

Jaime Montañez's eyes were cloudy with the opacities of cataracts, leading to difficulty visualizing the retina of each eye. His mouth was notable for diffuse dental caries, gingivitis, and tooth loss, and his hearing was impaired in the high frequency range, with difficulty hearing soft conversation. He also had arthritis and sun-damaged skin with

multiple pre-cancerous actinic keratoses. None of these conditions would explain his low sodium, however. To understand that, we need to consider his heart and abdominal examination.

My field notes describe Mr. Montañez as having a "3 over 6 holosystic crescendo-decrescendo murmur" best heard over the right second intercostal space. Along with this blowing sound typically not heard on a normal examination, his carotid pulses had an abnormal upstroke to palpation. The absence of any bruit, or abnormal sound with auscultation of the carotids, ruled out cholesterol plaques as a likely explanation. Mr. Montañez also had fine crackles, or rales, at the base of his lungs, consistent with fluid accumulation seen in early congestive heart failure. The overall picture was consistent with aortic stenosis with early congestive heart failure.

Mr. Montañez's wife also had evidence of aortic stenosis (AS) on examination, as did a number of elderly people I examined within the study and outside of the study while providing medical care. AS occurs in a quarter of patients with valvular heart conditions, and 80 percent of AS patients are male (Braunwald 1998). The most common cause of aortic stenosis is congenital abnormality of the valve, often in the form of a bicuspid valve, rheumatic fever, or the degenerative calcification process which occurs to some extent with normal aging. Untreated, AS causes three cardinal symptoms: exertional dyspnea, angina pectoris, and syncope. It typically leads to progressive heart failure and death in a few years. Twenty percent of patients dying from AS experience ventricular fibrillation or another dysrhythmia as a terminal event (Ibid.). Though digitalis and

diuretics can be employed to ameliorate symptoms, definitive cure is arrived at through replacement of the valve, an option not available to Mr. Montañez in rural Mexico.

My own suspicion is that rheumatic heart disease was prevalent at the time of Montañez's youth, and that he and his wife were both affected and both developed rheumatic heart disease and aortic stenosis. The result was a cardiac condition picked up on examination a half century later. Rheumatic fever is an autoimmune disease mediated by exposure to group A Streptococcal bacteria. It presents clinically after a latent period of two to three weeks following a pharyngeal infection with bacterial strains with certain protein wall characteristics, i.e. M serotypes 5,14,18,and 24 (Markowitz 1987). Individuals who develop rheumatic fever may suffer recurrences with subsequent throat infections, rates which may approach 50 percent per infection in the first year, decreasing to around 10 percent recurrence rates per infection after about 5 years (Bisno 1997, Taranta et al. 1964). Prevention of recurrences, a process known as secondary prophylaxis, requires monthly injections of long acting penicillin preparations, or daily oral therapy, for many decades (Bisno 1997).

In California, rheumatic fever is a disease which must, by law, be reported to public health officials. The full blown condition may be manifested by arthritis of the large joints, carditis, a neurological condition called Sydenham's chorea characterized by involuntary movements and muscular weakness, subcutaneous nodules, and a rash known as erythema marginatum. Though the mitral valve is most often involved, the aortic

valve can also be affected, making rheumatic fever the number one cause of valvular heart disease in the world (Gibofsky and Zabriskie 1997:1589).

A recent historical and epidemiological review of rheumatic fever emphasized the need for continued vigilance in seeking to diagnose and treat rheumatic fever (Da Silva, Pereira 1997). Rheumatic fever epidemics in Mexico in the 1940s and 1950s portended a mortality rate of 20% among those afflicted (Amigo; Martínez-Lavin; Reyes 1993), suggesting that latent affects of severe disease or even subclinical disease may be apparent in the elderly of Tzintzuntzan today. I found no subjects aware of a history of the disease or taking penicillin prophylactically to prevent recurrence.

On a global basis, rheumatic fever has been on the decline since the 1860s, long before the advent of antibiotics, decreasing from 250 cases per 100,000 population per year in Denmark in the 1860s 100 per 100,000 per year in Denmark in the 1960s (Gordis 1985). Nonetheless, an estimated 10 to 20 million new cases per year still occur in the third world countries where most of the world's population lives (Gibofsky and Zabriskie 1997:1581). Recent outbreaks in Utah have suggested that American physicians may have become complacent in treating the initial presentation of Streptococcal pharyngitis before complications involving the heart can develop (Vessy et al. 1987). It is certainly reasonable to attribute the aortic stenosis of Montañez to rheumatic fever, and the similar finding in his wife to a high prevalence of the condition in childhood.

Though only mildly symptomatic, if at all, his prognosis was poor for survival. The sodium of 118mg/dl suggested that he had the secondary baroreceptor driven increase in ADH secretion seen in a chronic cardiovascular condition. His lack of confusion or ataxia also was consistent with a chronic state, as an acute drop in sodium levels to 118mg/dl would cause the coma and convulsions described above. The brain can adjust to the gradual lowering of serum sodium levels, by decreasing intracellular osmolar levels and preventing cerebral edema. But the cardiac condition was not the only reason for Montañez's low sodium. He also had cirrhosis of the liver.

On examination of Montañez's abdomen, it was noted to be distended with "shifting dullness," or a tendency for the sound on percussion to go from high to low as one taps from the lateral abdomen to the center, and for this change point to shift when the patient rolls on his side. Together with a "fluid wave" when tapped (fluid rolling across the abdomen like a wave), and a small liver to percussion, the picture was consistent with advanced cirrhosis of the liver. This is another chronic condition leading to hyponatremia.

Nicolas Chavalas had the next lowest serum sodium level, at 124 mg/dl. He also had an examination significant for the appearance of chronic ill health, urinary incontinence, and had been placed on an oral antibiotic for a urinary tract infection. The most likely explanation for his low sodium was volume contraction secondary to inadequate fluid intake and decreased glomerular filtration, leading to increased ADH secretion and hyponatremia. Leticia Cortez had a sodium level of 131 mg/dl, with evidence of

congestive heart failure, manifested by swelling of the feet and consistent with a prior history of myocardial infarction for which she was on digoxin.

Francisco Geraldo's sodium was only minimally low, and his exam was significant for chronic obstructive pulmonary disease, severe osteoarthritis of the knees, osteoarthritis and adhesive capsulitis of the shoulders, onychomycosis, pterygia, cataracts, dental caries, gingivitis, degenerative disc disease with sciatica, and solar damage with actinic keratoses. The overall picture again suggests chronic ill health with secondary ADH excess as a mechanism. Again, decreased oral fluid intake was observed, as with nearly all elderly informants. Hypothyroidism would represent a possible cause, as well as adrenocortical insufficiency (Addison's disease), but Geraldo lacked the typical decreased reflexes of thyroid disease or the fatigue and cardiovascular collapse seen in Addison's disease. He did complain of carpopedal spasm, or hand cramps, which can be seen in conditions causing electrolyte abnormalities such as Addison's, but is more typically seen in hyperparathyroidism, for which I did not check him. Francisco Geraldo's hyponatremia may have been associated with lack of edema, often seen in conditions of combined sodium and water excretion, and thus consistent with either chronic inadequate water intake or a variety of other medical conditions (Levinsky 1991:280).

Finally, Linda Reposa's sodium of 133 was consistent with systolic hypertension with a 2/6 systolic ejection murmur radiating to the left axilla, possibly representing the incipient heart failure seen in patients with untreated hypertension and valvular heart

disease. The high ADH, altered baroreceptor model for hypertension and hyponatremia fits the lab tests.

In summary, hyponatremia in the village of Tzintzuntzan is more likely to be chronic than acute, and therefore secondary to underlying chronic diseases rather than the effect of medication, hospitalization, or intravenous fluids, as is seen often in the U.S. Thus, hyponatremia is a marker for serious underlying disease in Tzintzuntzan. Heart failure due to valvular heart disease caused by rheumatic fever, hypertension, and cirrhosis of the liver due to drinking alcohol are potentially common causes leading to a volume overload, high ADH type of picture. The possibility of Addison's disease or a volume contraction hyponatremia in a population with low fluid intake is an alternative explanation in some patients, such as Mr. Geraldo or Ms. Cortez. These conditions, resulting from either behavioral factors (decreased fluid intake, alcohol abuse), infections, or untreated hypertension, are all potentially preventable. Prevention of illness involves minimizing crowding, since Streptococcal throat infections and rheumatic fever increase in proportion to decreases in square feet of living space per person in a home. Given the propensity of Tzintzuntzeños to live in courtyards as well as enclosed spaces, the issue of determining living space may be more complicated than it appears at first glance. All of these issues are made apparent by interpreting the laboratory results obtained within the context of a detailed history, physical examination, and anthropological analysis of life situation and cultural factors relating to health.

Potassium (normal 4 to 6 mmol/l)

Potassium levels were generally low normal, ranging from 3.1 to 3.7 with a mean of 3.42 mm/l. The lone rheumatoid tested had a value of 3.9mm/dl (normal). Potassium is the principal intracellular positively charged ion, with all but 2% of the 2500 to 3,000 mmol of potassium in the body confined to the interior of cells (Singer, Brenner 1998). The relative increase in intracellular potassium is maintained by an active transport mechanism, as the gradient of potassium concentration across cell membranes is critical to the function of certain excitable body tissues, such as myocardium and skeletal muscle. Though an excess oral load of potassium is rapidly excreted within 12 hours to maintain a normal serum potassium concentration between 3.5 and 5.0 mg/dl, the response of the kidney to dietary potassium depletion is slow, requiring 7 to 14 days before excretion drops to the minimal level.

The causes of hypokalemia include deficient dietary intake and a variety of mechanisms increasing loss (vomiting, diarrhea, fistulas, etc.). Metabolic alkalosis is also a leading cause, especially in the absence of adrenal disease or iatrogenic factors which deplete potassium such as the administration of diuretic medications (Levinsky 1991:285). Adjustment to inadequate intake of oral sodium is nearly immediate, with the kidney retaining additional sodium. Potassium depletion, by contrast, can proceed rather rapidly due to a two week period of acclimatization to decreased potassium intake, during which period the kidney loses a large amount of the ion in the urine.

In the case of our patient population, I believe that the cause of hypokalemia in such a diffuse constant range is most likely poor intake of potassium combined with inadequate

intake of fluids with resulting "contraction alkalosis," or volume depletion with increased potassium excretion due to the ensuing alkalinity of the blood. Primary aldosteronism would be an uncommon cause, whereas secondary aldosteronism, in which the adrenal gland increased aldosterone secretion in states such as congestive heart failure, cirrhosis, or nephritic syndrome, would be a more likely explanation in this cohort. Whereas acute hypokalemia causes potentially fatal cardiac dysarrhytmias, chronic hypokalemia is better tolerated. The general absence of irregular heartbeats among this population suggests that we are dealing with a chronic low grade hypokalemia caused by chronic environmental factors.

Again, the serum potassium level paints a picture of chronic ill health due to behavioral factors amenable to anthropological inquiry, such as inadequate diet and fluid intake. The overall picture is consistent with marginal health status due to environmental and cultural factors. One important factor is dietary preference. The legacy of inadequate dietary intake in childhood played a role here. Elder informants preferred foods rich in sodium, such as refried beans and soups. As mentioned earlier, these foods are low in refined sugar, but they also lack the rich potassium supply of fruits and dark green leafy vegetables (often referred to as "rabbit food" by informants). Vegetables and fruits, calorie-poor but rich in potassium, were not sought after as desirable commodaties, although they were not rejected when included in a meal.

This actually represents an adaptive strategy for survival in near-starvation circumstances, such as those surrounding the early life period of many informants. It brings to light a

broader issue, i.e. that adaptive behavior subjectively defined exists within the context of historical memory rather than current circumstances. Thus a high fat, high protein diet makes perfect sense when one is dealing with starvation, but is deleterious in old age due to the increased risk of coronary artery disease and inadequate potassium intake. The time lag in adaptive behaviors is perhaps mediated in part by genetic as well as environmental factors, particularly if we view dietary preferences within a longer time framework.

Chloride (normal range 98-108 mmol/L)

Mean serum chloride level was 97 among five non-rheumatoids tested, at the low end of the normal range. Linda Reposa was hypochloremic with a value of 93. Chloride was not screened among the non-rheumatoids. Chloride is the principal negatively charged ion associated with sodium, and its excretion by the kidney is a function of both sodium metabolism and other intervening factors such as the use of diuretic medications (Kokko 1996). Hypochloremia, or low serum chloride levels, can occur with vomiting or nasogastric suction, and in that case typically is associated with alkalosis due to loss of hydrochloric acid, a so called hypochloremic metabolic alkalosis. What is the most likely explanation in Reposa, the one fairly hypochloremic subject? Looking over my notes regarding her examination furnishes some clues.

Linda Reposa, an 85 year old female, complained of stiff painful hands, tension headaches, and low back pain occasionally. Her past medical history was unremarkable, with denial of hypertension or diabetes. Her only medications were B complex vitamins

and something called "Dipirone." Her examination revealed an elevated systolic blood pressure at 162/82, pulse of 70/minute and respiration of 16/minute. Her eyes revealed no cataracts or pterygia, but she was edentulous with right ear cerumen impaction. Her neck revealed diminished range of motion, with extension to 20 degrees versus the normal 50 degrees, flexion 50 degrees (normal 65 degrees), lateral flexion 22 degrees (normal 40 degrees), and lateral rotation 50 degrees (normal 55 degrees). Overall, this was consistent with rather severe osteoarthritis of the cervical spine (Figure 6). In addition, her remaining musculoskeletal examination revealed kyphosis, or "dowager's hump," of the thoracic spine, typically seen in osteoporosis and in fact borne out as such by radiographs subsequently obtained (Figure 7). Her hands had the fusiform bony swellings of the proximal and distal interphalangeal joints known as Bouchard's and Heberden's nodes, respectively, again typical of osteoarthritis and demonstrated on radiographs to be due to this. Hips, knees, and feet revealed the typical "crepitus", or bone creaking, ligamentous laxity, and deformities of osteoarthris, with the toes demonstrating a classic hallux valgus deformity bilaterally.

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Figure 6. Lateral radiograph of cervical spine in Linda Reposa, revealing osteopenia and complete loss of teeth.

The contrast between Figure 6, revealing the advanced stages of cervical spine osteoporosis, and and Figure 7, revealing advanced stages of thoracic spine osteoporosis, demonstrates how the same process can affect different anatomic areas of the body differently. In Figure 6, on the previous page, the curvature of the spine anteriorly is exaggerated (increased lordotic curvature). In Figure 7, on the next page, the spine collapses anteriorly in a striking manner leading to curvature in the opposite direction (marked kyphosis).

Figure 7: Lateral radiographic view of thoracic spine of Linda Reposa, revealing advanced osteoporosis and multiple compression fractures.

Cardiovascular examination revealed a grade II/VI systolic ejection murmur best heard at the left sternal border, but also radiating to the left axilla in a manner nearly pathognomonic for mitral regurgitation. I felt that this represented presumptive evidence of valvular heart disease, again very possibly due to rheumatic fever in childhood. Finally, her skin exam revealed warts, sun damage with elastosis and actinic keratoses, diffuse alopecia (loss of hair), and a post-traumatic granulomatous cyst of the forehead caused by a thrown stone in childhood. In summary, she was an elderly woman with osteoporosis, osteoarthritis, dental caries, cerumen impaction of the ears, sun damaged skin with precancerous changes, warts, hypertension, mitral regurgitation, and evidence of previous head trauma, complaining of aches and pains and headaches. Does this explain her low chloride, and does culture play a role here?

The most likely explanation for Ms. Reposa's overall picture of hyponatremia, is a mild hypoaldosteronism, or decreased secretion of mineralocorticoid hormones from the adrenal cortex, mainly aldosterone. Confirming the diagnosis would require testing of serum aldosterone level, and also blood gas analysis to confirm a mild metabolic acidosis. The latter is to some extent supported by the existence of hyperventilation, a respiratory compensation which results in some degree of alkalinization of acidotic blood. Reposa's clinical picture is consistent with that of an elderly subject with mild electrolyte abnormalities, though often hyperkalemia and cardiac arrhythmias are also seen (Loriauz 1996). Mineralocorticoid deficiency of this kind is often seen in hyporeninemic hypoaldosteronism, which represents a failure of the kidney to properly produce renin, a

hormone which maintains electrolyte balance, due to glomerular injury. The most likely etiology is hypertension. Other possible etiologies include diuretic use, if "dipirone," which I have been unable to identify, is a diuretic.

The picture in this informant, again brought out by analysis by history, physical examination, radiographs, and blood tests, is of a chronically ill elderly female with electrolyte abnormalities brought on by uncontrolled hypertension. The lack of advanced medical care to control this condition is relevant. In our own culture, the over age 85 population is the fastest growing population in America, so her age alone should not portend a poor prognosis or poor health. What is relevant culturally, however, is a lack of concern about hypertension.

There was no screening program in the clinic to identify hypertensives, and there appeared to be little concern about the conditions as a treatable cause of disease or mortality. It was detected by examination in several patient, as will be discussed later. The lack of concern with the diagnosis reflected a general absence of appreciation for preventive medicine in general, with subjects seeking care for symptomatic problems rather than trying to maintain optimal health by dietary or pharmaceutical means. This may represent a fatalistic attitude towards illness, which derives from the religiosity of the informants. Moreover it reflects a sense of powerlessness, deriving from peasant culture in general, which was discussed earlier (Kroeber 1948:284; Anderson 1965; Foster 1967a,b,c; Diaz and Potter 1967).

Calcium (normal 8.4 to 10.2 mg/dl) and Phosphorus (normal 2.9-4.5 mg/dl)

Michael Whyte has emphasized that in evaluating patients with metabolic bone disease, "a complete history and thorough physical examination are the foundation for accurate diagnosis ... ," with particular emphasis on sorting out chronic versus acute onset of osteopenia in the evaluation of osteoporosis, and with specific questioning regarding intake of vitamin D, sunlight exposure, and evidence of trauma exacerbating the condition (Whyte 1993:83). In the proper clinical setting, serum calcium and phosphorus levels can play a role in determining whether thinning of the bones in the elderly is due to diet, vitamin deficiency, lack of sun exposure, or underlying cancer or hormonal disease.

Linda Reposa, the 85 year old female with severe osteoporosis, clearly had suffered from the condition for many years. Her stooping shoulders and the dowager's hump were consistent with advanced osteoporosis. Her history was significant for many years of hard work, both assisting in pottery activities and raising a family. Moreover, she reported taking vitamins, though the ingestion of vitamin D could not be verified. What was evident was the degree of sun damage of her face, with "elastosis of the skin with irregular pigmentation and actinic keratoses" noted on my field observations. Her radiographs revealed multiple compression fractures consistent with severe osteoarthritis and osteopenia. Her serum calcium level was normal at 9.0 mg/dl, and phosphorus was low normal at 2.9 mg/dl. What implications does this have for understanding the etiology of osteoporosis in elderly residents of Tzintzuntzan? How is the calcium and phosphorus evaluation useful in sorting this out? An adult human body contains about 1,000 grams of calcium, 99% of which is in the skeleton in the form of hydroxyapatite, and 1% of which

is found in extracellular fluids and soft tissues (Broadus 1993:41). Calcium and phosphorus are chemical screens critical for the evaluation of bone metabolism. They frequently vary in opposite directions as an indication of specific diseases, so I will discuss them together.

Calcium in the blood is largely bound to proteins such as albumin (40%), with 48% ionized and 2% complexed to phosphate, citrate, and bicarbonate (Buchanan, Ceulaer, Bánint 1997:190). Phosphorus, in turn, is found in plasma in organic form (bound to phospholipids) and in inorganic form, with the latter being 15% protein bound. Measurement of phosphorus levels is useful in the evaluation of metabolic bone disease (Buchanan, Ceulaer, Bálint 1997). We will see that in the appropriate clinical setting discussion of serum levels has implications important to understanding the health status of a community.

Measurement of serum calcium levels has been called the most important test in clinical medicine due to the wide diagnostic implications it offers the clinician (Buchanan, Ceulaer, Bálint 1997:190), As such, calcium plays both a structural role in normal physiological processes and is a critical serum ion (Ca^2). Low levels of ionized calcium in the blood lead to increased neuromuscular excitability which in severe cases can cause tetany, and early on may manifest by a positive Chvostek's sign (twitching of the upper lip when the facial nerve is tapped below the zygomatic arch) or a positive Trousseau's sign (carpal spasm after constricting the blood supply to the hand with a sphygmomanometer for 2 minutes) (Spiegel 1996:1365).

Elevated serum calcium can also be seen in malignancy, thyrotoxicosis, vitamin D toxicity, as a side effect of thiazide diuretic use, in acute and chronic renal failure, and in a variety of less common conditions such as familial hypocalciuric hypercalcemia (Buchanan, Ceulaer, Bálint 1997:190). The presence of hypercalcemia in the setting of hypophosphatemia is an indication of the presence of overactivity of the parathyroid glands (Buchanan, Ceulaer, Bálint 1997:163). In evaluating Linda Reposa, however, I was concerned primarily about the possibility of a low serum calcium level, and so I chose to order serum calcium and phosphorus levels in her as part of an evaluation of her osteoporosis with compression fractures. Was there an indication of a problem in the environment of Tzintzuntzan that might contribute to osteoporosis which would be revealed by these tests?

Hypocalcemia may result from primary hypoparathyroidism, but also is seen in vitamin D deficiency, malabsorption syndromes, renal failure, and after chemotherapy for Burkitt's lymphoma, due to a sudden increase in phosphate levels in the blood. (Spiegel 1996:1365). Low serum calcium levels are also seen in vitamin D deficiency states, hypoparathyroidism, and decreased UV light exposure. I chose to evaluate serum phosphate in one patient, LE Reposa, because of her significant osteoporosis. Specifically, we know that in endocrine conditions such as hyperparathyroidism and renal failure, hypocalcemia occurs in the setting of high phosphorus levels, whereas in nutritional deficiency states such as malabsorption syndromes seen with parasitic infections, low calcium is seen with low phosphorus levels.

On average, a healthy adult requires 400 mg a day of calcium intake to maintain calcium balance, due to an ongoing loss of calcium via fecal excretion on a daily basis (Lemann 1993:47). Absorption of dietary calcium is in turn dependent on adequate serum levels of 1,25(OH)2D3, known as vitamin D3, the hormonally active form of vitamin D. This is produced either by conversion of 7-dehydrocholesterol to vitamin D3 under the influence of sunlight in the skin, or as a result of direct ingestion of vitamin D3 in the diet (fortified milk, for example), or conversion of vitamin D2 to vitamin D3 metabolically. It has been suggested that since adequate sun exposure negates the physiological obligation to ingest vitamin D, it is perhaps more proper to consider vitamin D a steroid hormone, rather than a vitamin (Norman, Henry 1993:63).

For Linda Reposa, the overall picture was most consistent with long-standing chronic osteoporosis, *not* due to lack of vitamin D due to her sun exposure and recent intake of vitamins (although the latter was probably too late to effect her long-standing joint condition). This is most consistent with a condition brought on by overwork and poor dietary calcium intake. My own observations suggest that dietary intake among the elderly of Tzintzuntzan was lacking in dark green leafy vegetables and dairy products, and thus conducive to developing osteoporosis. Earlier I mentioned how these foods, rich in calories and protein, are low in some minerals, such as potassium. Calcium is also lacking in this preferred diet. Tortillas do contain lime (a mineral form of calcium oxide), but the quantity of tortillas ingested may be insufficient to provide meaningful calcium supplementation to an otherwise low calcium diet. The best intervention to prevent

osteoporosis in the elderly of Tzintzuntzan would be dietary, involving increasing the intake of calcium. Increasing vitamin D intake or sun exposure would be unlikely to help. Estrogen supplementation in elderly females would also be important.

Public health concerns may conflict at times. Consider, for example, the competing issues of osteoporosis versus skin cancer. In the United States, malignant melanoma is the cancer increasing in incidence most rapidly. As I write this, I am also consulting daily on a patient in the hospital in the United States with metastatic melanoma who developed gout as a consequence of the stress of surgery performed to remove his cancer-ridden spleen. Though calcium intake is a problem, vitamin D intake is generally adequate in most populations except for the housebound elderly, due to the prevalence of supplemented foodstuffs such as milk and dairy products. The compelling public health interest is to minimize sun exposure through the liberal application of sun screens and sun avoidance.

In Tzintzuntzan, by contrast, calcium intake is less than optimal, but patients like LE Reposa still manage to maintain a normal serum calcium level, suggesting a protective effect due to more than adequate skin synthesis of active vitamin D3 due to sun exposure. Is there a "greater good" argument to allowing sun exposure to be encouraged at the expense of more solar damage and a few skin cancers in return for minimizing the prevalence of osteoporosis? Would this argument still carry weight at high altitude locations, where the sun's rays are even more damaging? One could point out evidence that chronic sun exposure, though causative of aging of the skin and squamous cell

carcinomas, may not be as likely as intermittent sun exposure to cause melenomas. Such an argument in favor of sun exposure might run into difficulty, however, since relatively little sun exposure is necessary to synthesize enough vitamin D to fulfill metabolic requirements. Moreover, the sun damage issue is real and preventable and there are other ways to get vitamin D. Ostoeporosis could be minimized without sun damage through increased consumption of dairy products and dark green leafy vegetables. Lactose intolerance with dairy products would make it difficult to encourage milk consumption. The analysis of calcium levels in Tzintzuntzan raises thorny issues in which public health interests conflict with cultural dietary preferences, as was the case with our analysis of BUN, creatinine, and glucose levels.

One thing is clear from the case of Linda Reposa and an analysis of her history, physical examination, laboratory tests, and blood parameters. An understanding of health requires an integrative approach which draws from anthropological insights into life histories. Future efforts to improve the health of villagers in Mexico may need to balance competing public health concerns in a difficult manner, such as balancing the beneficial effects of sun exposure in maintaining normal serum calcium against the damage in terms of skin cancer and premature aging of the skin. Innovative approaches which do not require such trade-offs may depend on the insights which anthropologists and public health workers can develop working together.

Liver Function Tests (normals are total bilirubin 0.1-1.2 mg/dl, direct bilirubin 0.1 - 0.3 mg/dl, ALT 9-50 U/l, AST 12-42 U/L, Alkaline phosphatase 36-122 U/L).

Both Mr. Gonzalez and Ms. Vegas were evaluated with serum liver function tests (Table 18). These are laboratory tests designed to assess the functioning of the liver tissue. In rheumatoid arthritis patients this is a routine test for a couple of reasons. First, any disease modifying anti-rheumatic drug which might be employed to treat the arthritis has the capacity to injure the liver. In the case of Gonzalez, he was on both methotrexate and aspirin-like drugs, both of which are potentially hepatotoxic. Secondly, therapies which might be considered need to be evaluated in light of liver function. Thus, an elevated liver function profile, caused by leakage of liver enzymes into the blood after liver injury, would contraindicate certain medications. Mr. Gonzalez's liver tests revealed normal levels of AST, ALT, Alkaline phosphatase, and total bilirubin. Direct bilirubin (the form which is altered by liver prior to removal from the body), was minimally elevated, whereas indirect (chemically unaltered) bilirubin was normal. The picture was one of a normal liver in a non-drinker, perhaps strained a bit by the judicious use of methotrexate and non-steroidal anti-inflammatory drugs. Alkaline phosphatase levels were a little low, perhaps due to decreased metabolic activity in old age.

Vegas' liver profile also revealed a slightly elevated direct bilirubin, with normal ALT, AST, Alkaline phosphatase, total bilirubin, and indirect bilirubin. Why? One possibility is laboratory error, especially since the only other rheumatoid had the same profile. Another possible explanation is gallstones, but these would typically cause elevated alkaline phosphatase as well. I favor the explanation that this was a slight laboratory variation which was due to use of anti-inflammatory drugs and of little consequence.

In summary, liver function tests revealed that the only two rheumatoid arthritis patients studied, a man and a woman, were tolerating medications for their conditions well with minimally elevated direct bilirubin levels. No evidence of surreptitious alcoholism emerged, as liver tests would likely be more markedly diMr.upted in that case.

Urinalyses

Tables 19 through 21 summarize data from urine studies performed on the subjects selected for laboratory analysis. Urinalysis is a valuable tool in clinical medicine because it provides data concerning fluid intake, kidney function, ureteral disease such as stones, bladder inflammation as in urinary tract infection, and is readily obtained with a few simple laboratory tools (a microscope to look for bacteria, cellular casts, and crystals; a standardized laboratory strip of paper to test for glucose, protein, bilirubin). The urinalyses from our subjects confirmed in many ways our earlier impression of a culture in which the elderly eschew free water intake, resulting in a high prevalence of infection and perhaps kidney inflammation and stones as well.

Table 19: Urine analyses. SG=specific gravity, Alb=albumin, Glu=glucose, Acetone=acetone, Bili=bilirubin, Hgb=Hemoglobin, Ph=Ph value of urine.

Subject	SG	Alb	Glu	Acetone	Bili	Hgb	Ph
Cortez, Leticia	1.015	Neg	Neg	Neg	Neg	Neg	5.0
Chavalas, Nicolas	1.017	Neg	Neg	Neg	Neg	Neg	5.0
Geraldo, Francisco	1.020	Neg	Neg	Neg	Neg	Neg	5.0
Montañez, Jaime	1.023	Neg	Neg	Neg	Neg	Neg	5.0
Reposa, Linda	1.013	Neg	Neg	Neg	Neg	Neg	6.0

Table 20: Urine Microscopic analysis. WBC=white blood cells, RBC=red blood cells, Epi=epithelial cells per high powered field, Bact=bacteria (0=none, 1=few, 2=many), Ca++ = calcium crystals. For numerical values, numbers represent cells seen per high powered microscope field, for remaining categories, +=few, ++=many.

Subject	WBC	RBC	Epi	Bact	CA+ Crystals	Uric Acid Crystals	Mucous Strands	Granular Casts
Cortez, Leticia	12-15	0	++	++			++	
Chavalas, Nicolas	0-1		+	+			+	
Geraldo, Francisco	0-1	1-3	+	+			+	
Montañez, Jaime	1-3		+	++	+	+	++	0-1
Reposa, Linda	1-2		+	+			+	

Table 21: Gross urine appearance. Color and appearance represent gross appearance of urine, sediment describes density of precipitate after centrifugation. Heavy sediment suggests the presence of cells or crystals.

Subject	Color of Urine	Appearance	Sediment
Cortez, Leticia	Light yellow	Cloudy	Moderate
Chavalas, Nicolas	Amber yellow	Lightly cloudy	Moderate
Geraldo, Francisco	Amber yellow	Cloudy	Heavy
Montañez, Jaime	Light yellow	Cloudy	Moderate
Reposa, Linda	Light yellow	transparent	Moderate

Urinalyses revealed specific gravity determinations above the typical 1.010 level one finds in well hydrated patients. Specific gravity is simply the ratio of the weight of a volume of urine to a comparable volume of pure water. When elevated it suggests a concentrated urine with a large amount of sedimentation, cells, and debris resulting from a low volume of glomerular filtrate reaching the bladder. All of the subjects studied had relatively high urine specific gravities, ranging from 1.013 to 1.023. Linda Reposa had the lowest level at 1.013, which is interesting since she also had the only transparent urine and little evidence of infection by the other urine studies performed. This suggests that the pay-off for higher urine flow is less turbid and less frequently infected urine. Her urine still had some evidence of inflammation, as manifested by bacteria and white blood cells, but less than that of the other subjects tested.

Urine microscopic analysis should reveal no more than a rare WBC or RBC. Our subjects all had WBCs, and Geraldo had RBCs as well. Morover, one subject (Leticia Cortez) had a significantly elevated urine WBC level at 12-15 cells per high powered field, along with mucous stranding and epithelial cells, consistent with concentrated and infected urine. I treated her with antibiotics. The others had uniform presence of white blood cells, epithelial cells, bacteria, and mucous stranding. These are all findings seen in people with poor urine flow due to inadequate water intake. This picture is consistent with chronic low level bactiuria of the elderly. It is a risk factor for gram negative sepsis, which has a high mortality among the elderly.

Also significant was Nicolas Geraldo's hematuria. It may have represented inflammation of the bladder from infection or stones, but it might also prompt an evaluation for urinary tract carcinoma, most commonly bladder carcinoma, but at times renal cell or ureteral, in a more urban setting. He smoked, a major risk factor for bladder carcinoma. Nephritis or stones could also cause this. Prostate cancer would be another potential cause. Laboratory error remains a possibility, as with all of these studies.

Granular casts and both calcium and uric acid crystals were found in the urine of JS Montañez. This suggests inadequate fluid intake. Gout with hyperuricemia is another consideration. Crystals form in concentrated urine when compounds secreted in small amounts normally in the urine (which is the case for both uric acid and calcium), form microscopic foci of group adherence due to electromagnetic forces which are usually not significant with large urine volume.

Grossly, the urine of all subjects appeared cloudy, with the exception of LE Reposa (who had the lowest specific gravity as well, though still a bit high). The moderate to heavy sediment grossly visible along with the amber appearance of some specimens confirmed the universal tendency for these few elderly people selected for laboratory study to have very concentrated urine. In summary, the urinalysis data suggest that elderly Tzintzuntzeños are chronically dehydrated with a propensity to develop asymptomatic bacteriuria, symptomatic urinary tract infections, and urinary crystals, mucous strands, and granular casts.

Rheumatoid Factor (normally absent)

Three subjects were analyzed for the presence of rheumatoid factor. All three had evidence of possible rheumatoid arthritis on physical examination or by history, making the test a reasonable one to obtain with a reasonable predictive value for positive results. The test was run by the latex agglutination method, in which latex beads coated with IgG agglutinate in the presence of rheumatoid serum due to IgG, IgM, IgA, and IgE autoantibodies against the Fc fragment of IgG. This test is fairly sensitive for the diagnosis of rheumatoid arthritis, though false positives may occur in other inflammatory states such as hepatitis or tuberculosis, or in other rheumatic diseases such as systemic lupus erythematosus or scleroderma (Tighe, Carson 1997). Discussing the results of these tests will be a useful process as we seek to understand the prevalence of arthritic disease. Felty's original description of the triad of arthritis, splenomegaly, and leukopenia, known as "Felty's syndrome," is a rheumatic condition which I did not observe (Felty 1924; Pinals 1997). Data on rheumatoid factors obtained in this study are summarized in Table 22.

Table 22: Rheumatoid factors on three patients with possible rheumatoid arthritis. Normal is negative, any positive value is abnormal. 1:160 represents weakest dilution of serum at which latex agglutination still occurred.

Subject	Rheumatoid Factor
Montañez, Jaime	Positive 1:160
Gonzalez, Antonio	Negative (previously positive)
Vegas, Monica	Positive 1:160

Jaime Montañez had evidence of arthritis which was mutilating and affected his hands in a symmetric manner. As noted earlier, however, aspects of his presentation were atypical for rheumatoid arthritis. He had distal interphalangeal joint involvement, seen only in about 5% of RA patients, and his radiographs were most consistent with osteoarthritis (Figure 8). His rheumatoid factor, however, was a strongly positive 1:160. My feeling is that he had osteoarthritis with a false positive rheumatoid factor due to his intercurrent illnesses, including valvular heart disease with possible chronic subacute bacterial endocarditis, and perhaps also a component of hepatitis due to either alcohol consumption or perhaps chronic active hepatitis B (though this is conjectural, he had evidence of liver failure by examination).

Figure 8. Radiographs of hands of Jaime Montañez, PA view, revealing advanced osteoarthritis with proximal and distal interphalangeal joint osteophytosis

Mr. Montañez also had advanced degenerative arthritis of the lumbar spine along with spondylolisthesis, an anterior subluxation of one vertebral body on another, consistent with generalized osteoarthritis rather than rheumatoid disease (Figure 9).

Figure 9. Lateral radiograph of lumbar spine of Jaime Montañez, revealing osteoarthritis, degenerative disc disease with vacuum phenomenon, and grade I spondylolisthesis of L5 on S1

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Antonio Gonzalez had classic rheumatoid arthritis manifested by a symmetric destructive arthropathy and erosions on radiographs in a manner consistent with RA. His rheumatoid factor was strongly positive in prior determinations. On this evaluation, however, his rheumatoid factor was negative, his sedimentation rate was low, and his CBC revealed none of the normochromic, normocytic anemia frequently present in active RA and thought to be caused by ineffective erythropoiesis (Lipsky 1998). Thromocytosis and anemia often correlate with disease activity. The leukopenia of full-blown Felty's syndrome (Felty 1924) was also absent. He was treated for two years with a strong disease modifying anti-rheumatic drug, methotrexate, along with anti-inflammatory medication of the non-steroidal variety. This therapy was aggressive and consistent with current recommendations (Blackburn 1997), demonstrating that first rate medical care is available in Mexico for those with adequate funds. Gonzalez's examination revealed severe chronic deformities without the typical warmth, swelling, erythema, and tenderness of synovial tissue seen in acute rheumatoid arthritis flares. Thus he appeared to have "burned out" or less active RA, with a history of chronically positive rheumatoid factor determinations which had reverted to negative. Another possible explanation was laboratory error. The patient himself suspected this in light of his persistently positive rheumatoid factors before, and I have expressed my own reservations about the laboratory's accuracy in the discussion of mean corpuscular volume levels.

Mr. Gonzalez's radiographs showed not only the typical erosions of RA, but worsening erosions compared to one year previously (Figures 10 and 11). This suggested continued disease activity and a false negative rheumatoid factor due to laboratory error. I determined this by obtaining his prior radiographs obtained in Morelia one year previously. I then presented the radiographs and the clinical history to the U.C.S.F. Rheumatology Conference, leading to a general assessment that his erosions had worsened in one year. Thus, the consensus was reached that Mr. Gonzalez was a "robust rheumatoid," i.e., an individual with active ongoing disease manifested by considerable deformity and little in the way of active pain or complaints.

Figure 10. Radiographs of Antonio Gonzalez's hands, showing typical changes of rheumatoid arthritis: Carpal bone erosions, metacarpophalangeal erosions with ulnar deviation of the digitproximal interphalangeal joint erosions, and soft tissue swelling. This picture was taken one year prior to radiograph in Figure 11.

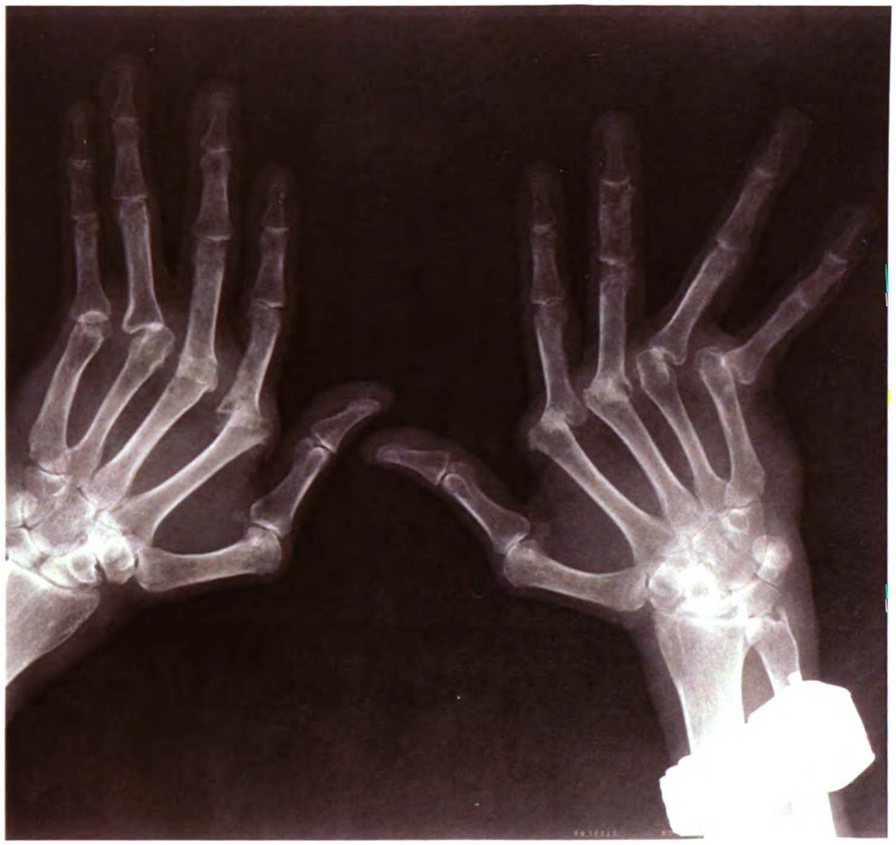

Figure 11. Antonio Gonzalez's hands one year after radiograph in figure 10 was taken, showing increased ulnar deviation and erosions, consistent with worsening rheumatoid arthritis despite aggressive therapy.

Monica Vegas had classic rheumatoid arthritis with deforming symmetric joint disease involving her hands and feet on examination. Her radiographs confirmed the impression, with an "arthritis mutilans" picture which would defy any attempt at surgical repair, based on extensive discussion with a hand surgeon (Figure 12). It was not surprising that her rheumatoid factor was strongly positive at a 1:160 dilution. In a recent review of age and gender, as predictors of mortality in rheumatoid arthritis, elderly women emerged as a group that may suffer earlier death as a result of RA (S. Anderson 1996). Monica Vegas certainly was quite frail due to her advanced rheumatoid arthritis, with an increased risk of death due to complications of the disease being a reasonable concern.

Figure 12. Radiographs of Monica Vegas with arthritis mutilans of advanced rheumatoid disease. Joints are grossly subluxed with carpal bones nearly completely eroded due to inflammation.

In summary, rheumatoid factor analysis revealed no clear cut rheumatoid disease among the 50 randomly selected subjects, though Mr. Montañez had a positive test consistent with chronic underlying hepatitis or infection. The two rheumatoid arthritis sufferers recruited from outside the study population revealed one positive test (true positive) and one negative test which is probably a false negative in light of persistent worsening disease by radiographic analysis and other positive rheumatoid factor tests in previous years at the regional hospital in Morelia. The example of rheumatoid factor analysis drives home the point that interpretation of blood tests, and particularly serological studies such as rheumatoid factors or anti-nuclear antibodies, requires that the clinician-anthropologist bear in mind an array of considerations, including disease prevalence, laboratory dependability, and other data acquired from physical examinations and radiographs.

Lab Summary

Laboratory data must be interpreted cautiously, due to the conscious selection of elderly subjects with arthritic conditions, and also because of the small numbers of subjects involved. Future studies will be able to assess larger numbers of subjects, allowing broader generalizations regarding health status to be made. Nonetheless, the evaluation of laboratory data was useful. The data painted a picture of elderly Tzintzuntzeños which was consistent and a bit disquieting. The elderly of the village appeared to be in chronic ill health, with low sodium levels due to intercurrent illnesses such as heart failure and liver disease, with somewhat poor kidney function due to dehydration, with evidence of chronic bacterial and parasitic infections by complete blood count and urinalysis results.

Among the elderly in Tzintzuntzan who have arthritic problems, a baseline level of overall chronic multi-system degenerative and infectious disease appears to be the norm, exacerbated by chronic dehydration caused by inadequate water intake.

A variety of cultural factors contributed to this picture of chronic ill health, including inadequate free water availability, distrust of water as a substance worthy of consumption, poor public sanitation and crowding, a high prevalence of rheumatic fever in childhood, and a high prevalence of alcoholism and smoking among men leading to chronic bronchitis, cirrhosis, and heart conditions. Few acute viral infections were observed, suggesting that recurrent encounters with respiratory pathogens in youth may result in greater immunity to acute viral infections in old age.

The randomized sample of 50 subjects will provide detailed information on the health problems afflicting the elderly. I will explore disease prevalence by organ system, and attempt to derive insight into cultural factors affecting health from these observations.

Chapter 4: Diseases of the Elderly

In this sample of 50 randomly selected patients, 153 diagnoses were made based upon the above-described history, physical examination, radiographic evaluation, and laboratory tests. Since prevalent diagnoses were found repeatedly, a higher number of conditions were found. Tables 23-34 present overall data reflecting absolute numbers of individuals with specific conditions, which represents the raw data from which we can discuss prevalence of specific conditions. Radiographic findings will be discussed within the appropriate clinical context. Disease categories are presented in the order which best allows me to discuss theoretical implications for understanding health among the elderly of Tzintzuntzan.

Osteoarthritis

Osteoarthritis (OA) is the most common joint disease in the United States, responsible for more chronic pain and debility than any other chronic disease of the elderly (U.S. Senate Special Committee on Aging 1991). Raw data on the number of individuals with clinical osteoarthritis among the 50 Tzintzuntzeños examined is seen in Table 23.

Table 23: Prevalence of osteoarthritis in population of Tzintzuntzan over age 60. OA= Osteoarthritis.

AGE GROUPS SEX M=MALE F=FEMALE	90-99 M / F	80-89 M / F	70-79 M / F	60-69 M / F
DIAGNOSIS				
Knee OA	1,1	4,3	3,6	0,7
hand OA	1,1	2,1	1,7	10,5
foot OA	0,0	3,0	6,4	3,6
shoulder OA	1,1	4,2	2,2	0,0
Hips OA	1,1	3,2	3,4	1,3
OA with Kyphosis	0,1	1,1	0,1	0,0
Low Back Pain w/ OA	0,0	3,2	8,4	4,9
Cervical Radiculopathy	0,0	0,0	0,0	1,1
Hypertrophic pulmonary osteoarthropathy	0,0	0,0	1,0	1,0
Hallux Valgus Deformity	0,0	2,2	2,2	0,0
Bunions	0,0	0,0	0,1	0,0
OA cervical spine	1,1	3,2	7,3	5,5
OA of thoracic spine	1,0	0,0	1,0	0,0
Osteoporosis, compression fractures	0,1	4,4	0,1	3,0
hallux rigidis	0,0	0,0	1,1	0,0
OA of metatarso-phalangeal joints	0,0	0,0	0,1	0,0
OA ankle	0,0	0,0	0,1	1,1
OA w/ degenerative disc disease and sciatica	0,0	0,0	1,0	2,0
contractures of hands	0,0	0,0	0,1	1,1
OA of elbows	0,0	0,1	1,1	1,0
erosive OA of hands	0,0	0,0	0,1	0,0
cock up deformities	0,0	0,0	0,1	0,0

OA has been described as a "truly universal disorder" which affects both sexes and all races, and it has been suggested that everyone, if he lives long enough, will have osteoarthritis somewhere, though in some cases radiographic findings are present in the absence of significant symptoms (Soloman 1997:1384). Autopsy studies suggest that beyond age 65 years the cartilage which cushions joints is deteriorated in the majority of individuals (Soloman 1997), and over half of all people over age 60 will have clinical or radiological evidence of degenerative arthritis (Felson 1990; Soloman 1997). In a sample of 50 elderly informants, osteoarthritis is something one can expect to be prevalent. It should be mentioned that there are dozens of less common forms of arthritis with prevalences on the order of a handful per thousand persons, which one would not expect to see in such a small sample. For example, arthritis is a frequent manifestation of infectious, auto-immune, and metabolic diseases ranging from hepatitis to hemophilia (Totemchokchyakarn and Bull 1997).

Clinically, osteoarthritis sufferers complain of slowly progressive pain and deformity of joints. Morning stiffness is also characteristic, though it typically is not present for hours (as is the case with inflammatory forms of arthritis such as rheumatoid). Hands, knees, and hips are most frequently involved. Often a history of trauma can be elicited, as in the case of the football player who "blows out" a knee with significant cartilaginous insult and menisceal tear. Prior to writing these words today, I evaluated 13 military veterans seeking disability benefits for medical conditions at the Veterans Administration Medical Center in Martinez. Twelve of the 13 (ranging in age from 26 to 59 years) complained of musculoskeletal conditions due to injuries sustained in the military, and the majority of

these had evidence of post-traumatic osteoarthritis, making the point that injuries can cause arthritis in the young, usually "degenerative" or osteoarthritis. An example was a 36 year old man who injured his left knee, left hip, and low back when his jeep collided with a tank in a training accident. He had evidence of degenerative arthritis at all three locations, and had required total joint arthroplasty of the hip. Osteoarthritis, though a disease of the elderly primarily, can affect people of all ages. Moreover, the severity of arthritis among the elderly does not necessarily increase linearly with age. For example, the oldest informant I identified in Tzintzuntzan, Don Cataldo, had relatively mild arthritic changes in his knees at age 97 (Figure 13).

Figure 13. Radiographs of knees of Alfonso Cataldo, showing mild degree of degenerative arthritis despite advanced age of 97 years.

Cultural factors may influence the development of osteoarthritis. For example, some evidence suggests that hip osteoarthritis is uncommon among both southern Chinese (Hoagland, Yau, Wong 1973) and sub-Saharan populations in Africa (Solomon 1997; Solomon, Beighton, Lawrence 1976), perhaps suggesting that environmental and behavioral factors such as a tendency to squat rather than sit in chairs may influence the likelihood of developing arthritis. The presence of other forms of arthritis among these populations, such as knee osteoarthritis among some African and Asian populations, suggests that there is not a genetic resistance to the disease (Solomon 1997).

Though men and women are both affected, women tend to develop symptoms in more joints. For example, the distal interphalangeal joints of the hands are often affected in women causing typical fusiform swelling know as Heberden's nodes, and this characteristic may have a genetic component with manifests more frequently among women in some families.

Men have traditionally been thought to be more prone to occupational and sports-induced injuries which predispose to osteoarthritis, such as knee arthritis in laborers and athletes (Lawrence 1977, Felson 1988; Soloman 1997), or hand arthritis ("jackhammer arthropathy") in workers who use vibrating tools (Schumacher, Agudelo, Labowitz 1972). These assertions are less and less valid in an age of increasing participation in

sports and professional opportunities among women in the United States. What of the sex differences in prevalence in rural Mexico among the elderly? This was a question I wanted to evaluate through prevalence studies of osteoarthritis. It seems to me that one could make a case for increasing joint trauma in women due to the double burden of working as young people in both the fields and the home environment, followed by an adulthood of chores and maintenance activities in the domestic sphere from which men are largely exempt.

Osteoarthritis was the only rheumatic condition for which I felt I could make studies of prevalence from a population of only 50 subjects. It would be impossible, for example, to posit prevalence observations regarding rheumatoid arthritis in a population of 50 people, because the absence of any cases would be statistically insignificant given a background point prevalence of around one percent in most populations. In the case of osteoarthritis, by contrast, one would expect to see a great deal of disease among the elderly, and we were not disappointed. Attempting prevalence analysis for individual subgroups, i.e., men between 90 and 99, would be meaningless because the subgroup samples are too small. Given this background, what do the data suggest?

Osteoarthritis was highly prevalent, as we can see from looking at Table 23. Lumbar spine, hands, knees, and feet were most commonly affected, in descending order of prevalence. 30 of 50 informants had evidence of low back osteoarthritis (60% point prevalence), 29 of 50 informants had hand involvement (58% point prevalence), 25 of 50 had knee involvement (50 percent point prevalence), and 22 of 50 had foot involvement

(44 percent point prevalence). All four age groups and both genders were affected. In addition, lesser amounts of OA were observed involving nearly every part of the body, including neck, ankles, elbows, and shoulders. As only a minority of patients could be radiographed due to logistical and economic considerations, this probably represents an underestimation of disease prevalence. I typically diagnosed arthritis when the history was classical and physical findings highly suggestive if not pathognomonic of the condition. In the case of hand OA this was fairly straight forward, as the bones are readily apparent and palpable. Clinical evidence confirmed by plain roentgenographs constitute the gold standard for diagnosing OA, though magnetic resonance imaging is being investigated as a method of detecting early degenerative change (Rubenstein et al. 1997). Plain radiographs typically demonstrate asymmetric joint space loss, osteophytes (bone spurs), subchondral sclerosis (thickening of the bone beneath the cartilage), and subchondral cysts (cavities in the bone under the endplate of the bone), findings which make the diagnosis of OA fairly straightforward in many cases (Flemming, Murphey 1997).

It appears that in Tzintzuntzan, as elsewhere, the heavily physical work which most men perform predisposes them to osteoarthritis of the hands. Figure 14 reveals typical joint space narrowing and sclerosis in the hands of Nicolas Chavalas, a man in his mid 80's.

Figure 14. PA radiograph of hands of Nicolas Chavalas, revealing osteoarthritis of distal interphalangeal joints.

Francisco Geraldo worked full time as a potter. On October 31, 1996 I discussed his case, and the possibility of finding successful treatment options, with to the University of California at San Francisco's rheumatology department. The consensus was that his clinical presentation was consistent with OA and not hypertrophic pulmonary osteoarthropathy (HPOA) and that his x-rays revealed advanced OA of the hands, knees, and LS spine without the typical periostitis seen in HPOA. He also had marked osteopenia consistent with osteoporosis. This could mean absence of HPOA or early HPOA developing without frank radiographic manifestations. My own conclusion was that Geraldo may well have suffered from HPOA manifested by clubbing and chronic bronchitis, along with superimposed OA (Figure 15).

Figure 15. Fluffy periosteal protrusions on PA hand radiographs of Francisco Geraldo, suggestive of hypertrophic pulmonary osteoarthropathy, or osteoarthritis.

Numbers within specific age-sex quartiles are not large enough to allow significant statistical evaluation, but a few comparisons are still worthwhile. Thus among the youngest group, between ages 60 and 69, 7 out of 14 women evaluated had evidence of knee osteoarthritis (50% prevalence), whereas no men had symptomatic knee arthritis among the 12 evaluated. Hand arthritis, by contrast, was present in 10 of the 12 men in this group (83% prevalence), but only 5 of the 14 women (35% prevalence). Could it be that arthritis is more of a problem for men in the hands, and women in the knees? If so why would this be the case? As older age groups appear to have a fairly even distribution of these conditions, it may be that there is something about the lifestyle of Tzintzuntzan that leads men to get hand arthritis earlier in life, and has a similar effect among women with respect to the knees. What would that be?

Men in Tzintzuntzan tended to be very active in pottery and agricultural work in previous years, and many apply themselves to artesenry work at present. These activities take a toll on the hands, involving repetitive motions of flexing and extending the fingers against heavy resistance. Women, by contrast, often kneel in the home and also are more likely to spend time at the local church in prayer. This seems to predispose toward arthritis of the knee. A predisposition towards arthritis in worker's in the home, known as "housemaid's knee," and pathologically characterized by prepatellar bursitis, is a well-known consequence of such activities. Working in the fields and with pottery also predisposes to osteoarthritis of the low back, which was often quite severe among elderly men in Tzintzuntzan. Figure 16 reveals the hips to be spared of OA, suggesting that the

tendency to sit in very low chairs in most homes is consistent to some extent with the South China model of squatting (Hoagland, Yau, Wong 1973), i.e., an environmental factor which diminishes arthritic changes of the hip.

Figure 16. AP radiograph of lumbosacral spine of Manuel Noguera, revealing levoscoliosis and degenerative arthritis. Hips appear to be normal.

9 of 14 women in their 60s reported symptomatic low back pain (64% prevalence), whereas 4 of 12 males in that group were so affected (33% prevalence). The back is not as easily examined as the knees and hands, due to intervening soft tissue. It may be that men in traditional Mexican rural environments are stoical, and that the difference in apparent OA prevalence is influenced by this. Nonetheless it was a fairly striking finding. Older subjects studied had too few members for comparisons of this type to be useful. Could it be that working as a potter, sitting in a stationary manner in front of a kiln or low table, placing pots in an oven or molding them with the hands, is less likely to traumatize the back than is the case with housework and domestic chores?

Living quarters were cramped, and women frequently rotated the torso as they negotiated internal spacial dynamics in acts such as washing, preparing food, and changing linen. Such lateral rotation movements increase pressure in the facet joints between vertebral bodies, predisposing to osteoarthritis. Men, by contrast, were called upon to lift heavy objects intermittently, usually outside of the house. For example, men lifted pottery into kilns. In previous years, men carried wood on their backs, though I observed this practice only once (the surrounding hills have lost most of their trees as a result of over-harvesting in this manner). A heavy load carried symmetrically on the back loads the spine in an axial manner, causing less facet joint pressure, even if a relatively massive object is carried (witness the ability of soldiers to carry back packs that nearly equal their body weights). It appears to me that women in the village are prone to low back pain due to their cultural roles as nurturers and housekeepers.

In summary, the evidence with respect to osteoarthritis suggests a high prevalence of this most common of arthritic disorders. Low back, hands, knees, and feet were most often involved. An unexpected finding was a tendency for women to be affected earlier in life by low back pain and knee pain due to OA, and a comparable tendency for men to be affected prematurely by hand OA. Cultural factors influencing this may include a tendency historically and to the present day for women to compromise knees and low back through household and religious activities, and for men to traumatize their hands occupationally.

Non-Arthritic Musculoskeletal Conditions

37 diagnoses of non-articular rheumatic conditions were made, summarized in Table 23. These are musculoskeletal conditions often referred to as "soft tissue rheumatism" by older physicians, representing disorders of muscle, tendon, ligament, bursa or tendon which spare the joint itself. Often osteoarthritis is coexistent, and the prevalence of these disorders rise with age.

TABLE 24: Non-arthritic musculoskeletal conditions in randomized sample.

AGE GROUPS SEX M=MALE F=FEMALE	90-99 M / F	80-89 M / F	70-79 M / F	60-69 M / F
DIAGNOSIS				
Tendinitis	0,0	0,1	0,0	0,1
Adhesive capsulitis of shoulder	0,2	2,1	1,2	0,0
Ganglion cyst	0,1	0,0	1,1	2,0
fractured tibia and fibula	0,0	0 ,0	0,0	0,1
Carpal tunnel syndrome	0,	0,0	0,0	0,1
subdeltoid bursitis	0,0	0,0	0,0	0,4
Post traumatic contracture	0,0	0,0	0,0	0,1
Flexion contracture	0,0	1,0	0,0	1,0
Evulsion, long head of biceps tendon	0,0	0,0	0,0	1,0
costochondritis	0,0	0,0	0,0	0,0
anterior cruciate ligament laxity	0,0	0,0	0,0	1,0
(knee internal derangement)	0,0	0,0		
Meniscal tear (knee internal derangement	0,0			
	0,0	0,1	1,0	0,0
Cock up deformities (toes)	0,0	0,0	0,1	1,0
Amputations	0,0	0,0	1,1	1,0
Plantar fasciitis	0,0	0,0	0,1	0,1
Pes planus deformity	0,0	0,0	0,0	0,0
Nocturnal leg cramps	0,0	0,0	0,0	0,1
Contractures	0,0	0,0	0,1	1,1
Prepatellar bursitis	0,0	0,0	0,0	0,1

Tendinitis was not highly prevalent (2%), but 9 of 50 individuals had adhesive capsulitis of the shoulder (18 percent prevalence). This condition, referred to as "frozen shoulder," involves soft tissue adhesions interfering with full shoulder movement. Adhesive capsulitis is an important functional problem, as it makes it difficult to remove a wallet from a rear pocket or put on a shirt or blouse. Adhesive capsulitis is a common end result from any shoulder injury leading to temporary immobilization of the shoulder. An injured person will hold the shoulder at rest, developing soft tissue fibrosis which limits motion. The high prevalence in Tzintzuntzan was widespread among both men and women. Why might this be the case?

In the United States, shoulder pain, usually due to injuries to the rotator cuff muscles which stabilize the shoulder, is commonly encountered in clinical practice (Evans, Minicaci 1997). House painters and car mechanics, reaching above their heads throughout the day, are frequently afflicted by this condition. By contrast, I observed relatively little shoulder pain in the elderly subjects I examined in Tzintzuntzan. Though 8 subjects revealed the diminished range of motion seen in adhesive capsulitis (16% percent prevalence), also known as "frozen shoulder," only 3 manifested the tenderness typical of rotator cuff tenditinis (6% prevalence). It is worthwhile to ask why the elderly in Tzintzuntzan have stiff but relatively painless shoulders.

Tzintzuntzeños live in a horizontal world. Most buildings are one story. Most daily activities do not involve reaching above the head. For example working as a potter, field

laborer, fisherman, or storekeeper generally does not involve reaching above the level of the shoulders. I observed potters and artisans sitting for extended periods working on their wares on flat wooden boards in front of them without lifting the arms above chest level (Figure 17). As a result, Tzintzuntzeños are not prone to tendinitis of the shoulder. They are, however, at risk for developing adhesive capsulitis as a result of not moving the shoulders through complete range of motion on a regular basis.

Figure 17. Men manufacturing chairs in the street, with arms below shoulder level.

Subdeltoid bursitis was seen in four individuals, perhaps a bit high in prevalence (8%), and this may have been a reflection of secondary injury associated with adhesive capsulitis. The subdeltoid bursa, a potential space between the deltoid muscle and the lateral humerus, is prone to inflammation when the shoulder is moved against resistance, as occurs when soft tissue adhesions prevent easy range of motion.

By contrast, carpal tunnel syndrome is nearly epidemic in our own country, but was seen in only one individual. The absence of keyboards is the likely explanation. Artesenry activities, pottery working, and household chores were frequently observed activities which did not involve the repetitive activity characteristic of keyboard data entry, for example. Carpal tunnel syndrome is a compression of the median nerve in the wrist thought to be caused by overuse of the hands in repetitive motions such as typing. A number of other conditions were present in one to three two isolated cases, suggesting that the elderly of the village suffer from a variety of soft tissue injuries. These included tendinitis, ganglion cyst, contractures, biceps long head tendon avulsion, ligamentous laxity, torn meniscus of the knee, toe deformities, amputations, plantar fasciitis, nocturnal leg cramps, finger contractures, and prepatellar bursitis.

Falls and Secondary Fractures

The presence of acute fractures among 2 of 50 subjects (4% point prevalence), caused by falling in both cases, suggests that falling is a problem for the elderly in this environment. One patient suffered a Colles' fracture of the wrist, the second a trimalleolar fracture of the distal tibia, both typical for fall-induced bone injuries. On examination, the woman

with the leg injury had diffuse ankle swelling and tenderness. The fracture had been casted, but. the bones were poorly approximated, suggesting that an operation to internally fixate the bones would have been a better treatment option (Figure 18). This kind of injury is generally referred to as a *Pott's fracture*, though Sir Percival Pott's original description in 1768 involved a fibular fracture with tear of the deltoid ligament (Simon, Koenigsknecht 1995:295). The mechanism of injury for such a fracture typically involves a combination of axial loading and either medial or lateral compression, so-called "primary injury forces" (ibid:296), consistent with the history of a simple fall provided by this subject. Thus, history and examination were consistent with falling down and fracturing a bone.

Why do the elderly of Tzintzuntzan seem to fall fairly frequently? To answer this question, it is necessary to first appreciate that falling is a public health problem for the elderly worldwide. By reviewing the medical literature on this issue, and then turning to specific issues in Tzintzuntzan, we will see that falling is a public health problem worthy of further study. Prevention of falls is a critical enterprise if we wish to maximize the health of the elderly in any part of the world, and medical anthropologists may be able to contribute to this endeavor.

In the U.S., accidents rank fifth among causes of death among older adults, with falls contributing to two thirds of these accidental deaths (Rubenstein, Josephson, Robbines 1994). One in three elderly in the United States fall each year (Campbell et al. 1989), with poor balance mediated by weak muscles or poor body alignment a causal factor

according to recent data (O'Brien et al. 1997). Three fourths of deaths caused by falls occur in the 13% of the population over age 65 years (Rubenstein, Josephson, Robbins 1994). Falls occur in America at a rate of 0.5 falls per older person per year, with depression and social withdrawal occurring as a result of fear of falling among elderly (Hough 1992). Falling and fracturing a hip portend a dismal prognosis, with 44 % of nursing home patients so injured dying within one year (Boyer 1993). Poor lighting, visual impairment, intercurrent illness, medications and environmental hazards also make falls more likely. Major risk factors for falling identified among 7575 elderly French women included slower gait speed, difficulty performing a tandem walk (walking toe to heel in a straight line), decreased visual acuity, and small calf circumference (Dargent-Molina 1996). In summary, falls are an enormous public health problem brought on by a combination of physiological and environmental problems. Does this information shed light on the 4 percent prevalence of acute fractures Tzintzuntzan?

Tzintzuntzan seems an ideal place to fall in. Houses are darkly lit, with irregular floors made of concrete or dirt. The elderly appear to have unsteady gaits, rarely use eyeglasses, and typically wear poorly-fitted shoes. The curbs are high and irregular, bordering streets littered with animal waste and rocks. Though an increasing number of major streets have been paved and equipped with sidewalks in recent years, many back streets are still dirt roads littered with debris. Mitigating factors that might minimize falling include a lower usage rate of prescription medications and continued activity in the form of work and walking regularly. There may be greater likelihood, in such an environment, of falling onto a soft surface that would not break a bone, but I have no

clear data to support this speculation. Less frequent use of sedating medications, compared to the U.S., may also militate against falling. On the other hand, however, the elderly in Tzintzuntzan are afflicted with many chronic conditions of the heart, lungs, eyes and ears, as we will continue to see, and these health problems predispose toward falling. On balance, the factors predisposing to falling seem to outweigh the factors protecting against falls in Tzintzuntzan, compared to what is seen in the U.S.

Clearly more research is needed to confirm this initial impression of a greater propensity for the elderly to fall in Tzintzuntzan than in the U.S. A larger study addressing the issue of falling directly might lead to public health recommendations to address the problem. For example, exercise training and nutritional supplementation have been shown by a randomized placebo controlled trial to increase stair climbing power and spontaneous physical activity in a study of 100 frail nursing home patients of mean age 87.1 years, with the potential of decreasing the terrible impact of falls (Fiatarone et al. 1994), and an effort to explore these interventions in Tzintzuntzan might be worthwhile. By first addressing the prevalence of falling and the mechanisms of falling, we may in the future be able to move on to prevention. Medical anthropologists, with their insight into behavior patterns and cultural obstacles to public health interventions, may play an important role in this effort.

Domestic Violence

In interviewing elderly female subjects, the issue of domestic violence emerged on rare occasions. For example, one elderly informant, Ms. María Villarreal, admitted to

separating from a husband years earlier due to spousal abuse and beatings. Such attacks typically occurred when the husband was drunk. At any rate, her examination suggested to me that she had not been assaulted. I relay her story to emphasize my concern in the village for discovering domestic violence when present. It seemed to me to be beneath the surface in many households, but difficult to substantiate clinically by objective means. A female investigator, as in the case with evaluating menopause or childbirth, might in the future have better access to this sensitive and important issue.

Figure 18. Anterior-posterior and lateral radiographs Ms. Villarreal's casted ankle reveal poorly reduced fractures of distal tibia and fibula, suggesting that open reduction and internal fixation would have been appropriate.

Fibromyalgia

Fibromyalgia is a condition characterized by aches and pains in soft tissue and pervasive fatigue, typically diagnosed in adult women in the United States and Europe. Fibromyalgia was absent among the fifty elderly villagers I evaluated. In fact the condition is unknown in the village, either by patients or local physicians. Yet, in the United States it so commonly encountered, and so perplexing to manage, that researchers have wondered if it should be called "bane of a rheumatologist's existence," (Solomon, Liang 1997), and it is estimated to have a prevalence of 11% in industrialized Western nations such as Norway (Forseth, Gran 1992). Can we make sense of this discrepancy in the relative prevalence of fibromyalgia among different cultures using data from Tzintzuntzan?

If fibromyalgia is indeed a physiologically mediated pain syndrome not associated with underlying emotional or family problems, we would expect to at least see a fair amount of it in Tzintzuntzan. I am not aware of an argument suggesting that genetic factors, for example, would render some populations less susceptible to fibromyalgia, or that certain geographic locations are required for its pathogenesis. This suggests to me that fibromyalgia has not found an emic definition in rural Mexican culture. As such, it does not exist in rural Mexico. I did find alternative somatization conditions which I believe take the place of fibromyalgia in rural Mexico, which I will briefly discuss later. Specifically, this absence suggests a repudiation of what I call the "organic" camp of fibromyalgia researchers in the U.S. (those that view it as a primarily physiological disease), and an endorsement of what I will call the "psychological" camp of researchers

in this area (those who view it as a manifestation of underlying emotional distress). Let us review the literature on fibromyalgia to lay the basis for this argument.

Economic and public health implications of fibromyalgia are not small. For example, the estimated yearly cost for service utilization among 538 fibromyalgia patients recently studied in 6 rheumatology centers was $2,274/year, with patients using a mean of 2.7 drugs each to treat the condition and averaging 10 outpatient visits a year (Wolfe et al. 1997a). Moreover, when followed for 7 years longitudinally, Health Assessment Questionnaire scores for these reveal continued abnormal scores for pain, functional disability, fatigue, sleep, and psychological status, with 59% of patients still describing their health as only fair or poor (Wolfe et al. 1997b). It should be mentioned that another study found more promising outcomes, with 66% of 35 patients followed for 10 years in one academic rheumatology practice reporting symptoms to be improved under therapy, but also reported that 79% of these patients still required medication to control their symptoms (Kennedy, Felson 1996).

The debate over fibromyalgia in the Western scientific literature is divided roughly between what I will call the "psychological" camp, which views the condition as a somatoform expression of affective disorder, and the "organic" school, which views fibromyalgia a specific disease entity with based on defined physiological dysfunction. Anthropologist Norma Ware has decried this sort of dialectic, pointing out that framing the debate over chronic fatigue syndrome as a conflict between "real" and "not real" illness tends to deligitimize the suffering of patients, perhaps reflecting a tendency among

health care workers to stigmatize psychological disorders and ignore the cultural significance of illness experiences (Ware 1992). Scheper-Hughes and Lock have similarly criticized what they view as a Cartesian duality of medical thinking, in which the mind and body are artificially viewed as separate, ignoring the intrinsic unity of the two systems (Scheper-Hughes, Lock 1987). It is true that dividing disease into somatoform and physiological categories is arbitrary to a large extent, and in fact modern neuroscience makes no such distinction. Nonetheless, let us explore the arguments for and against fibromyalgia as a primarily physical condition rather than a somatization disorder, seeing if this might shed light on the experience of the elderly in Tzintzuntzan.

The "organic disease" school of fibromyalgia research argues that fibromyalgia is a "real" condition with a physiological mechanism unrelated to depression or somatization. The American College of Rheumatology comes down on the "organic" school side in large part, having established criteria for the diagnosis of fibromyalgia in 1990, with tenderness in 11 of 18 designated bodily locations described by Wilke as having a "specificity of 81.1% and a sensitivity of 88.4%," (Wilke 1995:254). Tender points are sometimes measured with "dolorimeters" which produce constant pressure of up to 4 kilograms on a point, in an effort to quantify the nature of the stimulus needed to evoke pain.

Postulated pathophysiology involves a complex mechanism of depression leading to disordered state IV sleep, in turn causing decreased levels of central nervous system serotonin and endorphins, with release of substance P and pain as a common end stage

event (Wilke 1995). Electroencephalogram data revealing subjects may reveal alpha waves typical of resting wakefulness "intruding" into stage four levels of sleep which are usually not characterized by alpha waves, or evidence that fibromyalgia sufferers spend more time in stage 1 sleep (Côté, Moldofsky 1997). Diagnostic criteria include the presence of "trigger" points which are very tender, negative "controls," and the absence of evidence of other underlying rheumatological disease states. Studies purporting to show higher levels of substance P or biogenic amines in the cerebrospinal fluid of fibromyalgia patients (Russell et al. 1992, Vaeroy et al. 1988), have been critiqued for lack of control groups and weak statistical findings (Bohr 1995), but nonetheless represent arguments in support of fibromyalgia as a physiological condition.

Rheumatologists from the "organic" school eschew the idea that fibromyalgia may be mediated by cultural imperatives or psychiatric diagnoses. Studies from non-Western less industrialized countries are largely lacking, however, with multi-center trials describing fibromyalgia's prevalence largely deriving from large urban centers in the United States and Europe. Psychological problems among the "organic" school members are dismissed as factors involved in the pathogenesis of fibromyalgia. For example, Ried et al. recently reported a comparison of children with fibromyalgia with healthy controls and children with juvenile rheumatoid arthritis, finding "no statistically significant group differences in psychological adjustment, methods of coping, or family functioning for either the children or their parents," (Reid, Lang, McGrath 1997:758).

The "psychological/malingering" school, in contrast to the "organic" school discussed above, views fibromyalgia as a somatoform disorder, reflecting non-physiological anxieties and neuroses. Fibromyalgia is considered to be a recent addition to a litany of somatoform diagnoses dating to the 19th century. Shorter, for example, writes of the so-called "grand valetudinarians" of the 1860s who became "bed cases" for decades, unable to walk due to non-specific somatic pains. These are presented as early cases of a condition like fibromyalgia (or chronic fatigue syndrome, which is clinically indistinguishable in most cases), heralding the "modern endemic of chronic fatigue," (Shorter 1995:232).

The critics of fibromyalgia as an organic entity also view it as a non-specific syndrome. Neurologist Thomas Bohr, for example, writes:

> "It is recommended that the terms myofascial pain syndrome and fibromyalgia syndrome be dropped. An array of better choices exists, including aches and pains, chronic pain syndrome, generalized rheumatism, pain amplification syndrome, somatic dysthymia, hypervigilence syndrome, and affective spectrum disorder. These terms are more neutral, and are consistent with psychophysiologic formulations that encompass both soma and psyche, including illness behavior," (Bohr 1995:381).

Bohr's comprehensive review article on fibromyalgia criticizes the standardized ACR criteria for diagnosis as being a "garbage in/garbage out" committee consensus based on

metanalysis of flawed studies. He criticizes the lack of scientific rigor in many fibromyalgia trials, and argues that an underlying psychiatric problem, such as depression, is the causative factor leading fibromyalgia patients to complain of pains everywhere (Bohr 1995). Data supporting underlying depression or anxiety in fibromyalgia patients includes a finding that 53% of eighty-three fibromyalgia patients surveyed recently reported that they had been sexually or physically abused (Boisset-Pioro, Esdaile, Fitzcharles 1995). Women reporting physical or sexual abuse are more likely to complain of functional (non-organic) disorders such as irritable bowel syndrome (Drossman et al. 1990), so why not fibromyalgia as well? The implication of such an observation is that fibromyalgia is a manifestation of emotional distress, similar perhaps to other conditions such as reflex sympathetic dystrophy, a condition causing regional pain in extremities, which has been referred to as a condition whose sufferers "neither have nerve injury nor other organic dysfunction to explain their symptomology," (Ochoa, Verdugo 1995:359)

Furthermore, patients with fibromyalgia commonly manifest the depressed mood and sleep disturbances of patients with major depression. This suggests that fibromyalgia may be a manifestation of an affective disorder rather than a separate diagnostic entity (Hudon, Pope 1996). Psychiatrists from Georgetown University recently addressed this issue directly:

> "Many of the complaints seen in patients who have fibromyalgia fall into the category of neuropsychiatric problems. These include headache, fatigue,

depression, anxiety, and sleep disorders. The symptoms of fibromyalgia syndrome (FMS) also overlap those seen in patients with psychiatric disorders or with disorders of unknown cause, such as chronic fatigue syndrome (CFS). Because of these overlaps and because no organic cause for the physical complaints of FMS is found, patients are often dismissed as having a 'functional' or psychiatric problem," (Retfalvi, Rosse, Deutsch 1977).

Anti-depressants improve fibromyalgia, another argument for a primary psychiatric cause as the underlying problem. A recent comparison of fibromyalgia and chronic fatigue syndrome suggests the two conditions are identical, concluding, "CFS and FM are clinical conditions characterized by a variety of nonspecific symptoms including prominent fatigue, myalgia, and sleep disturbances. There are no diagnostic studies or widely accepted, pathogenic, explanatory models for either illness," (Buchwald 1996:236). Others have cautioned that it may be made to frequently without ruling out inflammatory forms of arthritis such as ankylosing spondylitis which can cause pain at tendon insertion sites (Fitzcharles, Esdaile 1997).

Rubel's work on *susto* might be useful in evaluating somatization disorders. Rubel and colleagues found that *susto* often represented a socially acceptable way for individuals stressed by life, and perhaps other diseases such as iron deficiency anemia, to be excused from social obligations and recover (Rubel, O'Nell, Collado-Ardón 1991, Rubel 1977). Susto may correspond in some respects to fibromyalgia, but I believe another condition is worthy of considering, which I will refer to as non-ulcer dyspepsia. *Ataques de corazón*, a

feeling of anxiety associated with chest pressure, is another alternative fibromyalgia equivalent in Mexico. The presence of alternative somatization disorders in Mexico, along with the absence of fibromyalgia, suggests that fibromyalgia is an emically constructed culture-bound illness of industrialized Western countries. The data derived from studying the elderly of Tzintzuntzan are thus relevant in seeking to understand public health dilemmas in other cultures. Tzintzuntzan offers a mirror against which we can look at our own health problems, with an anthropological approach of cross-cultural comparison allowing us to focus our gaze on this mirror.

Summary of Musculoskeletal Conditions

In summary, an analysis of non-arthritic musculoskeletal conditions among the elderly in Tzintzuntzan reveals widespread problems with tendinitis, bursitis, and an array of other problems, much as we would see in the United States. What stands out as different is a high prevalence of shoulder problems, particularly bursitis and diminished range of motion. Falls were encountered as causes of two fractures. The issue of traumatic injury due to domestic violence was not resolved by this research, though I have suggested that women report history of abuse by drunken husbands on occasion. I have suggested that occupational activities predispose to shoulder immobility and pain, and that falling is more prevalent due to both environmental and health factors. Fibromyalgia was notably absent, lending weight to the argument that it is a functional disorder rather than a discrete diagnostic entity.

Cardiovascular Conditions

Table 25 summarizes cardiovascular conditions, and chronic pulmonary conditions, in Tzintzuntzan. Atherosclerotic coronary artery disease (ASCAD) was probably diagnosed too infrequently. Without an EKG machine, only individuals with a clear history of a myocardial infarction would be detected, and we know that "silent" myocardial infarctions can occur frequently. Similarly, we know from autopsy studies that many clinically "healthy" individuals at young ages manifest thickening of arteriolar walls and plaque formation in the absence of classic chest pain. Thus, I picked up only 6 cases of clear cut ASCAD (prevalence of 12%), but the true prevalence may have been much higher. Six individuals gave histories suggestive of angina pectoris, which is seen in the presence of chronic ASCAD, leading to a total of 12 individuals who either had angina or a history of diagnosed heart disease (prevalence of 24%). Five of the cases reporting a history of heart attacks were women, but among those reporting angina, half were men and half were women. This may represent a true gender disparity, but one must also consider the possibility that men were more stoical and less likely to admit to symptoms of chest pain.

Table 25: Cardiovascular and chronic pulmonary conditions among sample of 50 Tzintzunznenos.

AGE GROUPS SEX M=MALE F=FEMALE	90-99 M / F	80-89 M / F	70-79 M / F	60-69 M / F
DIAGNOSIS				
Atherosclerotic coronary artery disease	0,0	1,3	0,0	0,2
Congestive heart failure	0,0	0,2	0,0	0,1
Intermittent claudication of legs	0,0	0,0	0,0	0,0
Hypertension	0,1	0,0	0,1	0,7
Transient ischemic event	0,1	0,0	0,0	0,0
Mitral valve insufficiency	0,0	0,0	0,0	1,0
Varicose veins	0,0	0,0	0,0	0,2
Status post hydrocele surgery	0,0	0,0	0,0	1,0
Angina pectoris	0,0	0,0	1,0	2,3
Aortic stenosis w/ Tachycardia	0,0	0,0	0,0	1,0
Telangiectasias of face and chest	0,0	0,0	0,0	1,0
Phlebitis	0,0	0,0	0,0	0,1
Mitral Regurgitation	0,0	0,0	0,0	0,0
Isolated systolic hypertension	0,0	0,2	0,0	0,1
Tachycardia, idiopathic	0,0	0,0	0,0	0,1

In interviewing subjects, most understand an *ataque de corazón* to be a transient event with acute chest pain and shortness of breath, perhaps with palpitations, precipitated by anxiety or fatigue. The concept of permanent damage to the underlying heart muscle resulting from a heart attack is largely unknown in Tzintzuntzan. Women were more likely to report a history of heart problems. Individuals with a history of panic attacks or hyperventilation syndrome (both more common among women than men in the U.S.) may report having heart problems in Mexico, leading to an increased self-reported level of heart disease among women. However, the evidence regarding congestive heart failure and hypertension suggests that women may suffer more heart disease than men in Tzintzuntzan, and we know that the high prevalence of heart disease among women in America has been underappreciated, with studies tending to concentrate on the health problems of men to the exclusion of those in women.

Congestive heart failure (CHF) can be detected by physical examination in most cases. The presence of abnormal heart "gallops" (S3 or S4 sounds as opposed the normal "lub dup" of the S1 and S2 heart sounds), peripheral edema, jugular venous distention, and congested lungs all reveal evidence of inadequate cardiac ejection fraction. This was observed in 3 individuals, all female. In a sample of 50 elderly people, six cases of CHF is not unexpected. It suggests that underlying atherosclerotic coronary artery disease is prevalent, with heart failure manifesting more often than acute chest pain. In all likelihood, myocardial infarctions are perceived as cases of acute indigestion or anxiety, and emergency department visits are not prompted by the cardinal symptoms of chest pain, nausea, vomiting, arm pain, or chest pressure, as would be the case in developed

countries with greater public awareness of heart disease. The possibility that sub-clinical rheumatic heart disease with valvular insufficiency played a role here was discussed earlier.

Hypertension was detected in 9 subjects, all females (17% prevalence). Hypertension was diagnosed when diastolic blood pressure was greater than 90 mm Hg (millimeters of mercury), and systolic blood pressure was greater than 140 mm Hg. Whereas one could suggest that the increased prevalence of heart disease among women examined represented an aberration due to gender disparities in willingness to report heart disease, the hypertension data is an objective finding suggesting increased cardiovascular stress among women. In the case of isolated systolic hypertension, defined as a systolic blood pressure above 160 mm Hg with a normal diastolic blood pressure, all cases identified were female. Thus 12 out of 12 subjects with increased blood pressure readings were women (25% of women, 0% of men). This is rather astounding, as hypertension is more prevalent in men than in women in our own culture, with a corresponding increase in the prevalence of heart disease among women. It is also surprising since alcohol consumption, much more prevalent among men, typically is considered a risk factor for developing hypertension, probably due to withdrawal symptoms causing increased release of catecholamines and increased arteriolar resistance (Potter 1997, Klatsky 1996). What is going on here? Vegetarians have lower blood pressure in most cultures (Beilin 1993). Could it be that women eat more meat in Tzintzuntzan relative to body weight? I tend to doubt this, but more research in this area might prove useful.

It is highly speculative to try to explain the blood pressure disparity in Tzintzuntzan, but I will attempt to cast some light on this issue. To do so it is necessary to search for behavioral factors in the village which might predispose men to high blood pressure, or women to low blood pressure. What distinguishes women from men with respect to cardioprotective or cardiotoxic activities? Stress levels, alcohol abuse among men, and domestic violence may play a role here.

Hypertension has not been linked to life stress by randomized prospective studies. Nonetheless, it is considered a "rebuttable presumption" in evaluating police officers and fire fighters for workman's compensation benefits in the State of California that any heart attacks sustained resulted from stress, with transient increases in blood pressure and serum catecholamines considered causal mechanisms (Newton 1996). A recent monograph on the issue of stress and hypertension suggests that pressures of daily life may be one of many environmental and behavioral factors that contribute to the development of hypertension in a genetically predisposed subject (Shapiro 1997). Former prisoners of war under the Japanese in World War II are often granted veteran's disability benefits under the assumption that beatings and the threat of execution may damage the heart through similar mechanisms. Non-pharmacologic remedies for hypertension have focused on stress reduction through biofeedback and meditation. Thus it is not unreasonable to consider increased blood pressure as a manifestation of stress.

Domestic violence, particularly in a culture which sanctions alcohol abuse among men, may have contributed to the high rate of hypertension among women. Several women did intimate that the men in their lives had caused them anxiety and stress through their carousing and drinking while young. There may be some truth to this stereotype, with a resultant degree of powerlessness and frustration emerging in women, manifesting as hypertension.

Claudication, a syndrome of acute muscle pain in the lower extremities caused by peripheral vascular disease, was detected in two men. The individuals gave the classic history of severe calf pain occurring after walking a couple blocks, relieved by rest only to occur again. Physical findings in intermittent claudication involve diminished popliteal and dorsalis pedis pulses, sluggish capillary refill in the feet, and diminished skin appendages such as hair roots along the pretibial surface of the lower legs. Both individuals so affected were men, and smoking probably played a role in this condition in both.

Remaining cardiovascular conditions diagnosed included transient ischemic attacks, mitral valve insufficiency, varicose veins, hydrocele (swollen veins in the scrotum), aortic stenosis with tachycardia, idiopathic tachycardia and phlebitis, as outlined in Table 25. These conditions only confirm that valvular heart disease was not uncommon and that the elderly suffered a wide variety of cardiovascular conditions.

In summary, the cardiovascular profile of the elderly in Tzintzuntzan is incomplete, due to methodological limitations which precluded exercise tolerance testing, MUGA scans, Thallium scans, angiography, or other sensitive tools for detecting coronary artery disease. Therefore, accurate estimates of disease prevalence are probably impossible. The tendency for past attacks of anxiety to be reported as "heart attacks" may also cloud the picture. The only observation which appears significant enough to comment on was that elderly women were afflicted with hypertension to a surprising extent. Non-physiological parameters reflecting life stress and possible domestic violence may represent causal factors, perhaps implicated in the etiology of hypertension in the same manner as *susto*. Perhaps the concept of the "rebuttable presumption" should be extended to the women of Tzintzuntzan with respect to the deleterious effects of subjugation and stress on their hearts and blood vessels.

Dermatologic Conditions

Skin diseases are summarized in Table 26. Non-specific solar damage refers to generalized irregular pigmentation and thinning of the skin seen with sun exposure. Most of the damage we accrue in our dermis is a result of the cumulative injury of ultraviolet light exposure rather than "normal" aging. Twelve subjects were observed to have these findings, with another 15 with evidence of elastosis, or loss of elasticity of the skin with aging. Pre-cancerous actinic keratoses were seen in another 12 subjects. These are superficial lesions which often progress into squamous cell carcinomas if not removed surgically. They were most evident on the backs of the hands of older subjects. Seborrheic keratoses, brownish plaques which appear on the skin of older individuals,

were also seen in a couple subjects, and irregular moles which might have the potential to progress into melanomas were seen in 7 others, listed as dysplastic nevi. Irregular skin pigmentation was seen in two other subjects. Thus, a total of 50 different conditions caused by sun exposure were picked up in these 50 subjects. In fact, the incidence is underestimated, as I did not examine the entire skin surface due to lack of a proper examining room environment, and as I examined people in poorly lit houses. I would state that there was a 100 percent prevalence of sun damaged skin among these elderly villagers, with about 25% of subjects exhibiting precancerous lesions (Figure 19).

Table 26: Dermatological diseases among 50 village subjects.

AGE GROUPS SEX M=MALE F=FEMALE	90-99 M / F	80-89 M / F	70-79 M / F	60-69 M / F
DIAGNOSIS	0,0	1,0	0,0	1,0
Venous stasis ulcers	0,0	2,1	0,2	2,3
Onychomycosis	0,0	0,0	1,0	0,0
Subungual hematoma	0,0	0,0	1,1	1,0
Vitiligo	0,0	0,0	0,0	0,0
Solar damage, non specific	0,0	1,1	0,4	4,3
Elastosis	0,0	3,3	0,2	2,2
Seborrheic keratosis	0,0	0,0	0,0	1,1
Actinic Keratosis	0,0	3,2	2,1	0,2
Dysplastic nevi	0,0	0,0	3,0	1,0
Mule bite	0,0	2,0	0,0	1,0
Dermal ulcers, non-specific	0,0	0,0	0,0	1,0
Abrasions	0,0	0,0	0,0	1,0
Contact Dermatitis	0,0	0,0	0,1	0,0
Herpes Simplex Virus	0,0	0,0	0,0	0,0
Common warts	0,0	0,1	0,0	0,1
Cellulitis	0,0	0,0	0,0	0,1
Alopecia,non-male pattern	0,0	0,1	0,0	0,0
Skin tags	0,0	0,0	0,0	1,0
Irregular skin pigmentation	0,0	0,1	0,0	0,1

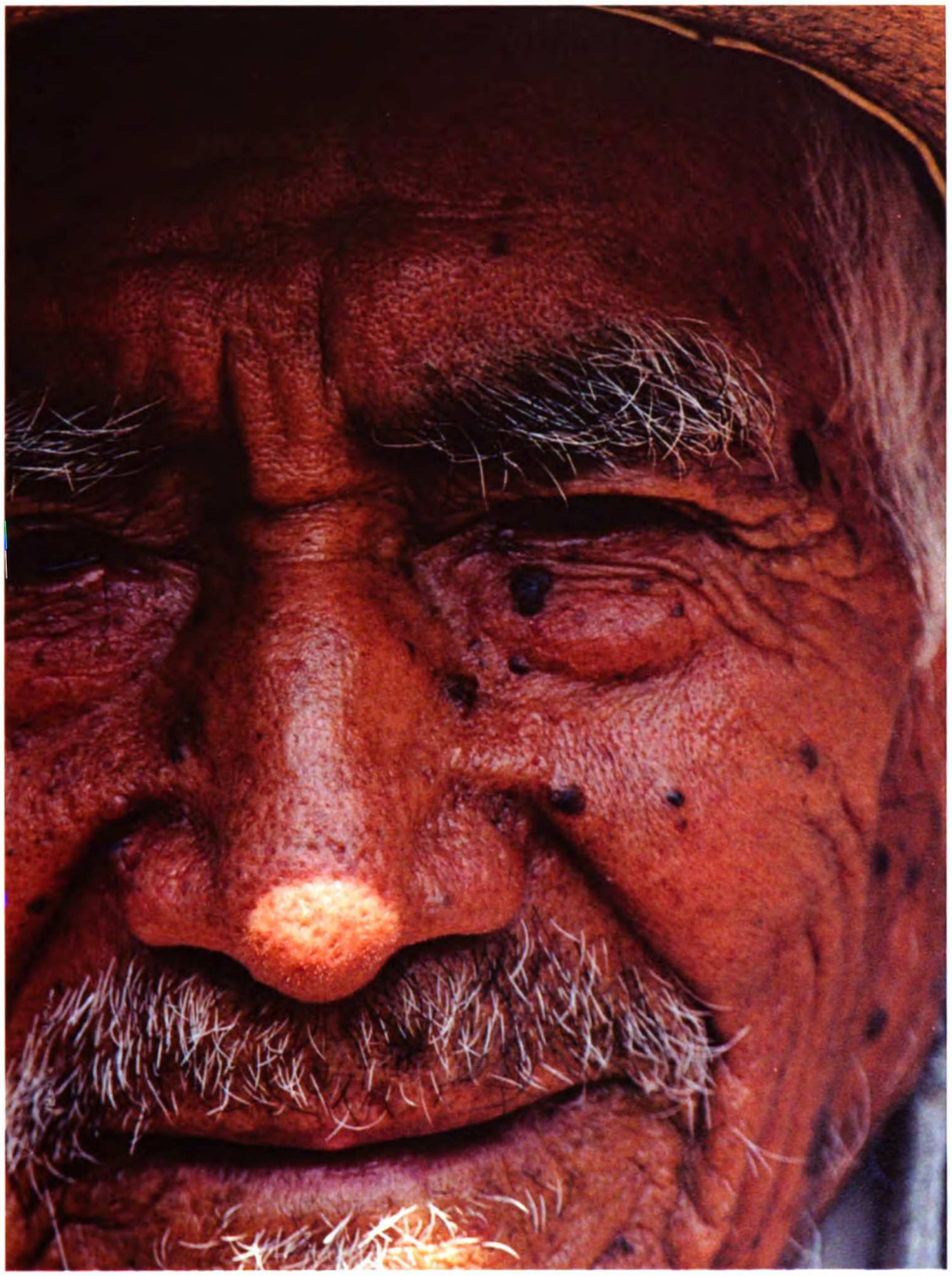

Figure 19. 97 year old Tzintzuntzeño with sun-damaged skin.

Malignant melanoma, the fastest growing malignancy in the United States today, was not seen in Tzintzuntzan. There are several explanations worth considering. Most people with melanoma would die without receiving chemotherapy. Also, long term steady sun exposure, though a major risk factor for squamous cell carcinomas which are locally invasive, does not appear to predispose to melanoma in the same way as intermittent intense sun exposure. For this reason, the American executive who spends a weekend in the sun playing tennis or boating and then returns to his office with an acute sun burn may be more prone to the fatal melanoma than someone living in Tzintzuntzan exposed to sun on a daily basis. Tzintzuntzeños also appeared to be fairly darkly pigmented compared to many European populations, with a resultant protective effect with respect to melanoma. They also routinely cover their skin with clothing, hats, or scarves. Elderly Tzintzuntzeños appear to be heavily damaged by chronic sun exposure. If a larger sample were studied for many years we might have identified deaths due to melanoma, but a point prevalence study did not reveal any cases. Finally, it should be added that as an internist I am trained to identify typical skin conditions which may arise; a board certified dermatologist undoubtedly would have identified more pathology.

The presence of fungally infected toe nails was also high, at 16 percent. It suggests exposure to warm damp environments and difficulty maintaining the feet in a clean and dry condition. Foster outlined the annual rainfall statistics long ago, and there is enough precipitation to keep courtyards wet through much of the year (Foster 1948). Skin examination also revealed venous stasis ulcers in 2 subjects (4% prevalence), caused by varicose veins, fungal infections of the nails in 8 subjects, an isolated burn, a subungual

hematoma (collection of blood under a nail caused by trauma), vitiligo (diminished pigmentation in a speckled pattern, thought to be due to an autoimmune disorder), a mule bite, non-specific dermal ulcers in one patient, an abrasion, a case of contact dermatitis caused by a local irritant effect, a case of herpes simplex virus infection, two cases of warts, a case of cellulitis (infection of the skin due to bacteria), baldness probably caused by a fungus infection in one case, and one case of skin tags (benign growths on the skin, probably caused by local irritation). These conditions collectively represent an array of pathology not surprising in any older population. The exceptions are the mule bite, hematoma, abrasion, and burn. Four cases of traumatic insults to the skin corroborate the observation made with respect to falls and fractures, i.e. that the elderly of Tzintzuntzan seem prone to accidents, many of which are tied to continued activity in old age. Fully 8 percent of those examined had at least one injury to the skin.

In summary, the evaluation of skin diseases among the elderly of Tzintzuntzan paints a picture of a hard life. All of the elderly have mottled, thinned, sun damaged skin, and 24% had the skin cancer precursors known as actinic keratoses. Though 14% had nevi which were dysplastic and could progress into melanomas, no active melanomas were seen. Wide spread evidence of traumatic insults to the skin (prevalent in 8% subjects), fungal infections of the nails (16% point prevalence), and one case of deep skin infection (point prevalence 2 percent) suggest that the elderly of Tzintzuntzan are besieged by traumatic, solar, bacterial, and fungal insults to the skin. Can we hypothesize why the skin suffers so in Tzintzuntzan?

The high solar damage associated with living at high altitude in a low latitude environment represents a doubly harmful effect caused by both intense sun and a relative lack of atmosphere to screen out harmful ultraviolet B rays. Moreover, sunscreen use was unknown among all participants, and all had long histories of working outdoors without protection during their youth. There was a tendency for men to wear hats with brims, and this undoubtedly mitigated the damage of the sun, especially among the elderly who wore such clothing in their youth. Sun damage was also reflected in a high prevalence of cataracts and pterygia, to be discussed elsewhere. Above all, there was no appreciation of sun as a cause of cancer.

The idea of cancer as a tumor was appreciated. However, there was no widespread fear of contracting cancer or dying of cancer, and the concensus of the elderly interviewed regarding health problems was that an individual might develop any illness if it was "God's will." There was a fatalism and lack of anxiety regarding serious illnesses in general. This is a double-edged sword, from a public health standpoint, with both salutory and deleterious effects. On the one hand, stress is a potentially harmful entity which can damage the health of anyone. We implicated stress as a possible factor leading to hypertension among women. On the other hand, an awareness of the harmful effects of sunlight exposure, cigarette smoke, or alcohol as potentially harmful cancer-causing environmental agents was lacking entirely among the elderly whom I interviewed.

There was no public health campaign aimed at educating the public regarding the harmful effects of sun exposure, for example. Thus, I believe that a combination of fatalism

(caused by religious belief) and lack of knowledge contributed to a high prevalence of certain chronic conditions. In the case of skin diseases, a complete lack of appreciation of the harmful effects of sun exposure among older Tzintzuntzeños was a major problem (one which may be remedied with greater public education among the young). It remains to be seen if awareness of this The economic deprivation and lack of formal education in the village played a role in fostering this ignorance, but we should avoid cultural chauvinism in this respect and recognize that citizens in our own country are also only recently being alerted to the damage caused by sun exposure. Sun exposure precautions are still not taken by the majority of American adults, suggesting that we are confronting something akin to the battle we fought with cigarettes (and are still fighting), in which public awareness of the importance of a preventive health measure lags a generation behind the publication of warnings by medical professionals.

Skin infections were prevalent for a variety of reasons. The poorly lit and irregular surfaces of streets were alluded to earlier in a discussion of falling and fractures. The presence of dirt courtyards or even dirt floors in some homes is a factor predisposing to infection of the skin and nails, leading to onychomycosis and cellulitis. Working until old age without retiring predisposes to accidents causing infections, as does the widespread distribution of animals (witness the mule bite observed). Fungal infections of the toe nails have been attributed to wearing shoes in Western industrialized cultures. The elderly in this community did wear shoes, with traditional *huaraches* not being seen. It may be that with increasing industrialization, and increasing use of constrictive clothes and footwear, the incidence of fungal infections of the feet and nails will rise.

Endocrine

Endocrine conditions are described in Table 27. Obesity was listed here, though I recognized that it is somewhat arbitrary and may be perceived as stigmatizing and ethnocentric. My reasoning was that since endocrinologists evaluate individuals complaining of obesity in our culture, this seemed a reasonable place to place that condition. Other conditions are also listed, including diabetes and gynecomastia (abnormal breast tissue in a male). Let us begin with an evaluation of obesity.

Table 27: Endocrine conditions and complications.

AGE GROUPS SEX M=MALE F=FEMALE	90-99 M / F	80-89 M / F	70-79 M / F	60-69 M / F
DIAGNOSIS				
Morbid obesity	0,0	0,0	0,0	0,1
Obesity	0,0	0,0	0,2	1,7
Gynecomastia	0,0	0,0	0,0	0,0
Non-insulin dependent diabetes mellitus	0,1	0,0	0,0	1,1

Obesity

Is it even reasonable to consider it pathological to be heavy? Body image is defined culturally, and the anthropological literature has clearly indicated that what physicians in the United States define as obese may be a sign of health and high socioeconomic standard in other cultures. Obese people in our own culture are often stigmatized and suffer discrimination. Advocates for the obese have questioned this tendency to pathologize increased body girth, and a movement to fight against discrimination and stigmatization of overweight is underway in America. The possible alienation and discrimination suffered by the obese is also an issue which should be acknowledged and respected.

Nonetheless, obesity has deleterious health consequences, and so is worthy of anthropological study as a public health concern (as well as an issue of self-identity, stigmatization, and cultural relativism). I have included obesity as an endocrine disorder with some trepidation because of its association with non-insulin dependent diabetes mellitus, hyptertension, elevated cholesterol levels, heart disease, respiratory illnesses, and osteoarthritis, and because of emerging evidence that obesity may rank only behind smoking as a cause of premature death in the United States, leading to as many as 300,000 deaths per year (Lerman 1997:16). Is it reasonable to view obesity as a public health problem in both Mexico and the U.S. because of these associations?

Epidemiological data from North America suggest that obesity needs to be addressed if we are to understand causes of death in elderly populations, including among

Tzintzuntzeños. For example, the prospective Nurses' Health Study, conducted with a cohort of 115,195 American nurses over a 16 year period, demonstrated a correlation between body-mass index and mortality from all causes in middle-aged women (Manson et al. 1995). Multivariate adjustment for smoking and other risk factors did not alter this association (Manson et al.:679). Being overweight appears to increase the risk of breast cancer in post-menopausal women (Huang et al. 1997). The lowest mortality rates were found among the leanest women, weighing at least 15 percent less than the average woman in the U.S., though extreme leaness was associated with some increase in mortality in a "J" shaped curve. Obesity has been described as an epidemic in the United States, with one quarter to one third of U.S. adults, or at least 34 million people, tipping the scales at 20% above desirable body weight levels, and a higher incidence of obesity among Hispanics (Manson, Colditz, Stampfer 1994). Some investigators regard obesity as, "the most pervasive epidemic disease of modern society," costing the United States perhaps $60 billion in health costs with another $30 billion being spent in the pursuit of ineffective diet remedies (Halstead 1997:3). If obesity is prevalent in Tzintzuntzan, it would be reasonable to infer that its cost to the economy and well-being of the village's residents would be great.

Can we estimate obesity in Tzintzuntzan going door to door without a scale? Probably not. Even the use of skin calipers or estimation of body mass index (BMI), measured as weight (kg)/height $(m)^2$ might not have provided data. Body mass index, though widely recognized as a good way to determine obesity (Garrow, Webster 1985), may be inaccurate in some populations which have not been studied carefully, due to variations in

"normal" body proportions which are overlooked when we use standardized tables based upon European populations. For example, New Zealand Polynesian women on average manifest a higher BMI than New Zealand women of European extraction with comparable percentage of body fat as measured by estimations of total body water using radioiOlverapes of oxygen to metabolic processes reflecting fat content (Rush et al. 1997). Due to the difficulty of carrying around a scale, and the relative inaccuracy of relying on crude measurements with skin calipers or even body mass index determinations (and the impracticality of doing sophisticated radioisotope studies), I simply estimated obesity by inspection, though I recognize the shortcomings of this approach.

Among Tzintzuntzeños studied, 11 were obese, and 1 was morbidly obese, defined as about twice ideal body weight. This represents a prevalence of obesity of 22 percent, lower than one sees among most populations in the United States. Explanations for this may include a tendency to walk a great deal due to lack of motor vehicles. Childhood experiences with malnutrition were common as well, and we know that though the majority of obese individuals become obese in adulthood, childhood obesity is a major risk factor for obesity in adulthood (Figure 20). Being lean in childhood, though not a guarantee of ideal body weight later, nonetheless confers a better likelihood of maintaining a healthy body proportion as one ages

Figure 20. Elderly woman and granddaughter, demonstrating obesity in different generations of one family (photo by Camille Castro).

Earlier the political movement of the obese in the United States was noted, a recent response to stigmatization of overweight. Is there similar stigma in Tzintzuntzan towards those with endomorphic physiques? While in Mexico I did not find obesity to be stigmatized by Tzintzuntzeños. To the contrary, being "gordito" was viewed as a sign of robust good health. A researcher from America, known well in the village, who had lost 20 pounds through exercise and dietary moderation, elicited anxious concern from village friends who worried about his weight loss and felt he was more robust when previously slightly heavier. While eating at a hospital in Guadalajara to which I traveled to give a lecture, I was also told that if I stayed in Mexico I would be "gordito" because of the better food, and this was viewed as desirable. The exception to this rule of "healthy fatness," if I may call it that, is the naturopathic physician Dr. José Oliveras Soto. He advocated a low fat vegetarian diet, and had a considerable influence on the inhabitants of the house in which he held a clinic once a week (though significant weight loss of his patients was not documented).

The literature on stigma may be helpful in sorting out the lack of censure and acceptance of being fat in the village. Ablon's study of short statured adults belonging to Little People of America identified stigma as a major hurdle for her subjects (Ablon 1984:23-25). Goffman's role in bringing the issue of stigma into the collective consciousness of social scientists emerges as a landmark in Ablon's analysis of this (Goffman 1963. At the extreme, Ablon notes, a condition may exceed stigmatization and be actively persecuted as a form of deviance, an area originally analyzed by Becker (1963) and Lemert (1951). Applying this paradigm to Tzintzuntzan, it would appear that being

overweight carries no stigma and certainly is not viewed as deviant. Both in terms of self-regard and societal standards being heavy is viewed as a sign of health. Thus the self-perception of an individual, as Goffman might say in an everyday life way, is not threatened (Goffman 1959).

Osteoporosis

Osteoporosis was prevalent among elderly women, as discussed under the laboratory section dealing with calcium and phosphorus levels. The major manifestation of osteoporosis encountered was compression fractures of the thoracic spine, seen in 4 of 50 informants (prevalence of 8%), with three-quarters of individuals revealing the typical "dowager's hump" of this condition being women. Radiographs of both thoracic and cervical spines often revealed typical compression fractures and osteopenia. Hand radiographs revealed that the cortical thickness of the combined metacarpal shafts corresponded to less than half of bone diameter, consistent with osteoporosis, in at least one elderly woman (Figure 21). More formal diagnostic imaging, with use of bone density scanning equipment, would undoubtedly have revealed a higher prevalence of osteoporosis, which often is clinically apparent only after a fracture causes pain.

Figure 21. Linda Cortez's hands on PA radiograph, revealing mild osteoarthritis and advanced osteopenia. Note diminished cortical thickness of mid metacarpal shafts.

Miscellaneous Endocrine Disorders

One case of gynecomastia (enlarged breast tissue, usually in a man) was detected, increased deposition of breast tissue in the male seen in Klinefelter's syndrome and other feminizing conditions, but also typical as an incidental finding in elderly males. Alcoholism is a predisposing factor as well, and may have played a role in this case (a male in the youngest age group). Diabetes was documented in four of 50 informants. As discussed earlier in the section on glucose levels, this undoubtedly represents an underdiagnosis of the condition, as blood sugars were not measured in all informants, and therefore I will not dwell on this. It was a self-reported statistic.

Patients were not screened for thyroid disease, as the necessary laboratory facilities were not available. It seems nearly certain that thyroid disease was therefore underdiagnosed. This is particularly true as classic signs of an overactive or underactive thyroid may be absent or atypical in the elderly. For example, the classical increased sweating, tremor, and heat intolerance of hyperthyroidism may be absent in the elderly who suffer from this condition, and they may present with the apathy or depression one expects to see in an underactive thyroid gland (Trivalle, Doncet, Chassagne 1996).

In summary, endocrine evaluation in Tzintzuntzan revealed a relatively low prevalence of obesity as the principle finding. Childhood malnutrition and a lifestyle with walking as a major activity may have contributed to this. Obesity was not stigmatized, but rather viewed as a sign of robust good health. This finding contrasts with our own culture, in which the prevalence of obesity is high, and the condition is condemned widely.

Diabetes may have been less prevalent as well, though lack of widespread screening makes this conjectural. Similarly, thyroid disease was not blatantly appreciated, but almost certainly would have been detected with thorough screening. More work in Tzintzuntzan may be needed to address these important issues.

Infectious Diseases

Infectious diseases, summarized in Table 28, were prevalent. Three of 50 subjects manifested acute viral upper respiratory infections (6% prevalence), 5 had congestion of the lungs consistent with bronchitis (10 % prevalence), 3 had sinusitis (6% prevalence), one had laryngitis (2% prevalence), for a total of 12 of 50 with acute upper respiratory infectious diseases (24% prevalence). Smoking probably played an important role. Most of the men smoked; none of the women did. Women, however, were exposed to second-hand tobacco smoke, as the concept of non-smoker's rights was absent among the villagers. For this reason, perhaps, men and women were equally afflicted with respiratory complaints. At least one subject, Francisco Ramon Geraldo, had significant chronic bronchitis induced by smoking.

Table 28: Infectious diseases among 50 randomly selected subjects.

AGE GROUPS SEX M=MALE F=FEMALE	90-99 M / F	80-89 M / F	70-79 M / F	60-69 M / F
DIAGNOSIS				
Viral upper respiratory infection	0,0	1,1	0,0	0,1
Urinary tact infection	1,0	1,0	1,1	1,0
Streptococcal pharyngitis	0,0	0,1	0,0	0,1
Bronchitis	0,0	1,0	0,2	2,1
Peritonitis, status post	0,0	0,0	0,0	0,0
Exploratory laparotomy	0,0	0,0	0,0	0,0
Sinusitis	0,0	1,0	1,0	0,1
Laryngitis	0,0	0,0	0,1	1,0
Dental caries	0,0	0,0	4,1	8,8
Gingivitis	0,0	0,0	0,0	3,1
Otitis media	0,0	0,0	0,0	0,1
Post-herpetic neuralgia	0,0	0,0	0,0	0,1
Onychomycosis	0,0	1,0	0,0	2,3
Cellulitis	0,0	0,0	0,0	0,1

Cigarette Smoking

Cigarette smoking among Tzintzuntzeños was engaged in as a social activity when cigarettes were available. It was not chronically undertaken throughout the day as is the case with American smokers. The reason was economic; most villagers did not have sufficient financial resources to buy cigarettes on a regular basis. As a result, although nearly all of the men interviewed indicated that they smoked "sometimes," few were observed actually smoking. This observation also suggests that fewer Tzintzuntzeños are heavily nicotine dependent, and that therefore smoking cessation public health campaigns might be quite effective due to less overt addiction to cigarettes.

Dental Caries

Striking also was the prevalence of dental cavities, with 21 of 50 subjects having grossly carious teeth (42% prevalence). Four informants had grossly inflamed gums, known as gingivitis (8% prevalence). Many subjects lost nearly all teeth due to dental decay and gingivitis (Figure 22). These oral conditions have the potential to cause secondary complications. For example, recent research indicates that chronic tooth decay and gum infection can be a minor risk factor for the development of heart disease. Dental infections can also cause soft tissue abscesses in the sinuses or soft tissues of the neck, with potentially fatal consequences. In the case of Ludwig's angina, the soft tissues of the floor of the mouth and the neck fill with pus, closing off the airway and causing death if prompt surgical intervention is not undertaken. Dental decay can also contribute to malnutrition. If one considers dental decay, gingivitis, and tooth loss, there were no

elderly subjects who were spared. They all had significant problems maintaining a mouth full of healthy teeth and gums.

Figure 22. Elderly woman with near complete loss of teeth (photograph by Camille Castro)

The reasons for the poor dental health of the elderly are several. First, there is a general lack of concern about dental loss, and an expectation that it is a normal and inevitable part of aging. Villagers do not brush their teeth regularly. One elderly informant told me, perhaps in gest, that he quit brushing his teeth after he got married. Preventive dentistry is unknown, with a trip to the dentist being a last ditch effort to alleviate acute dental pain, usually through extraction. There is not a public awareness of the importance of consuming calcium in childhood. Finally, changing dietary preferences with more use of refined sugar and soft drinks exacerbate the underlying poor dental health of the villagers.

One cannot seek to understand the health of the elderly without addressing the health of children. Though this was not undertaken systematically, I did observe several children with markedly carious teeth. The poor dental state of the elderly begins in childhood. I saw no acute toothaches, however. The natural history of dental decay is variable, and a sizable proportion of afflicted individuals may suffer gingivitis and tooth loss with only intermittent and mild pain, rather than acute dental abscess and facial swelling.

The poor dental health observed raises issues concerning the distinction between emic and etic explanatory models for disease. In Tzintzuntzan dental caries, gingivitis, and tooth loss are not pathologized to the extent that we see in our own country. That is not to say that villagers would not prefer to have nicer teeth, or that they do not seek care from a dentist when tooth pain is severe. Rather, there is the belief that tooth loss is an expected, though perhaps unfortunate, consequence of a normal life course. To some

extent a generational effect independent of culture is involved, a reflection of the recent advent of preventive dentistry in the 20th century.

My experience in Tzintzuntzan, particularly my observation of a continuing cycle of dental neglect among the children, leads me to be reluctant to predict rapid improvement in dental health in rural Mexico. Urbanization and migration may play a critical role in changing this bleak outlook, however. As television images of smiling city dwellers invade the village more and more, and as greater numbers of young people travel to cities and to the U.S., there may be a tendency to pathologize dental loss, leading to greater concern about preventing it. Visiting physicians performing social service obligations, for example, had gleaming smiles (Figure 29).

Miscellaneous Infections

Fungal infections of the nails were common (onychomycosis), as discussed under skin conditions. Urinary tract infections were underdiagnosed due to lack of screening for this, but as noted earlier, I still picked up several, with four symptomatic infections. An isolated case of recent peritonitis was recorded in an individual recovering from surgery for this. A case of *Herpes zoster* (a reactivation of latent chicken pox infection) induced skin pain (post herpetic neuralgia) was observed, along with one ear infection and a case of cellulitis (mentioned also under dermatology).

In conclusion, infectious diseases were prevalent, with 54 specific diagnoses being made among 50 informants. Most striking was the nearly universal prevalence of dental loss,

tooth decay, or gingivitis. Fungal infections of the nails and urinary tract infections were also common, along with a scattering of other infections ranging from peritonitis to cellulitis.

Eye, Ear, Nose and Throat Conditions

Table 29 illustrates the difficulty of sorting out diseases by both categories of illness and anatomical sites. In a summary of ear, nose and throat complaints, sinusitis is listed, though it is also in most cases an infectious disease.

Table 29. Head, eye, ear, nose and throat conditions.

AGE GROUPS SEX M=MALE F=FEMALE	90-99 M / F	80-89 M / F	70-79 M / F	60-69 M / F
DIAGNOSIS				
Cataracts	0,0	3,1	6,4	3,6
Cerumen impaction	0,0	1,2	3,1	1,2
Edentulous	1,2	3,5	3,4	2,4
Tooth loss, partial significant	0,0	0,0	0,1	1,3
Pterygium	0,0	2,2	2,3	8,0
Arcus senilis	0,0	0,2	2,0	2,1
Conductive hearing loss	0,1	0,0	0,0	0,1
Visual loss	0,1	0,0	0,0	0,0
Sinusitis	0,0	0,0	0,1	0,1
Presbyopia	0,0	1,0	0,0	0,1
Diabetic retinopathy	0,0	0,0	0,0	1,1
Labyrinthitis	0,0	0,1	0,0	0,0
Conjunctivitis	0,0	0,0	0,0	0,0

Ophthalmological Conditions

Eyes seemed to be in poor shape among the subjects evaluated, perhaps due to lack of anti-oxidant vitamins, heavy sun exposure, and lack of eye protection with sunglasses (completely absent among all informants). Almost half of the informants examined had cataracts advanced enough to detect on routine examination (23 of 50 subjects, 46% prevalence). A higher number would have been picked up with dilated examinations. Cataracts are almost "normal" among the elderly in Tzintzuntzan. These opacities of the lens of the eye significantly impair vision. Yet they may well be largely preventable by avoiding excessive exposure to ultraviolet B light, with some evidence also suggesting that judicious intake of vitamins E and C may also "scavenge" the free radicals of oxygen which appear to mediate the damage to the lens.

Seventeen of 50 patients had pterygia (34% prevalence), benign tumor-like growths across the eye often seen in dusty climates with high sun exposure. Arcus senilis, a deposition of cholesterol along the edge of the cornea visible in many elderly patients, was also present in 17 of 50 subjects (34% prevalence). Though not in and of itself disabling, it is a sign of an aging eye. Two patients had evidence of the proliferative changes of diabetic retinopathy, a major cause of blindness in this country.

One patient had gross presbyopia, or the "farsightedness" that causes difficulty reading in most persons older than about 45 years of age, but I did not formally test for this due to the difficulty of testing for reading ability among informants who were largely illiterate. Beyond these concerns, I was warned by Professor Foster that written forms incited stress

and anxiety in Mexican rural culture, largely due to a history of unscrupulous practices of stealing property from peasants in the past. I suspect, based upon understanding that the incidence of presbyopia is nearly 100 percent among most individuals over age 60, that nearly all subjects would have benefited from reading glasses for the performance of fine reading or observing procedures. Yet, as was the case for dark glasses, reading glasses were never observed, except in one elderly woman who had extensive contact with visiting Americans in the past.

In summary, the elderly population of Tzintzuntzan represent a visually impaired group. At least half had cataracts, rendering sight dark and unclear during the day and nearly absent at night. Arcus senilis deposits clouded the peripheral corneas of many, and fleshy growths known as pterygia impinged upon the optical axis. Presbyopia was present and rarely corrected with reading glasses. It is interesting to note that only one subject was nearly blind from this in a functional sense.

What are the implications of these visual handicaps? Surprisingly few in the context of village life, at least subjectively. Few if any patients complained of visual difficulties. This is to a large extent consistent with an insidious illness developing over many years. It raises larger questions regarding the definition of pathology among a people with nearly universal disease prevalence. In Tzintzuntzan, being nearly blind in old age is considered normal and unnoticed, whereas mild presbyopia among affluent individuals in the States may be a cause of considerable distress. To a large extent this represents a difference in normative behavior. Tzintzuntzeños work with their hands, making pottery

vases or artifacts of straw for sale. This kinds of "hands-on" activity requires a keen sense of dexterity and awareness of the tactile qualities of items handled. It does not require the fine close vision necessary to read the financial section of the *Wall Street Journal.* The visual impairments of the elderly in Tzintzuntzan are not job handicaps, in most cases.

Miscellaneous Eye, Ear, Nose and Throat Conditions

The ophthalmological findings were the most striking in the Eye, Ears, Nose and Throat category, but other conditions were found. Ten of 50 subjects had cerumen impaction, obstruction of the outer ear which can cause hearing loss, depression, and isolation among the elderly. Two of 50 subjects were functionally deaf due to this conductive hearing loss. 26 of 50 informants had no teeth, and 4 of 50 had only a few teeth left. Discussed earlier under the infectious disease category, this significant loss of teeth renders the elderly prone to malnutrition. One subject had dizziness due to labyrinthitis, a viral inflammation of the inner ear. In summary, the ENT data suggest a nearly universal prevalence of severely impaired vision and poor or absent teeth, with a fair number of other chronic conditions.

The implication of these observations is that there is a discrepancy between impairment and disability. In general, the definition of being handicapped was far less prevalent among our informants, reflecting a belief that certain conditions, such as near complete visual loss, were not anything beyond the usual. By comparison, the State of California's Industrial Medical Council publishes a *Physicians Guide* which explicitly defines

disability as distinct from impairment for the purposes of determining eligibility for workman's compensation benefits: (Rudolph et al. 1994):

> "When the body, an organ, or part of the body loses all or part of its function, compared to its previous level of functioning, it is said to be ***impaired***. Some impairments can be defined in purely medical terms and can be objectively measured. Examples of such impairments are loss of vision or hearing, or a decrease in range of motion, muscle strength, or grip strength ... ***Disability*** is the inability, or reduced ability, to compete in the ***open labor market,*** due to impairment. The open labor market consists of all jobs or occupations, not just an injured worker's usual and customary occupation. Disability is the effect of a medical impairment on a worker's ability to secure or perform any job (Rudolph et al. 1994:30, italics and bold print in original).

What is the "open labor market" in an agrarian village economy? Working as a potter, as many of informants did, requires manual dexterity and decent vision, but it does not require acute vision in most cases. It may be that significant visual impairment does not constitute a great disability in Tzintzuntzan, as it would in the technologically oriented world of California, where reading is a prerequisite to most forms of employment.

One must be cautious in taking this too far, however. Visual loss due to cataracts is notoriously insidious in onset, and Tzintzuntzeños would notice a dramatic improvement in vision and functional abilities with modern lens replacement surgery, if such an

expensive procedure were available and if they consented to have it performed. Furthermore, Tzintzuntzeños who migrate to cities in increasing numbers would surely be disabled by advanced eye disease. We must not romanticize the equanimity of the village elders in the face of eye and ear disease. Nonetheless, the acceptance of poor vision and hearing among the elderly suggests that in a village environment a lower level of organ functioning and a higher level of impairment may result in less disability in the locally defined "open labor market." This underscores the point that disability (though often defined in terms of competition of workers for jobs) exists for individuals within their own spheres of understanding and experience.

Neurological and Psychiatric Conditions

Table 30 summarizes neurological conditions. Hearing loss will be discussed here, rather than under Ear, Nose and Throat, because of a presumed etiology related to nerve damage, which I will discuss further below.

Table 30. Neurological and Psychiatric conditions among 50 Tzintzunztzenos.

AGE GROUPS SEX M=MALE F=FEMALE	90-99 M / F	80-89 M / F	70-79 M / F	60-69 M / F
DIAGNOSIS				
High frequency hearing loss	1,0	1,3	2,3	3,3
Sensorineural hearing loss	1,0	3,2	1,2	2,2
Depression	0,0	0,0	0,0	0,1
Anxiety	0,0	0,0	1,1	1,2
Visual loss	0,1	0,0	0,0	0,0
Seizure disorder	0,0	0,0	0,1	1,0
Alzheimer's disease	0,0	0,1	0,0	0,0
Alcoholism	0,0	1,0	5,0	5,1
Tension headaches	0,0	0,1	0,1	2,1
Tremors	0,0	0,0	0,0	1,0
Insomnia, idiopathic	0,0	0,0	0,0	1,0
Tinnitus	0,0	0,0	0,0	0,1
Head trauma	0,0	0,0	0,0	2,0
Post herpetic neuralgia	0,0	0,0	0,0	0,1

Hearing Loss

Hearing loss was assessed by a "rustle" test, in which a soft sound next to the ear was used to determine hearing acuity. If the canal was clear and hearing was diminished, it was presumed to be sensorineural (caused by nerve damage rather than obstruction of the conducting mechanism of the ear). If the canal was obstructed with ear wax, the diagnosis was more complicated, as obstruction can cause hearing loss in the absence of neural damage. This was often recorded as high frequency hearing loss. A total of 16 subjects had high frequency hearing loss, and 13 had sensorineural hearing loss. These numbers also represent impressions gleaned from conversing with elderly informants who could not hear well. Thus, they represent an underestimation of the prevalence of hearing loss, which ideally requires formal auditory testing for greatest sensitivity (early hearing loss is often clinically inapparent). Even with the crude measures employed, 29 of 50 subjects were impaired with respect to hearing, a prevalence of 58 percent. One subject also had tinnitus, a ringing in the ears which may occur as a result of noise exposure (point prevalence 2%).

The prevailing opinion regarding hearing loss in the military and Veterans Administration of the United States is that hearing loss results from repetitive acoustic trauma, i.e. loud noise exposure. It is also increasingly apparent that loud noise may be perceived as innocuous, yet still cause considerable damage with prolonged exposure. Tinnitus (ringing in the ears) is also caused by noise exposure. Are Tzintzuntzeños exposed to injurious noise?

During my time in the village I observed truly harmful levels of noise at a wedding reception I attended next to the clinic. The band employed for the occasion played amplified brass instruments and guitars, with a deafening roar which precluded any conversation between the clinic *pasante* physician and me. This volume of music would injure the ears with prolonged exposure. The elderly were probably not exposed to amplified music in their youth, however. Elderly males did, however, in many cases work in construction, either in Mexico as braceros in the United States. One might conjecture that exposure to road equipment, such as cement mixing machines, played a role in the etiology of their hearing loss. Women were affected with hearing loss as frequently as men, with no clear history of injurious exposure to noise. Perhaps noise exposure was just as ubiquitious among women, but via less obvious sources, such as loud infants, farm animals, or other sources not readily apparent. Genetic factors may influence hearing loss as well, though I encountered no family histories whch were significant for this.

I suspect that the hearing loss may be due to repeated episodes of bacterial ear infections in youth, prior to the advent of antibiotics in a world in which few could afford antibiotics any way. Several young people were brought to me with untreated upper respiratory infections, such as streptococcal pharyngitis, and many had swollen tonsils which might obstruct the Eustachian tubes, predisposing to Otitis media, a middle ear infection. The elderly recalled their youths as times of malnutrition and civil unrest. Malnutrition also predisposed to infections. Therefore, especially in the absence of obvious sources of repetitive loud noise exposure, the majority of the elderly may well have developed

hearing loss from prior infections. Superimposed on this is a tendency for some hearing loss to occur among most elderly people, a condition known as presbycusis, but I think we were seeing more than just the typical attenuation of high frequency hearing one expects with age.

As was the case with visual disabilities, few people seemed concerned about hearing loss. Why? One explanation may have to do with the structure of conversational interaction in Tzintzuntzan. We know that the loss of high frequency hearing makes it difficult to hear conversations clearly in environments with significant background noise, as in a restaurant in which many people are talking. This environment was absent in a village with no restaurants or hotels. As a result, an elderly person with moderate hearing impairment in the village need not contend with the obstacles so frequently present in our own culture to those with hearing loss. Speech patterns also involved sequential uninterrupted speech, with the elderly allowed to speak and listen at length without either being interrupted or contending with trying to decipher two or more interlocutors at the same time. A person with moderate hearing loss could speak and understand speech with less difficulty in Tzintzuntzan than in a typical U.S. city with its cacophony of background noise and overlapping speech. The rural environment and respect for the elderly in Tzintzuntzan compensate for the high prevalence of impaired hearing. This illustrates a point similar to one made with respect to vision impairment earlier, that disability exists within a context of what is expected of one for successful social interaction and functioning.

Depression

Depression was not highly prevalent by my asssessment, with only one subject manifesting depressed affect and no individuals manifesting the "vegetative" signs of depression often seen in the elderly, such as significant weight loss. Cultural dimensions of diagnosing depression in Mexico, such as the confounding influence of alcoholism, may have made the diagnosis difficult. The experience of *susto*, for example, may represent a form of agitated depression (Rubel 1977, Rubel et al. 1991). There is no reliable biochemical test for the presence of depression which is valid cross culturally (R Anderson 1996:245). Kleinman explored depression in China for example, as a fully trained psychiatrist, and found that patients exhibiting features of depression were diagnosed with *neurasthenia* by local doctors (a diagnosis which was popular in the U.S. in the 19th century), suggesting that their are culture-specific diagnostic categories encompassing depression both within and outside of the allopathic medical community (Kleinman 1986, R. Anderson 1996:245). It is certainly likely that a board certified psychiatrist such as Kleinman would diagnose depression more readily in Tzintzuntzan, but I do believe that I am adequately trained as an internist and geriatrician to pick up overt depression in many cases. How could these elderly people not be depressed, with the high prevalence of chronic diseases they suffered? This is something will discuss at greater length in the concluding chapters, but I believe that to some extent we are seeing the benefits of growing old in a supportive environment in which the elderly are generally respected, integrated into community civil and religious life, and surrounded by a cadre of solicitous relatives.

Anxiety, as a clinical finding manifested by subjective nervousness and perhaps tremor or increased heart rate, was seen in 4 individuals (8 % prevalence), three of whom were women. The causes of anxiety were intercurrent illnesses (such as a broken leg) and family strife. With respect to the family situation, many women lived with spouses who were alcoholics and potentially abusive, and this no doubt played a role in causing anxiety. One male in his 60s had a seizure disorder. The elderly manifested anxiety by talking about it and at times describing non-specific abdominal discomfort.

Dementia

Three individuals probably suffered from dementia of the Alzheimer's type. Ideally, Alzheimer's should be diagnosed only after a thorough evaluation involving head CT scan to exclude a subdural hematoma, thyroid function tests to exclude an underactive thyroid, and perhaps a lumbar puncture or formal neuropsychiatric testing. Undertaking such a "work up" to exclude potentially treatable causes of dementia is a standard geriatric undertaking, though in only 14% of subjects so studied have reversible causes of the global cognitive dysfunction been found, and only about 5% of the demented elderly respond well enough to treatment to prevent worsening of cognitive dysfunction (Ham 1992:275). Nonetheless, ideally one would like to do the proper evaluation, which was not possible in the village. The ubiquitious finding of sensory impairment due to eye or ear pathology should be noted here, as cataracts and hearing loss can be contributory to dementia by causing sensory deprivation, though they are not usually primarily causative (Ibid:279). Hypertension can also cause a condition known as multi-infarct dementia, caused by multiple small strokes.

Diagnosing Alzheimer's may be more challenging in Tzintzuntzan than in an urban environment. For example, the most commonly performed test for dementia, the Folstein mental status examination (Folstein, Folstein, McHugh 1975), requires asking patients to draw intersecting pentagons, answer questions about date and time, and perform tasks which may not be typical behaviors for a rural Mexican environment in which being concerned with precise dates is not necessarily of great daily significance and in which writing is not a routine activity. As such, I chose not to administer that particular test. The literature on dementia in America also involves descriptions of activities which are atypical in Tzintzuntzan. For example, Sager et al. recently performed a logistic regression analysis of 1279 community-dwelling elderly discharged from hospitals, identifying three predictors of functional decline outside of the hospital (Sager et al.. 1996). These included older age, lower scores on the Folstein mental status examination, and difficulties with what geriatricians call *instrumental activities of daily living*. Unlike the more mundane *activities of daily living* such as washing and dressing one's self, these include more complex tasks, with the authors mentioning telephoning, shopping, using transportation, preparing meals, doing housework, taking medications, and managing finances. Elderly Tzintzuntzeños, surrounded by relatives who usually perform housework, without the need to take buses or manage complex finances, would rarely perform any of these activities. They might, by contrast, be challenged in ways unique to the village life, such as performing *mayordomía* activities or acting as traditional healers. As such, the likelihood of picking up dementia using culturally inappropriate tests devised for urban America would be small.

In the United States, by contrast, dementia in the elderly may become apparent more readily when evaluated by standardized tests. Herskovits has suggested that we may in fact be overly pathologizing Alzheimer's, and my observations of the low prevalence in Tzintzuntzan supports her contentions (Herskovits 1995). Lyman argued that we neglect social factors contributing to the experience of dementia, leading to excessive "biomedicalization" what she calls the "legitimation of medical control over persons with dementing illnesses," (Lyman 1989:597). Emic explanations for forgetfulness may be more tolerant in non-industrialized societies as well, and may involve different explanatory models. For example, Cohen found that in Banaras, India, senility was believed to be a consequence of a state of anger called "hot brain," leading to a perceptual construction of dementia as more of an emotional than cognitive problem (Cohen 1995). Alzheimer's is a devastating disease, however, with a constellation of typical pathophysiological findings, suggesting that it is not a culture-bound illness (Ham 1992). The manifestations and implications of the disease, however, may be less apparent in rural Mexico.

On the other hand, obligations of the elderly in Tzintzuntzan to participate in *mayordomía* activities and to fulfill *compadrazgo* obligations represent challenges absent in urban America. More research is clearly needed to determine whether dementia is less of a problem in the village than in the U.S. As a preliminary observation, however, I would suggest that Tzintzuntzeños tend to accept the elderly as they are and not subject them to inordinate work demands or other pressures. This may result in

integration of those with mild dementia into the mainstream of communal life in a manner we might wish to emulate in the more industrialized countries of Europe and America.

Miscellaneous Neurological Conditions

Remaining neurological conditions included tension headaches (10% point prevalence), tremors (2% point prevalence of significant tremor), insomnia (2% point prevalence), and post herpetic neuralgia (2% point prevalence). Two cases of prior head injuries, probably related to alcohol ingestion, were observed in older men (4% point prevalence). These are not very remarkable observations, with the exception of the absence of benign essential tremor, a more common condition among the elderly in the U.S. It may be that the absence of caffeine tended to mask this. No one in the village typically began the day with coffee, something that surprised me. In fact, ground brewed coffee was unavailable, and strong teas were also not frequently encountered. Sleep deprivation was also absent, leading me to conclude that if tremors develop in Tzintzuntzan the environment tends not to exacerbate them, contrary to my experience in the United States where benign essential tremors are typically worsened in the elderly due to caffeine, anxiety, or poor sleep. Acute alcohol intoxication tends to markedly *improve* benign essential tremors.

In summary, the neurological conditions of Tzintzuntzan's elderly were varied, with the most notable findings being a high prevalence of hearing loss, perhaps due to antecedent infections, and relatively little depression, anxiety, or dementia. Further research is

needed, but I have suggested that the village environment with its social integration of the elderly and lack of technology may foster favorable aging experiences in many respects.

Genitourinary conditions

Genitourinary conditions, listed in Table 31, were undoubtedly underdiagnosed. My usual examination on a male involves palpating the testicles for masses, inspecting for lesions and other abnormalities, and performing a digital examination of the rectum. These procedures were not feasible in the field environment. Females, similarly, did not receive a pelvic examination. Diagnoses are to some extent, therefore, based upon reported conditions, and perhaps more suspect than observations on other organ systems. It is therefore not surprising that all individuals with genitourinary conditions (except urinary tract infections, discussed elsewhere) were male.

Table 31. Genitourinary conditions among 50 randomly selected subjects.

AGE GROUPS SEX M=MALE F=FEMALE	90-99 M / F	80-89 M / F	70-79 M / F	60-69 M / F
DIAGNOSIS				
Urinary incontinence	0,0	1,0	0,0	0,0
Benign prostatic hyperplasia	0,0		1,0	0,0
Nephrolithiasis	1,0	0,0	0,0	2,0
Hydrocele, status post repair	0,0	0,0	0,0	2,0
Orchiectomy status post for	0,0	0,0	0,0	1,0
testicular carcinoma	0,0	0,0	0,0	1,0

One individual had urinary incontinence, three revealed symptoms consistent with benign prostatic hyperplasia, three reported kidney stones, one male was status post repair of a hydrocele, and one was status post orchiectomy (removal of one testicle) for testicular cancer. These data suggest that genitourinary conditions did occur, but do not allow meaningful estimates of prevalence. The paucity of observations in this category reflect my belief that, without conducting a thorough and complete physical examination, one cannot estimate disease prevalence with accuracy.

Hematological and Oncological Conditions

The prevalence of these conditions was not high, perhaps reflecting early mortality after diagnosis of malignancy, and hesitancy in reporting the diagnose of cancer to patients in Mexico. Table 32 summarizes the data regarding cancer and blood disorders in Tzintzuntzan, as best I could determine from available resources. In the case of Alfonso Cataldo, his prostate cancer came to light fortuitiously. During a trip to Quiroga to obtain radiographs and blood tests for evaluation of arthritis he developed fever and experienced difficulty urinating. Further evaluation at the local hospital revealed an obstructing prostatic mass consistent with an advanced prostate cancer. He was treated with antibiotics for infection at the regional hospital and ultimately sent back to Tzintzuntzan. Due to the advanced nature of the malignancy he was not a surgical candidate. The physicians involved did not outline to Don Alfonso the life-threatening nature of the illness, which seemed typical of Mexican doctor-patient interactions.

Though a U.S. physician is often trained to be frank and open in revealing bad news, in Mexico this is viewed as callous and inhumane. As Don Alfonso seemed unable to fully comprehend the meaning of a prostate cancer with his limited understanding of anatomy, and as effective remedies were not available, I found myself not unsympathetic to this approach. It seems to me that in our own culture, physicians sometimes convey information related to malignancy with thoroughness and bluntness in an effort to be honest and open with patients. This approach, in keeping with the directness and frankness which U.S. residents are inclined to value, may nevertheless lead to a sense of helplessness among patients, and perhaps foster a perception of physicians as being cold and distant.

The only other neoplastic disorder detected was a non-cancerous granulomatous cyst of the oral cavity, and a case of polycythemia. This latter condition, characterized by increased red blood cell concentration, is often a response to chronic lung disease, high altitude, or smoking, and is therefore quite non-specific. In all likelihood, malignancies were inapparent in Tzintzuntzan due to poor survival among those afflicted.

Table 32: Hematologic, oncologic conditions among Tzintzuntzenos. Premalignant skin lesions are listed under dermatological conditions.

AGE GROUP	90-99	80-89	70-79	60-69
SEX	M / F	M / F	M / F	M / F
M=MALE				
F=FEMALE				
DIAGNOSIS				
Prostate carcinoma,				
obstructive	1,0	0,0	1,0	1,0
Status post trans-urethral	0,0	0,0	0,0	0,0
resection of the prostate	0,0	0,0	0,0	0,0
Polycythemia	0,0	0,0	1,0	0,0
Granulomatous cyst, lingual	0,0	0,1	0,0	0,0

The social stigma of smoking or drinking among women in Mexico deserves mention in the context of evaluating malignancy. Foster reported on the relative rarity of excessive alcohol consumption among women while noting that such behavior in men is "a fact of life," (Foster 1966:159). Though perhaps a discriminatory social norm, the abstemiousness of Mexican women with respect to these habits protects them from lung and gastrointestinal malignancies. Conversely, women in the United States have smoked in increasing numbers since World War II, and the risk of death from lung cancer has surpassed even breast cancer in recent years to become the number one cause of cancer death among women in the U.S.

Gastrointestinal Conditions

Gastritis and Ulcers

Table 33 summarizes gastrointestinal problems, with a high prevalence of gastritis observed in both sexes and all ages. Thirteen of 50 subjects reported epigastric burning consistent with either gastritis or peptic ulcer disease (26% point prevalence). Ideally, an upper endoscopy would allow one to distinguish the conditions, but this technology was not available in the field of study. Increasingly the role of *Helicobacter pylori* is appreciated as a causal agent in the development of peptic ulcers. Three subjects provided clinical histories more consistent with ulcers, such as prior vomiting of blood (one subject). Three had reflux esophagitis symptoms, commonly known as heartburn. Thus, a total of 19 of 50 subjects had either gastritis, GERD, or peptic ulcer disease, a 38% prevalence of the most common conditions typically associated with the damaging effects of stomach acid.

We know that, as one ages, the prevalence of colonization with this bacterium rises, so to some extent it is not surprising that we saw a fair amount of gastritis or peptic ulcer disease. Men in the village drink alcohol, which causes gastritis, ulcers and PUD. In the case of women, alcohol is absent as a risk factor. Whether stresses unique to the female role in the culture of Tzintzuntzan were at play in causing gastritis among women is not clear. The association of life stress with ulcers is falling into disfavor in the medical community to some degree, as specific etiologic agents such as aspirin or bacteria become appreciated increasingly as causes of stomach problems. Nonetheless, women did often report feelings of gastrointestinal distress when dealing with the stress of running households, businesses, and dealing with their husbands, so stress may be an issue with respect to stomach conditions.

Table 33: Gastrointestinal conditions among 50 Tzintzuntzenos.

AGE GROUPS	90-99	80-89	70-79	60-69
SEX	M / F	M / F	M / F	M / F
M=MALE				
F=FEMALE				
DIAGNOSIS				
Gastritis	0,0	1,1	1,0	6,4
Status post hemorrhoidectomy	0,1	0,0	0,0	0,0
Peptic ulcer disease	0,0	1,0	2,0	0,1
Hernia	0,0	0,0	0,1	1,0
Status post herniorrhaphy	0,0	0,0	0,0	1,0
Cirrhosis	0,0	0,0	3,0	0,0
Pancreatic insufficiency	0,0	0,0	1,0	0,0
Gastroesophageal reflux	0,0	0,0	1,0	0,0
disease	0,0	0,0	0,0	1,0
Constipation	0,0	0,0	2,0	0,0
Diarrhea	0,0	0,0	0,0	0,1
Cholelithiasis	0,0	0,0	0,0	0,1
Lactose intolerance	0,0	0,0	0,0	1,0
Gastrointestinal hemorrhage	0,0	0,0	0,0	0,1
Acalasia	0,0	0,0	0,0	1,0

Alcoholism

Though a complex disease with ramifications for function of nearly every body organ, alcoholism often causes death through its effects on the liver, so I will discuss it under gastrointestinal conditions. Twelve of the elderly were clearly alcoholics, reporting heavy chronic drinking in the present or recent past. Eleven of these 12 alcoholics were men. Thus, the male prevalence of alcoholism was at least 25%, whereas the comparable figure for women was less than 2%. Most of the men in the sample I studied, however, had given up frequent drinking in old age, though one subject was routinely intoxicated when I visited him.

Casual assessments for alcoholism may underdiagnose the condition. Nonetheless, the matter-of-fact nature with which men often admitted to drinking suggests little reluctance to admit to alcohol dependence (which is viewed as an affliction or weakness, rather than as a moral shortcoming). Brandes current work on alcoholism in Mexico, however, revealed two Alcoholics Anonymous chapters in Tzintzuntzan, suggesting that a change in traditional tolerance of drinking may be underway (Brandes 1998: Personal communication).

Three men had cirrhosis on the basis of alcoholism, all in age group 70-79, a prevalence of over twenty percent among that group. The absence of cirrhotics in age groups 80-89 and 90-99 probably reflects earlier mortality among heavy drinkers with resultant survival into advanced age of those who stop drinking before developing the disease. The absence of cirrhotics among the 60-69 year olds is harder to explain. Many reported

heavy alcohol consumption. It may be that cirrhosis is present in earlier clinical stages in those subjects. Typically advanced cirrhosis, with a distended abdomen caused by ascitic fluid in the peritoneum, is easy to pick up on examination. Early hepatic fibrosis may escape clinical detection.

Anthropological research on alcoholism among other Hispanics may be relevant to understanding this. For example, among Puerto Rican men in New York, drinking is considered largely a male prerogative provided that it does not interfere with work (Singer et al.. 1992). In Tzintzuntzan I observed a similar mentality, though perhaps even more indulgent towards male alcoholics. One man was unable to work for days due to drinking, but his family was indulgent and assisted in pottery-making activities in his absence. Drinking was viewed as a vice to which one is susceptible, not as a negative reflection on one's character or personal worth.

Miscellaneous Gastrointestinal Conditions

One patient was status post hemorrhoidectomy, two were status post herniorrhaphies, one had gallstones, one complained of constipation without clear abnormalities on exam, one was symptomatically lactose intolerant (probably most were, but milk drinking was rare so it was not typically picked up), and a case of achalasia was picked up by inspection of an upper GI series obtained at a local hospital. This condition typically involves disturbance of esophageal motility with distention of the esophagus by food which is not transported promptly to the stomach. These are typical GI conditions of the elderly, and so they do not bring to mind striking cultural issues to correlate.

In summary , the gastrointestinal survey reveals a high prevalence of chronic gastritis, peptic ulcer disease and esophageal reflux. Cirrhosis is also often present in elderly men, especially in their 70s. The picture which emerges is that of a culture with a high prevalence of male alcoholism (Figure 23), and one in which societal stresses may play a role in causing epigastric symptoms among the female population. This latter condition, along with *ataques de corazón*, or chest pain with anxiety, may represent a somatization equivalent to fibromyalgia in rural Michoacán.

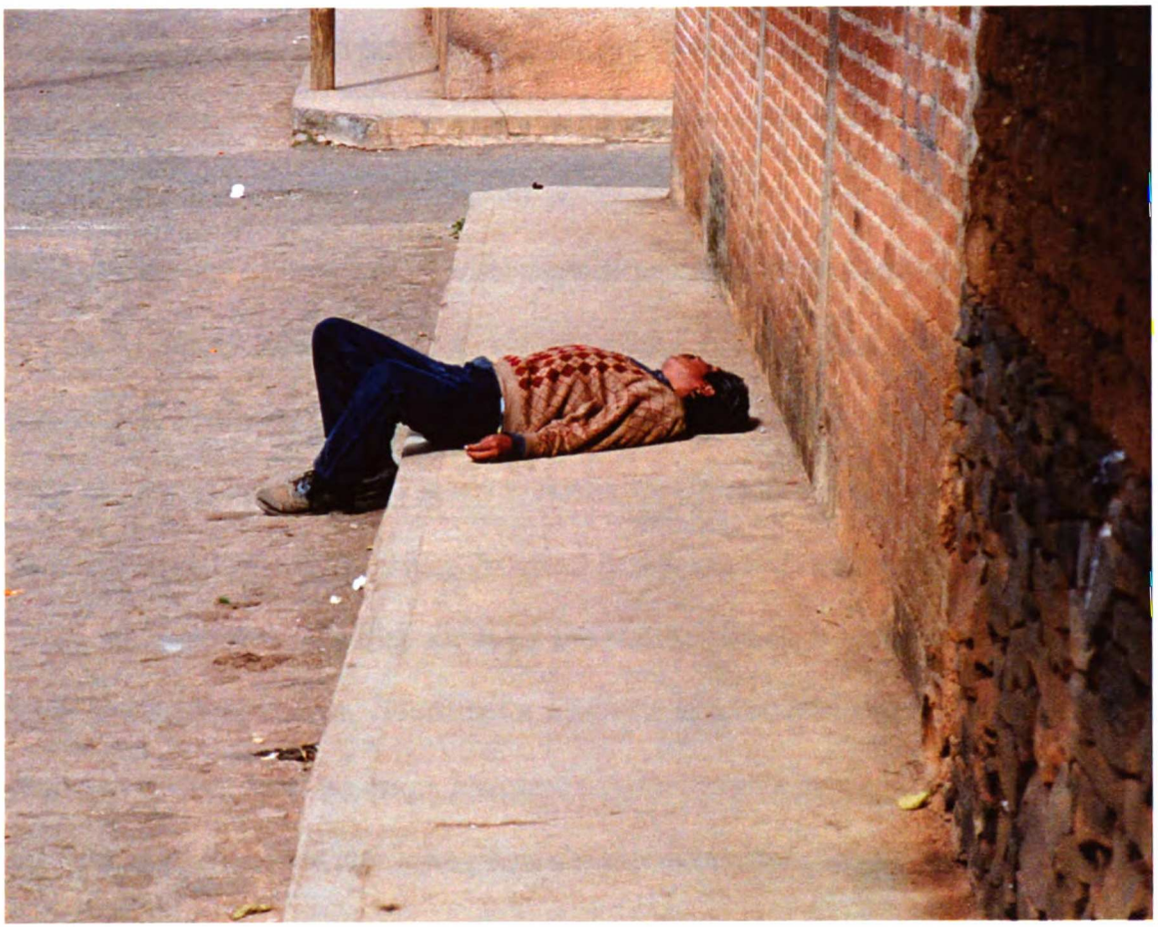

Figure 23. Young man passed out from acute alcohol intoxication.

Pulmonary Conditions

The relative lack of symptomatic lung disease was striking (Table 22). Five men had evidence of chronic obstructive pulmonary disease due to smoking, a prevalence of around 11 percent. This would be an expected finding in a population in which smoking is common among men, and I might have expected to see even more disease. Women were without symptomatic pulmonary conditions. What is mitigating the prevalence of lung disease?

High altitude and a lifetime of physical exercise appear to be the factors at work. All of the elderly *did not drive cars.* In the United States, by contrast, the isolation which follows loss of driving privileges contributes to depression among the elderly. In Tzintzuntzan, people walk as a nearly exclusive means of local transportation. The elderly still walk, though they may do less of it. Church bells before mass stimulate the whole village to stop what they are doing and walk to church, which may be a kilometer away on the edges of town. Walking for a lifetime at 6,700 feet contributes to increased forced vital capacity of the lungs, increased oxygen carrying by the blood, and a diminished likelihood of developing lung disease, even among smokers.

In summary, the pulmonary data suggest a moderately high prevalence of emphysematous lung conditions, but overall are significant for revealing the elderly of the village to be well served by a life of aerobic conditioning associated with walking at high altitude.

Table 34: Pulmonary conditions (Chronic) among 50 subjects.

AGE GROUPS SEX M=MALE F=FEMALE	90-99 M / F	80-89 M / F	70-79 M / F	60-69 M / F
DIAGNOSIS				
Chronic obstructive pulmonary disease	0,0	2,0	3,0	0,0

Health Study Conclusions

In summary, elderly Tzintzuntzeños in this randomly selected cohort between the ages of 60 and 97 had a high prevalence of multiple diseases, including osteoarthritis, non-articular rheumatic conditions such as tendinitis and bursitis, infectious diseases, neurological diseases, endocrine diseases, ophthalmological conditions, skin diseases, and dental decay and tooth loss. Yet few informants considered themselves to be seriously ill, though many had major health problems which portend a poor prognosis for long-term survival.

The most prevalent conditions were dental caries and gingivitis, cataracts, high frequency hearing loss or conductive hearing loss due to cerumen impaction, and osteoarthritis. No clear case of rheumatoid arthritis was found. This is consistent with prevalence studies of RA (about 1 percent), and highlights the shortcoming of this kind of a study. That is, the sample size is far too small to allow estimation of prevalence data for any rheumatological disease with the exception of the most prevalent, i.e., osteoarthritis.

Methodologically, I probably underdiagnosed Alzheimer's and other forms of dementia. This is probably also the case with eye disorders such as macular degeneration, and we almost certainly underdiagnosed diabetes. It just was not practical to draw blood on all patients, to dilate pupils for better eye examination, or to do neuropsychiatric testing.

Similarly it was impossible to differentiate between causes of dementia, i.e. multiinfarct dementia or rarer conditions such as normal pressure hydrocephalus or hypothyroidism.

In summary, the elderly of Tzintzuntzan suffer chronic poor health due to various diseases affecting most organs of the body. In spite of this, their self-assessed health is viewed as fairly decent, as we shall see in the next chapter.

Chapter 5: Standardized Questionnaires

The four questionnaires administered (Tables 6-9) were scored for the 50 randomly selected subjects, along with the 2 additional rheumatoid arthritis patients selected in non-random manner. Tables 35 through 42 summarize these data, with individual tables for men and women in 10 year age quartiles between ages 60 and 100. Table 43 reports the data for the two rheumatoid arthritis patients evaluated.

Table 35: Questionnaire Scores: Males between ages 90 and 99 years old.

Subject	Pt #	HAQ	ASES	MOS Health Perception Scale	MOS Pain Severity Scale
Cataldo, Alfonso	0950	1.38	8.375	2	38

Table 36: Questionnaire Scores Females between age 90 and 99 years old.

Subject	Pt #	HAQ	ASES	MOS Health Perception Scale	MOS Pain Severity Scale
Ceballos, Felicia	1699	1.875	7.875	4	28
Jimenez, Mariana	2132	0.25	8	4	63.33

Table 37: Questionnaire Scores Males between 80 and 89 years old.

Subject	Pt #	HAQ	ASES	MOS Health Perception Scale	MOS Pain Severity Scale
Chavalas, Nicolas	1827	1.75	3.62	4	74
Zaponca, Malonso	4826	0.75	6.875	3	44
Cortez, Jaime	0528	1.875	1	5	94
Escobar, Oscar	1829	1.875	6.5	4	82.66

Table 38: Questionnaire Scores for Females between 80 and 89 years old.

Subject	Pt #	HAQ	ASES	MOS Health Perception Scale	MOS Pain Severity Scale
Zapata, Guillermina	1907	1.125	4	5	92.66
Reposa, Linda	1774	0.25	7.25	4	46.66
Cortez, Linda	4495	2.37	6.375	5	84
Zaragosa, Sonia	5016	0.875	5.375	5	58.66

Table 39: Questionnaire Scores for Males between 70 and 79 years old.

Subject	Pt #	HAQ	ASES	MOS Health Perception Scale	MOS Pain Severity Scale
Cuevas, Salvador	1333	2.125	4375	5	86
Cima, Fernando	0508	0.125	2.375	5	39.33
Herrera, José	0241	1	7	4	52
Advincula, Frederico	4914	0.625	8.25	4	76.66
Montañez, Jaime	2377	0.25	6.875	4	73.33
Esqueda, José	1557	1	5.375	4	67.33
Melendez, José	2234	0	10	4	37.33

Table 40: Questionnaire scores for Females between 70 and 79 years old.

Subject	Pt #	HAQ	ASES	MOS Health Perception Scale	MOS Pain Severity Scale
Felipe, Gorgona	4014	0	9	2	45.33
Sandoval,Monica	4375	1.875	1.125	5	82.66
Espinosa, Natalia	4984	0.5	9	3	67.33
Lozano, María	2367	0.25	7.5	3	38
Fajardo, María	1898	1.5	2.25	5	54
Chavalas, Sandra	938	0	10	3	80.66

Table 41: Questionnaire Scores for males between 60 and 69 years old.

Subject	Pt #	HAQ	ASES	MOS Health Perception Scale	MOS Pain Severity Scale
Zaponca, Humberto	3034	0	7.875	3	80.66
Espinosa, Jaime	1060	0	10	1	10
Noguera, Manuel	2264	0	1	3	10
Geraldo, Francisco	3910	0	10	4	60.66
Espinosa, Alonso	2745	0.125	9.25	4	70.66
Moreno, Maria	3357	0.5	5.5	4	64
Monterrosa, Juan	2129	0.625	4.125	4	60
Alvarado, Arturo	3584	0.125	6.125	5	82
Dominguez, Armando	0672	0	9.5	4	42
Cordes, Francisco	3058	0.625	6	5	72.66
Alvarado, Gabriel	3128	0	9.75	4	40
Cordova, Gumaro	1071	0.125	9.75	4	40

Table 42: Questionnaire Scores for Females between 60 and 69 years old.

Subject	Pt #	HAQ	ASES	MOS Health Perception Scale	MOS Pain Severity Scale
Cataldo, Josefina	3824	0.875	6	4	65.33
Zaponca, Ramona	1427	0.625	6.125	4	67.33
Alvarado, Rosana	1903	1.125	3.875	5	77.33
Huipe, Adriana	0199	0	10	3	10
Chichipan, Margarita	2702	0.875	2.25	5	93.33
Espinosa, Emilia	1906	0.375	7.75	4	41.33
Chavalas, Monica	1403	0.5	5.75	5	70.66
Inzerillo, Monica	0628	0	10	1	10
Villarreal, Monica	2789	2.625	2.375	5	80
DeOlvera, Eugenia	4206	0	10	4	35.33
Gomez, Victoria	3869	0.375	8.125	3	68
Reyes, Amparo	3973	0.25	6.375	4	40.66
Uribe, Cecilia	2572	0.25	3.625	5	62.66
Zaponca, Monica	3281	0.125	9.875	4	20

Table 43: Questionnaire Scores for Rheumatoids.

Subject	Pt#	HAQ	ASES	MOS Health Perception Scale	MOS Pain Severity Scale
Gonzalez, Antonio	--	0	1	2	10
Vegas, Monica	--	3	5.25	2	18

Health Assessment Questionnaire

The Health Assessment Questionnaire, developed at Stanford University by Fries and colleagues (Fries et al. 1980), measures the influence of arthritis on ability to perform key activities of life. Table 6 summarizes the contents. Many of these activities may be taken for granted by us, but are difficult for patients with arthritis to perform. They include dressing and grooming, arising, eating, walking, hygiene, reaching, gripping, and activities such as shopping or running errands. Scores range from 0 for "no difficulty" to 3 for "unable to do." One would expect these activities to be more challenging for the members of the oldest age group in the village, given the nearly universal prevalence of osteoarthritis among those surveyed.

Table 44 reveals the HAQ scores for males and females in all eight gender-age quartiles, and Table 45 graphs out the same information. Among the oldest study participants, aged 90 to 99 years, only three informants are involved, one male and two female. As it happens, they were cheerful and upbeat individuals who reported less impact of arthritis than the age quartile younger than them. It is impossible to statistically manipulate such small numbers, but this is probably a surviving cohort which made it into advanced old age partly due to a strong constitution and tendency to minimize somatic complaints.

With respect to gender, males in the three oldest groups seem to have higher HAQ scores, but this is probably not statistically significant. In fact, most notable is the lack of any significant disparity between the genders in HAQ scores. This may reflect a village life in which gender disparities in role behavior are less prevalent than one might expect.

For example, both men and women were observed engaging in pottery-making activities in the village. In the case of osteoarthritis, however, activities in early life are often critical. As women typically experience worse arthritic pain in old age in our own culture, one has to wonder if this lack of gender disparity in HAQ scores also reflects increased musculoskeletal trauma among men in youth. Such an effect might damage male joints excessively, leading to a diminution of the typical female excess in HAQ scores one would expect to see.

Table 44: Health Assessment Questionnaire Scores (Mean score for all tasks. 0=no difficulty, 1=some difficulty, 2=much difficulty, 3=unable to do task. Score equals mean of scores for seven categories of activities)

	Age 90-99	Age 80-89	Age 70-79	Age 60-69
Males	1.38	1.56	0.73	0.18
Females	1.06	1.155	0.6875	0.571

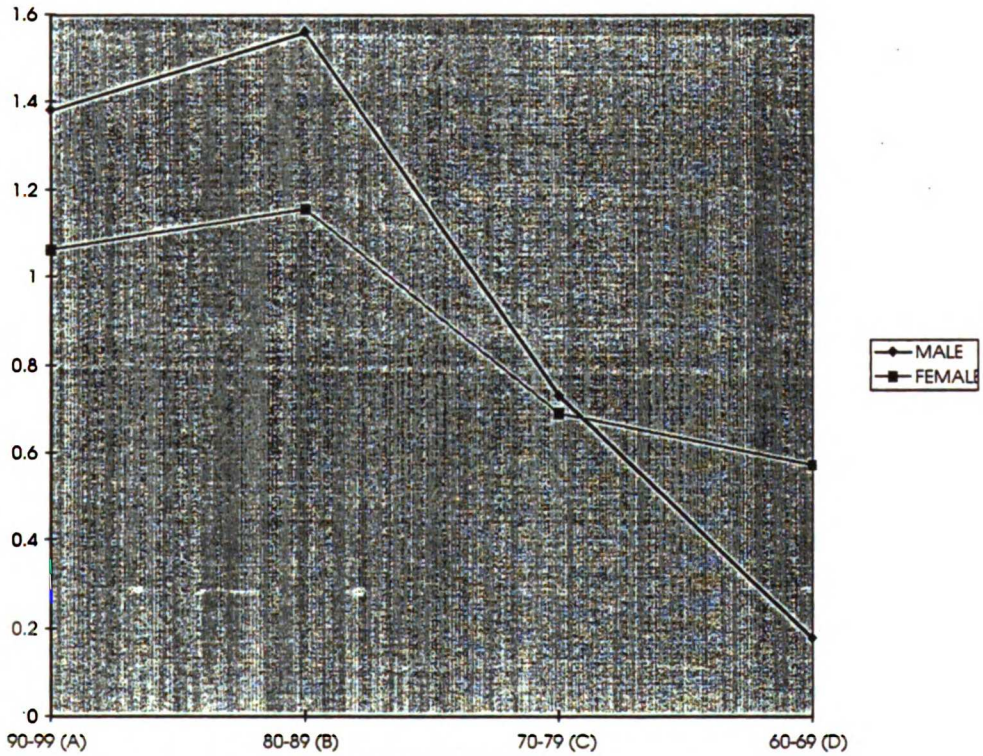

Table 45: Graph of HAQ scores.

Arthritis Self-Efficacy Scale

This represents a report of the ability of patients to "control" the impact of arthritis on their lives, summarized in Table 6. Though validated in Spanish, I found it to be a confusing questionnaire for both researchers and subjects. The concept of "controlar" with respect to arthritis is meaningless to most respondents. Question #3 contains a confusing double negative. Thus, the questionnaire seems to be difficult to decipher grammatically, and also involves a concept of "controlling" disease which is difficult to use clinically. Most respondents view arthritis as an infirmity which occurs for some people as a result of God's will. Why control something that just happens to you?

Table 46 and 47 summarize the results of administration of this questionnaire. No significant trends with respect to age or gender emerged.

Table 46: Arthritis Self Efficacy Scale Scores (1= very uncertain, 10 equals very certain to control the impact of arthritis in 8 different activities).

Sex	Age 90-99	Age 80-89	Age 70-79	Age 60-69
Male	8.38	4.50	6.32	7.41
Female	4.06	5.75	6.48	6.58

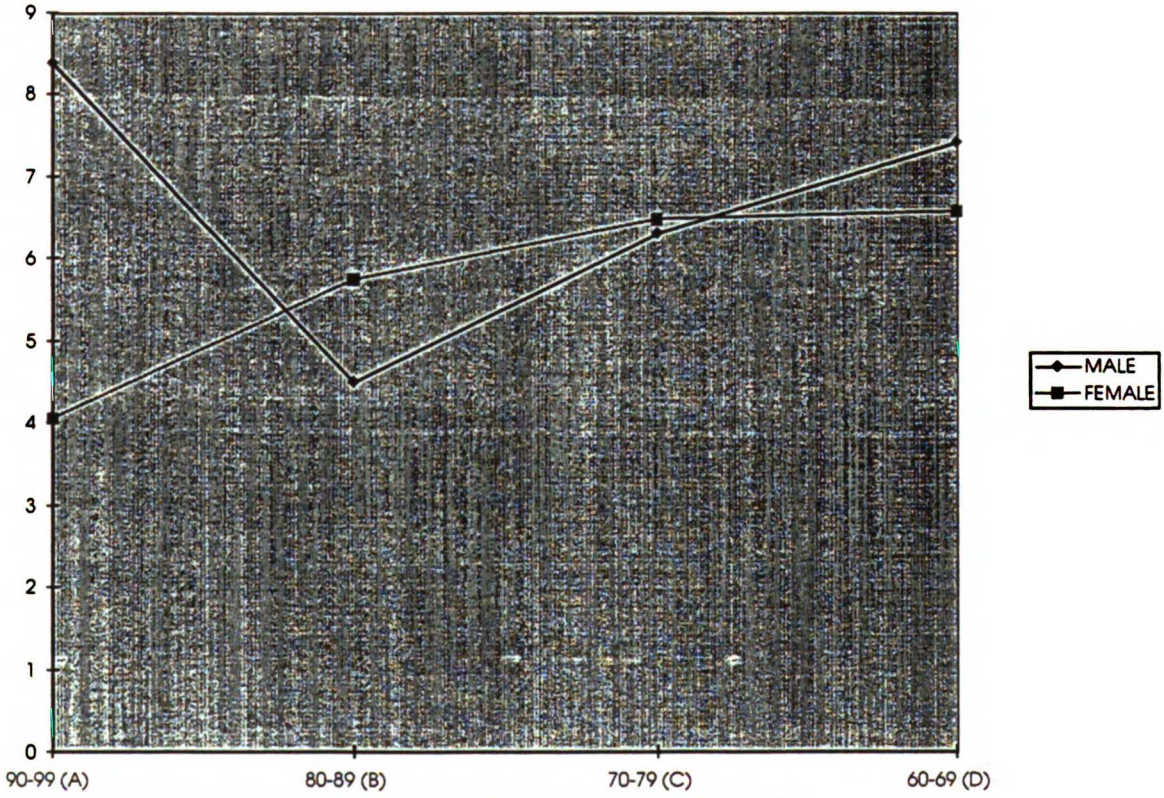

Table 47: Graph ASES scores (see table 45). A=90-99 years old, B=80-89, C= 70-79, D= 60-69 years old.

Medical Outcomes Study Health Perceptions Scale

Summarized in Table 8, this single item questionnaire reflects a respondent's opinion of his or her own health, with "1" representing excellent health and "5" representing poor health. Table 48 and 49 summarize these data. The scores for each age-gender quartile, reflecting mean scores of individual respondents, ranged from 2.00, or very good, to 4.75, approaching poor self-rated health. No group averaged excellent or poor, tending to cluster around the fair, or *regular*, level.

This tendency to describe health as "fair" may represent a desire to avoid envy among others by describing one's health as too good. Foster's *equilibrium model*, and to some extent his *image of limited good* (Foster 1967a), appear to be influential among the elderly with respect to self-reported physical well-being. Though these traditional models are disappearing among residents of Tzintzuntzan (Foster 1979, 1988), old-fashioned ways of thinking still influence the elderly in a disproportionate manner.

Table 48 Medical Outcomes Study Health Perceptions Scale (Self assessment of overall health with 1=excellent, 2=very good, 3=good, 4=fair, 5=poor).

	90-99 years	80-89 years	70-79 years	60-69 years
Male	2.00	4.00	4.28	3.75
Female	4.00	4.75	3.50	4.00

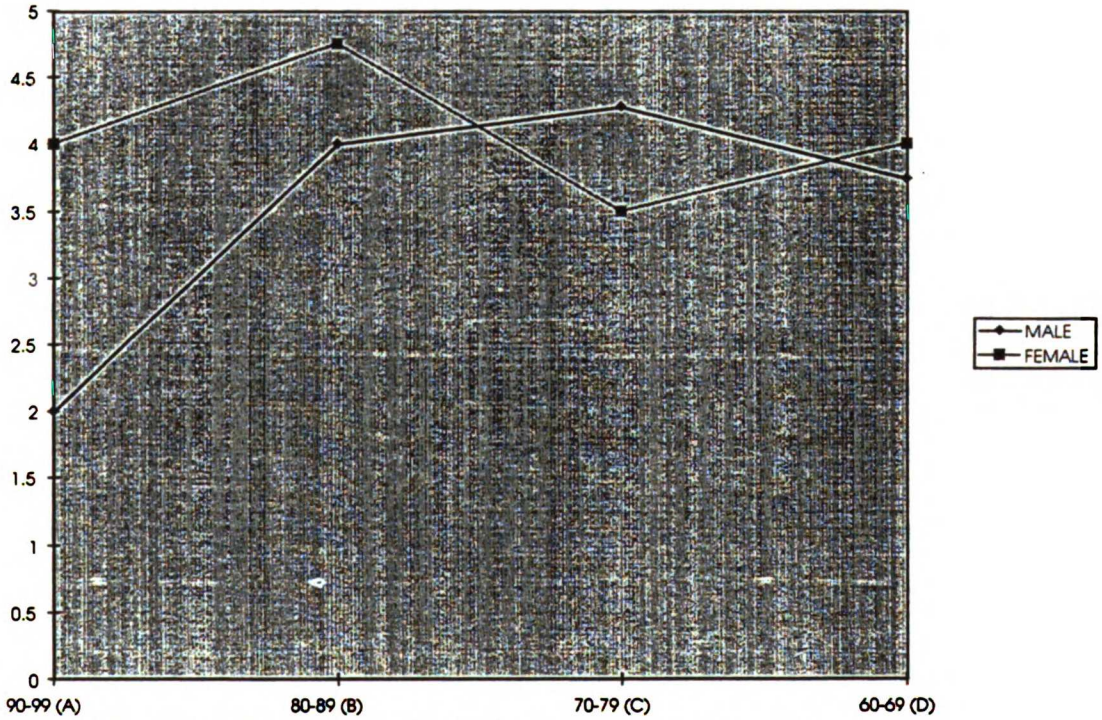

Table 49: Graph of MOS Health Perceptions Scale results . A=90-99 years old, B= 80-89, C=70-79, D= 60-69 years old.

MOS Pain Severity Scale

Reproduced in Table 9, this questionnaire is scored from 0 to 100, lower scores on this scale correspond to less pain. The questionnaire measures severity, frequency, and duration of pain over a previous week, using a visual analog pain scale.

As is the case with other questionnaires administered, there is a tendency for the oldest informants to describe less pain (see tables 50 and 51). It may be that the oldest community members are more free to state that they are doing fairly well, eliciting less fear of resultant envy. Beyond that observation, there is a tendency to complain of increasing pain as aging occurs. There is no significant difference between the sexes in this respect.

Table 50: MOS Pain Severity Scale Scores

Sex	Age 90-99	Age 80-89	Age 70-79	Age 60-69
Male	38.00	73.66	61.71	52.72
Female	45.66	70.50	61.33	52.99

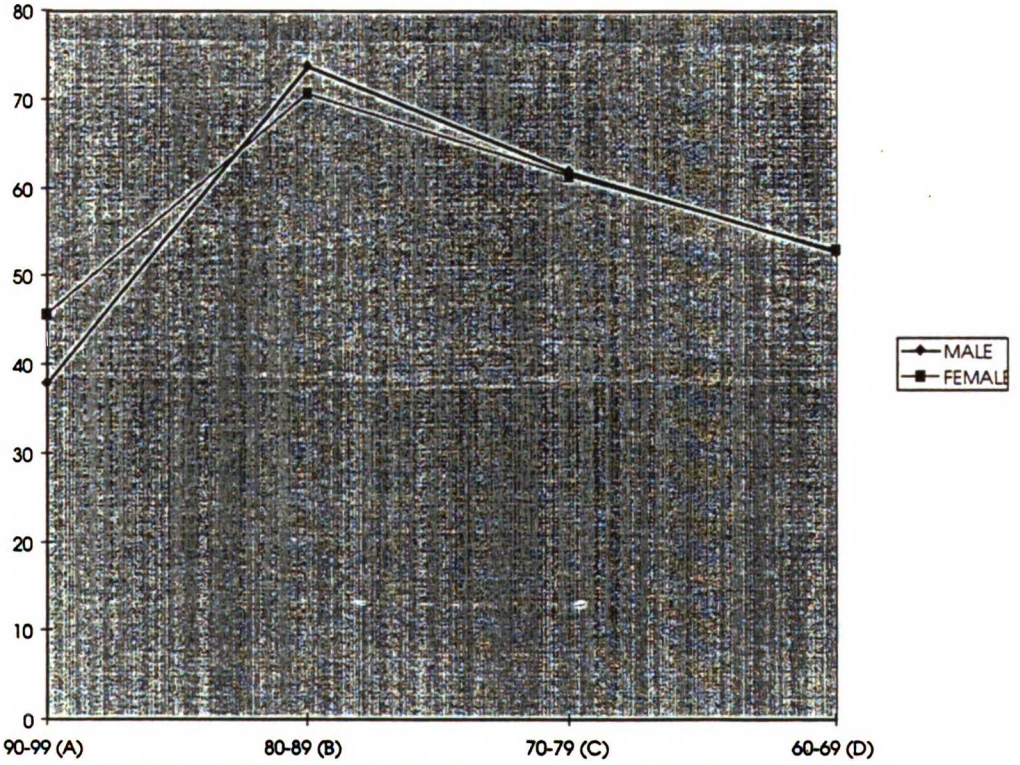

Table 51: Graph MOS PAin Severity Scale Scores . A=90-99 years old, B= 80-89, C= 70-79 D= 60-69 years old.

Questionnaire conclusions

Administration of four validated questionnaires in Spanish revealed a tendency in the Health Assessment Questionnaire, MOS Health Perceptions Scale, and MOS Pain Severity Scale for informants of both genders to complain of moderately severe arthritic symptoms throughout their older years. Little difference existed between the genders, suggesting that the typical tendency for worsening of arthritic symptoms in elderly women may not be the case in Tzintzuntzan. A tendency to describe pain in moderate terms, rather than as severe or absent, may reflect a tendency toward avoiding envy by describing health as good, consistent with Foster's image of limited good. It may also represent a tendency to avoid describing health as excessively poor. Why would this latter finding be the case?

Particularly among the elderly, isolation and loneliness can exacerbate the effects of poor health. Among the elderly observed in the village, there was no isolation and little loneliness, and this may have blunted the effect of chronic illness in old age. In fact, there was a tendency to begin to assess health as better in the last years of life. Due to the small number of elderly informants in the 90 to 99 year old age group, we cannot interpret these observations as having any statistical significance. Nonetheless, it suggests that the elderly may be freed to some extent from some social constraints on the basis of their age. They may have reached a point where envy is not feared as much and they can report their health status as better than before. Or, more probably, their good health status is why they have survived.

Chapter 6: Narratives on Health and Aging

By now the reader should be well acquainted with the demographics of aging in Tzintzuntzan, the prevalence of disease, and the impact of disease on the lives of 50 elderly informants. But what of their earlier lives? How do they view aging as an experience? What are the memories and expectations of the future which frame their day-to-day lives?

In an effort to address these issues, I returned to a group of key informants, spending more time with them, seeking to learn about their lives as children, middle-aged persons, and older persons, as well as their thoughts about disease causation and use of alternative healers. Specifically, I chose 17 individuals with rather severe arthritis, as I wished to learn how arthritis sufferers view the process of growing old. I also interviewed eight healers in the vicinity of the village: An obstetrician in neighboring Quiroga and his colleague in radiology, the *pasante* physician in the clinic, a naturopath, a nurse, a curandero, a huesero, and the village priest. In this chapter I will concentrate on what was learned from the cohort with arthritis.

Table 10 reveals a questionnaire which I devised to assist me in this enterprise. It was not adhered to as strictly as was the case with the prior validated questionnaires. Rather, I used it as a jumping off point for wide ranging discussions and recollections of the elderly which I felt to be critical to this ethnography.

What trends emerged from these interviews? Do they allow us to understand what it is like to grow old in Tzintzuntzan in a more informed light? I think that the trend that emerged is a childhood and early adulthood of deprivation and poverty. This influences growing old in subtle ways, tending to make the elderly face the privations of lost body functions with greater equanimity than might be the case in our own culture. I describe this as a kind of cognitive mindset, much as the *image of limited good* or *equilibrium* represented similar ways of looking at life around a Tzintzuntzeño. In this case, the elderly experience what I will call a *happiness by default* emotional outlook on life. Due to experiencing near starvation, civil unrest with violence, and the lack of respect associated with working as a laborer for subsistence wages, the elderly find their old age more tolerable than one might imagine because of the overall improvement in their economic standing since youth. Associated with this is greater respect afforded them by extended families in a culture which tends to respect the elderly.

In other words, old age is a trade-off, with deteriorating health being compensated to some extent by a better standard of living, freedom from social unrest, and the increase in social standing incumbent to being an old person in a Mexican village. Reaching a similar conclusion, Foster viewed old age as a balance between "pros and cons" (Foster 1981:136). Loneliness and the trauma of retirement are avoided. Loss of health and attractiveness are also inevitable. This balanced view of old age is borne out by the interviews reported here.

One must be careful, however, not to romanticize old age in Mexico. One case of depression was noted in Table 29, though it was in a member of the youngest age group studied. The elderly frequently reported that they were without *fondos*, or money, and at least one informant among the 50 studied was in fairly abject poverty, sifting through the garbage in the village looking for valuable items. Nonetheless, the trend I observed was for the oldest of the old to be afforded greater deference by their families, to be fairly well attended to and fed, and to be generally philosophically inclined to view old age as a part of a life, perhaps even a good time for relaxing a bit and being with family. No formal "retirement" exists in Tzintzuntzan, but those in the 90 years and older group generally were freed from work burdens, and had ample time to wander around and visit relatives in the village. The following is a survey of responses to the questions asked in the questionnaire represented in Table 10.

<u>What was a typical day in your life like as a child, middle-aged person, and as an old person?</u>

José Melendez became tearful remembering his youth in the aftermath of the Mexican revolution. He recalled *"muchos muertos,"* many dead people. General Cardenas came into Tzintzuntzan during the beginning of a land reform uprising, and many people were killed. One day 9 people were shot in Tzintzuntzan alone. Another day he saw 4 people summarily executed. Villagers often ran into the fields in fear for days at a time, and food was in short supply. Children often had no shoes.

In the aftermath of the revolution, Melendez, who was born in 1917, traveled to the United States as a migrant field worker, and life began to improve. The winters were very cold. But finally he felt that he was making "a little bit of money." He also recalls that a local company that he worked for arranged round table gatherings in which Mexicans and Americans would sit together and exchange information on their languages, for an hour or so a week (which sounded pretty progressive to me for the 1930s). During this period he traveled seasonally between Michoacán and the United States. During the early 1940s he returned to the village to work on the highway from Quiroga to Patzcuaro. He still possesses his work identification card from that time, with the word "peon" typed on it under his name. After working for several years, he asked to go on leave, and a friend of his filled out the necessary forms. His supervisor called him in and said, "you're just a peon. You can't take vacation or go on holiday," and tore up his holiday papers. He decided at that moment not to work for them anymore, and left. Just recalling the insult he experienced during that period, the sense of being devalued as a human being, caused him to cry and leave the room to compose himself.

Leticia Cortez, a woman in her nineties who ran a local store with her husband, looked pensive but unmoved as she described her childhood: "I worked in the fields as a child and we were poor. My parents died, so I was an orphan. I had to fend for myself until my grandparents took care of me, and then I was on my own again when they died a few years later. I remember when I was a child as a time of poverty and difficulty."

Leticia Cortez's husband, Malonso Zaponca, described life in his childhood as difficult: "I worked in the fields, starting at 6 o'clock in the morning until 2 o'clock in the afternoon without a break ... Old age is much better, because I have less poverty now and I'm happier." In their early years the elderly recalled a more agrarian life style with greater emphasis on agriculture as opposed to pottery-making. Most of the elderly could recall working in *el campo*, spending long hours in the fields. This was not gender specific, as mentioned above. The women equally recalled long hours in the fields. Both Leticia and her husband reported a generally better economic picture in their middle and older years, as they got into making pottery and eventually opened a small store. They consider their old age to be a decent time, free of poverty and worry.

Many of the elderly similarly reported changing from working in the fields to pottery-making in their early adult years. At this time many of the women remembered getting married, such as Guadeloupe García, who proudly reported her ten children. Her husband regularly beat her from age 17 to 39, a difficult time in her life. At age 39 she was abandoned by her husband who moved to Tijuana, took up residence with another woman, and never returned. This period of being alone with her children was "the worst time of my life." Her life improved in middle age as her children began to contribute economically to the household through work, and as she began to realize how happy she was to be free of an abusive husband. "All we ate was frijoles and tortillas, but at least we had frijoles and tortillas ... before we often went hungry." She reported a happy life now, in spite of a broken ankle from a recent fall which rendered her dependent on her

children. She has her own secure home, and concerned relatives, and reports, "We are all fine now."

In summary, narratives of the elderly revealed a tendency to describe childhood as a time of poverty and suffering, with life improving slightly in middle age and becoming fairly happy in old age. The tendency was to describe old age as happy because of the absence of abject poverty and suffering, freedom from physical abuse among elderly women, and because of the presence of concerned and solicitous extended family members.

What was the happiest period of your life?

The age from 20 to 40 emerged as the best time of life for most informants, though they also reported being generally content in old age and more economically secure. Nonetheless, as Guillermina Maricopa said in describing life around her late 30s, " I was strong and could do anything; I could work all day. Life was wonderful. Life was good." Many women also reported a sense of relief when their children became adults and were able to contribute economically to the household.

Guillermina Maricopa's husband, Francisco Advincula, similarly reported that he could "handle anything" in his late 30s, when his economic fortunes were also starting to improve due to making better money as a potter than working in other people's fields. He also recollected going out with friends and trying to meet girls at dances and other social events before marriage. Few of the men discussed their marriages as a particularly happy occurrence in their lives, seeming to reminisce about their youth prior to marriage

with fondness. The impression of a kind of working partnership between men and women in marriage emerged more than an image of romantic memories.

It appeared that there was a trade-off between economic and physical well-being in the lives of most elderly villagers. Their health and economic status were both fairly good in the period of their 30s and 40s, when chronic illnesses had not taken hold to a great extent and when the poverty of childhood was behind them. A compromise view of life tended to lead them to view this period of early middle age as a good time of their lives. Old age was viewed as tolerable because of improved economic well-being and the support of family members, though fond recollections of a healthier youth lingered.

What do you think the cause of growing old is?

Foster's theory of the accepted explanation for growing old among Tzintzuntzeños describes decreased blood supply and decreased body heat as central factors (Foster 1967a). This view was prevalent among most of the elderly. Blood was envisaged as decreasing in amount throughout life, causing the elderly to be dryer in body consistency and colder, more prone to chills and infections. This was an enduring manifestation of the humoral medicine described by Foster, and reflected, in keeping with the *principle of contraria*, with a tendency to bundle up in warm clothing at all times. Even on warm days the elderly wore sweaters and long sleeve shirts to avoid a chill.

There was by no means unanimity of opinion about the cause of aging, however. Mr. Melendez felt that aging was caused by the accumulated abuse of the body sustained

doing labor throughout one's life to survive. Gorgona Felipe, rejected the idea that decreasing body heat was the cause of aging. She was not sure what did, however. One women suggested, "as you get older your body just doesn't resist as much any more. It just gets weaker and weaker." This concept of "decreased resistance" was fairly prevalent, though not as popular as the explanation for aging in terms of decreased heat and decreased blood supply. I interpret this as a gradual change in the view of the aging population of human physiology, influenced by the presence of physicians at the local clinic since it opened 30 years ago. The concept of "resistance" to illness is distinct from the concept of humoral imbalance, and is a more allopathic perspective. In keeping with this, many of the elderly have had experiences taking antibiotics and think of disease as being caused by invading microbes, especially upper respiratory infections. They report the need to take an antibiotic to fight off an infection, which is distinct as an emic explanatory model from the concept of "risen heat" which needs to be treated with poultices or warming of the feet, as described by Foster (1967a). Thus, humoral theory is showing tenacity in the village of Tzintzuntzan, but is being slowly supplanted by biomedical influences.

In closing, I should also mention that the most common explanation for the cause of aging was a non-explanation, i.e. simply stating, "I don't know," and being unable to come up with a causal theory. This suggests to me a kind of "explanatory fallacy" among anthropologists, a tendency to ascribe detailed theories of causation to all whom we interview about diseases or life events. It is worth noting that, in Tzintzuntzan, as in

the United States, there is a variance in the degree to which people ponder questions such as the cause of aging and develop explanations.

In summary, the cause of aging in Tzintzuntzan is often viewed as a diminishing of body heat and blood supply, consistent with Foster's observations of three decades ago. An increasing proclivity to invoke explanations involving "decreased resistance" to infection or other insults is emerging. This appears to be a consequence of contact with physicians who prescribe antibiotics and explain their function in terms of helping the body overcome invading microbes. This suggests that among the elderly long-held explanatory models for disease are subject to change, and that humoral medicine is beginning to be less influential in Tzintzuntzan. The metaphoric ascription of intrinsic values to foods irrespective of their actual temperature is also diminishing in importance, with most informants revealing little knowledge of the subject. This confirms Foster's concept of the "prescriptive fallacy," i.e., that villagers may explain the ingestion of a salutory food or beverage in terms of correcting an excess of heat or cold retrospectively but they do not seek out the food for prescriptive purposes to "cure" a disease.

What causes arthritis?

The reason I asked this question was to explore explanatory models for disease causation. The explanation of diminished heat and blood discussed above was applied by many informants in the abstract as a cause of the infirmities of aging. They generally did not ascribe a particular condition, such as arthritis, to lack of heat or blood. Rather they developed their own explanations in some cases. Here, as earlier, I should mention that

the majority of individuals interviewed did not have any idea what caused arthritis and did not seem to care about causation. Disease experience was defined more in terms of the process of being old and a bit infirm in general terms.

José Melendez took a mechanistic view of arthritis causation. The body started out well, but developed soreness and pain in joints due to the effect of hard work and injuries, which damaged the joints and caused arthritic pain. He recalled many of his friends who were already dead after working on the highways and in the fields as he did: "What do you expect after years of working hard ... things don't function as well ... the legs and arms might hurt a person..." He did not believe that exposure to hot or cold weather, or certain foods, had any role in the etiology of arthritis.

Melendez's explanatory model for arthritis is similar in many ways to the medical explanation for osteoarthritis, which is increasingly viewed as a degenerative process which results from cumulative trauma. Melendez did not address the influence of genetics or obesity, however, which may play a role in some forms of osteoarthritis. With respect to traditional beliefs, Melendez's understanding of the cause of arthritis did not invoke a humoral explanation. Neither literal hot or cold exposures or metaphoric exposures to certain foods played a role in causing joint pain. Melendez also expressed a strong preference for seeking medical care from physicians, and was surprised when I asked him about seeing a bonesetter or curandero. "I go to the doctor, of course. I don't have any interest in seeing bonesetters or curanderos." In fact, he had prescription pain medications from the clinic in his house, confirming his visits their. It thus appears that

Mr. Melendez's experience suggests a diminution of influence of alternative healers and humoral medicine practitioners.

Antonio Gonzalez, the elderly gentleman with rheumatoid arthritis, did think that cold exposures may have caused his disease. Though not a member of the randomized sample of fifty subjects, I interviewed him at length as a rheumatoid patient from the area. There were no rheumatoids whom I could identify in the village itself among the fifty persons I chose to evaluate, and the clinic physician was not able to direct me to any others. I became acquainted with Mr. Gonzalez when I noticed his deformed hands while visiting the leather store in Quiroga which he owns. The symmetric destructive arthritic changes of hands and wrists were typical of rheumatoid disease, and subsequently confirmed by radiographs. His disease involved hands and feet, which were significantly deformed.

Mr. Gonzalez denied any pain, however, or morning stiffness. He represented a "robust" rheumatoid, an individual with little pain or stiffness in spite of progressive deformity (Figure 24). A local physician suggested to me that Mr. Gonzalez's relaxed life style and solid economic standing allowed him to tolerate his disease well, and there is perhaps some truth to this. As a successful merchant he could afford to see a physician and buy the best medications, and he was not obliged to do any manual work which might injure his joints .

Figure 24. Hand of elderly man with rheumatoid arthritis, with typical ulnar deviation of digits.

Antonio Gonzalez's life had not always been so easy. He worked for many years as a bus driver, transporting passengers from Michoacán throughout Mexico. During this time he frequently had to attend to minor mechanical problems with his engine. In Senior Gonzalez's estimation the exposure to motor oil, which often coated his hands at the end of the day, seemed a likely cause of his arthritis. "I don't know," he reported, "whether the oil caused my arthritis or not. I can't think of anything else that might have, and some people think the coldness of oil on your hands damages the joints. So maybe that was it. I don't really know."

Motor oil did not have a metaphoric property of being hot or cold. It did not have intrinsic properties in this sense, as Gonzalez saw it. But the physical coldness of having wet hands in a cold environment may have played a role. Mr. Gonzalez was curious to know what doctors thought about the cause of arthritis and treatment of arthritis, and I agreed to present his case at a rheumatololgy conference at the University of California at San Francisco to discuss therapeutic options. I wrote back that his current therapy was appropriate, though a higher dose of methotrexate might be something worth discussing with his physician. In short, Gonzalez had a literal hot/cold explanation for disease causation of arthritis, but did not subscribe to humoral theory in a metaphoric sense. Moreover, he seemed most impressed with the approach of his physician, whom he credited with improving his flexibility and causing his pain to subside.

An elderly woman, Natalia Espinosa, took a contrary view in explaining her hand arthritis. It seemed that she had worked as a young woman in a tortilla factory. "I am

sure the heat of working with tortillas did damage to my hands. It is still harming them to this day." It may be, then, that extremes of temperature exposure, be they hot or cold, are viewed as potentially harmful to joints. This is consistent with Foster's observations of concern about suddenly cooling down "hot" hands after working with cold water, necessitating a waiting period before washing one's hands. It appears to be a local process, however, rather than the "displaced heat" process which involves damage to remote parts of the body. The explanatory model for some among the elderly seems to involve literal hot or cold insults, perhaps mediated by the shock of suddenly changing body temperature, as the cause of arthritic joints.

In summary, interviewing local residents about their causative models for arthritis revealed that most people had no idea and little concern with the issue. Among arthritis sufferers who had given the issue some thought, two explanations emerged. The first was a mechanistic model, which viewed the body as a collection of parts which broke down with repeated use and local injuries. The second was a theory of arthritis as being the result of exposure to cold environments or cold substances.

The mechanical model of arthritis, voiced by Melendez, is to some extent consistent with American popular lay explanations of arthritis. I have had patients, for example, apply a topical lubrication oil to joints, commercially known as WD40, due to thinking by analogy with respect to the dysfunction of the body and a motor part. I think Mr. Melendez fell in this camp, although he did not explicitly compare the body to inanimate objects such as machines. His model also is consistent with biomedical theory in some

respects, though not couched in terms of multiple causal factors including heredity, as mentioned above.

Gonzalez, by contrast, viewed arthritis as being caused by cold exposure. Among older residents expressing an opinion regarding arthritis, not all viewed cold as a cause (the majority had no opinion), but nearly all believed that keeping an arthritic joint warm was essential. As arthritic joints have a tendency to "gel" and become stiff with inactivity, this is a point of view which I find easy to accept as reasonable on physiological grounds. Indeed, the accepted standard physical therapy for arthritic hands in industrialized countries may involve warm paraffin wax baths, which provide symptomatic relief though perhaps not altering the natural history of arthritis

In summary, explanatory models for arthritis are varied in Tzintzuntzan, with most informants not having an opinion regarding causation, and with others viewing the body as something which wears out with age, which I have called a mechanistic model. Humoral explanations appear to be generally less popular, though literal exposure to extremes of hot or cold is felt to cause arthritis by some informants. Once one has arthritis, however, it is clearly better to keep the affected part warm. An arthritic knee wrapped with rags and hidden under thick trousers was an example of this I observed in Mr. Cataldo, the oldest informant, whose knees were severely damaged by osteoarthritis.

<u>How do you decide whether to see a physician, a curandero, a huesero, or other healer?</u>

There was a tendency to unequivocally prefer treatment by physicians whenever possible. Guillermina Maricopa, born in 1917, told me, "I have health insurance. I always go to Mexico City and see doctors in private clinics. I wouldn't go to a huesero or a curandero because I don't have confidence in them."

Others without private insurance or sufficient funds to seek care from physicians reported that they sought care from physicians at the *Centro de Salud.* This was less than ideal because of the tendency for the *pasante* physician to go away at times on house calls or trips, and due to the necessity to wait for a long time to be seen. Nevertheless, I think it is fair to say that the public health clinic generated a great deal of good will among the elderly of the community for the provision of free medical care it provided.

Alternative healers were not sought out if physicians were available, *Empacho*, the folk illness characterized by intestinal symptoms of obstruction, for example, was not observed, though informants recognized the term. They preferred to describe *extreñimiento*, or constipation, and to seek laxative medications for this if available. There was at least one herbalist who prescribed alternative medicine in the form of teas from his garden, and one naturopath also used medicinal herbs (both to be discussed later). Nonetheless, the majority of study participants exhibited a distrust for traditional remedies and a desire to receive allopathic medical care whenever possible. This finding of a relative lack of interest in alternative remedies contradict conclusions reached by other investigators in Michoacán and beyond. Part of the explanation for this

discrepancy may lie in the passage of time since other reports from the field regarding this issue were published.

For example, Young, in his *Medical Choice in a Mexican Village,* based on research performed in the nearby community of Pachátaro, described a general distinction between folk illnesses requiring *remedios caseros*, and biomedical problems requiring *remedios médicos* (Young 1981:102). An example of a folk therapy would be the use of *manzanilla* (chamomile) for upset stomachs, often cultivated near homes. Young's view of healing choices is consistent with the concept of a hierarchy of treatment elaborated by Romanucci-Ross, based on observations in the Admiralty Islands (Romanucci-Ross 1969).

It should be recognized that the subjects being interviewed knew I was a physician, and may have been interested in pleasing me and demonstrating a lack of regard for old fashioned remedies. Though this probably played some role, older traditional practices clearly have diminished influence in Tzintzuntzan. There is other evidence for this beyond that obtained by my interviews, which I will now discuss.

The two active hueseros in the community are in their 70s and 80s. They both reported to me that no young person has expressed an interest in learning the healing techniques they are proud of. I also found both healers surprised to be sought out for care, and both reported that they had not been busy with requests for treatments in recent years, being consulted every few weeks or months rather than several times a week, as in the past

decades. The curandero whom I studied was also not busy in his practice, though he was not old. Finally, the clinic in the *Centro de Salud* was nearly always busy, with a long wait to see the physician there. Though residents reported that "some doctors in the clinic are better than others," they clearly chose to be seen their for medical emergencies and acute infections. Childbirth, for example, was viewed as being safest when performed by a doctor in the clinic. The efforts of the clinic physicians to vaccinate the population and educate the public with respect to nutrition and disease prevention were generally looked on favorably.

As a final observation regarding this trend towards seeking western medicine, the most busy alternative healer in the community, a naturopath practicing one day a week from the home of Doña Mariana, is useful to consider. Dr. José Oliveras Soto relied primarily on dietary interventions, stress reduction, and lifestyle advice rather than on technologically focused therapies, he presented himself as a physician rather than an alternative healer. He wore a white shirt and tie, saw patients in a laboratory coat, carried a black bag, pointed out that he had trained as an M.D. prior to studying naturopathic medicine, and was referred to in reverent manner as "El Doctor" by all assistants and patients (Figure 25). His clinic was extremely busy, and patients paid cash for his advice, prescriptions for herbal teas and other remedies, and follow-up care.

Figure 25. Dr. José Oliveras Soto, naturopathic physician, shaking hands with author at clinic (photograph by Camille Castro).

When alternative care is sought in Tzintzuntzan, what is the explanation? Explanations for seeking alternative care usually were economic. For example, in the case of musculoskeletal injuries, bonesetters provide an alternative therapy which may be palliative and is economically affordable. Young observed in his research in Pichátaro a tendency to make health care utilization decisions based on cost as a "second ordering" decision, after a "first ordering" determination of what healer "seems most likely to cure the illness" (Young 1981:139). Within this paradigm, turning to a physician is an expensive alternative turned to "only as a last resort after the other less costly options have been exhausted (Ibid: 139).

I observed a different approach, seeking medical care at the clinic as a first-order decision, with use of alternative healers reserved for secondary attempts at cure if the physician was not present. Cost was not a primary consideration, as care provided at the clinic was provided free of charge, but it did become a consideration in some cases. For example, a woman needing extensive evaluation for a fractured leg sought care from local doctors after the clinic proved unable to adequately treat her problem. She eventually was treated at the regional hospital near Patzcuaro as an alternative to the care she sought locally, due to lack of money to pay doctors. In her case a bonesetter was not considered, as she did not have confidence in their ability to treat her problem.

There are many times when the clinic physician is not present. There are several other practicing doctors in the community, but they often are only in practice part-time, having other business interests or larger offices in other towns. Thus, the use of alternative healers may be viewed as a necessity when no other treatment is available.

No doubt there are also still individuals who seek treatment from curanderas, for example, for emotional problems which are perhaps not amenable to sympathetic intervention in the rather cold clinical environment of a doctor's office or clinic. We will discuss this more in the section on alternative healers.

What illness do you fear the most?

This question was asked because I was interested in determining whether there was a pervasive fear of cancer, heart attack, or other potentially stigmatized illness among the villagers. Cancer, for example, was once referred to euphemistically in some obituaries in the United States, with individuals be described as dying "after a long illness," rather than due to cancer (Foster 1966:54).

The concept of illness among the elderly interviewed was different from what one thinks of in either the biomedical sense or Kleinman's sense of the subjective nature of a disease. Rather, the elderly of Tzintzuntzen are concerned about *symptoms* of disease. They fear pain or discomfort, and associate this with particularly problems they have had in the past. For example, one woman told me that she had had an attack of gall bladder pain some years before. She feared that it might come back some day. This concerned her because, as she said, "it caused me severe pain. I had it before and I sometimes am afraid it will happen again." Fear of a perforated gallbladder, sepsis and death is notably absent from this description of her gallbladder. Similarly, several older informants were concerned about chronic constipation, but there was no sense of concern about colon cancer or the possible harmful implications of digestive problems. In fact, there was no

fear of death voiced by any informants. They all described the future as in the hands of God, and they expressed no particular fear about morbid conditions or possible harmful diagnoses.

To some extent this is typical of elderly individuals (and for that matter young people) on both sides of the Rio Grande. No one wants to feel sick, and we all are concerned when the body's malfunctions cause pain or bloating. I would suggest, however, that even among relatively uneducated persons whom I have treated in the United States in clinics and emergency rooms the experience of growing old is more influenced by fear of serious diagnoses, and fear of death. For example, a 90 year old man with ankylosing spondylitis insisted that I assure him that he did not have cancer or a bone condition that might cause him to die, even though he was old, frail, suffering from other chronic problems, and surely facing his own demise in a few years at most. Nonetheless, death and a preoccupation with diagnostic accuracy was a major concern for him, and my job as a physician was viewed as involving forestalling death and thoroughly checking him out to detect occult disease.

Excessive concern with screening for colon cancer, breast cancer, prostate cancer, hypercholesterolemia, and other illnesses can create a kind of hypervigilant neurosis among many elderly in the United States. The elderly of Tzintzuntzan appeared to have been spared this experience, though they also do not benefit from early detection of treatable illnesses via sigmoidoscopy, mammography, and exercise stress tests. It appears that, for the elderly of the village, old age does not involve great fear of illness.

Fear of uncomfortable symptoms, such as pain or stiffness, was more prevalent than fear of an ominous diagnosis.

The equanimity with which the elderly approach aging in Tzintzuntzan stems from a couple of obvious sources, I believe. The first is a religious orientation which makes death appear less frightening than might be the case in a more secular society. Beyond this, the lack of any tradition of health care screening leads to a lack of awareness of cancer, heart disease, or other infirmities as significant health threats.

In most cases, a Tzintzuntzeño with cancer will die of complications of the condition, such as malnutrition or pneumonia, without a specific diagnosis being made. There are exceptions, as in the case of an isolated gentleman who reported undergoing an orchiectomy (removal of a testicle) as a curative therapy for testicular cancer years earlier. Alfonso Cataldo, whose prostate cancer caused recurrent infections and urinary obstruction, was diagnosed with prostrate carcinoma, but not informed of the diagnosis. He was treated palliatively and even hospitalized once, but the physicians caring for him elected not to subject him to radiation therapy, chemotherapy, or extensive surgery . As one physician caring for Don Cataldo told me in a humane manner, his cancer was advanced and aggressive therapy would not provide improved survival ... "So why not let him be comfortable and die in peace?"

It may be that we can learn something from the experience of growing old in Tzintzuntzan. Perhaps the experience of aging in the United States is made more

onerous by well intentioned efforts by physicians not only to meticulously screen for cancer and heart disease, but to communicate the dangers of these diseases constantly to patients. We may be creating a culture of unhappy elders preoccupied with death and dying. It may be that a less brutally honest approach, though contrary to the American tradition of frankness and directness, may free the elderly to age with more grace and equanimity. This may be a lesson for Western health care practitioners derived from the people of Tzintzuntzan.

Is it Difficult to Grow Old?

To some extent this question was already addressed above. For example, Malonso Zaponca reported frankly, "It is not difficult for me to grow old. When I was young I was poor. Now I am no longer poor." This theme of relative happiness in old age due to less poverty was consistent in my interviews.

Guillermina Uribe, born in 1917, agreed with this assessment with respect to her own life: "Is it difficult to grown old? No, it's better because now I'm not poor. We have a nice house and my children take care of me. When I was younger it was very difficult."

There were exceptions, of course. Gorgona Felipe reported, "I feel as I grow old that I have somewhat decreased strength. That bothers me a bit." A mother of ten children, four of whom died, she nonetheless agreed with other informants that her life was overall better because of less poverty. Natalia Zaponca Espinosa echoed this theme, particularly decrying her lack of energy upon arising in the morning. Nonetheless, the majority of

elderly interviewed felt that old age on balance was a good time due to lack of poverty. As such a theme of relative happiness emerged, perhaps reflecting a tendency to view age within a broader context of individual life histories.

What was the most memorable experience of your life?

Early life experiences of political unrest and poverty were consistent themes. Nicolas Chavalas described his most memorable experience as follows:

> "The period of the Revolution was the most memorable experience of my life. I was just a boy. Suddenly there were men on horseback galloping through the streets. I could still hear the sound of the hooves as they came charging through town. It was a frightening experience. They did not hurt us, though. They just wanted tortillas to eat. But we were so scared, we ran from our houses into the fields for two days. We did not know what would happen to us. We thought we might be killed. But then they moved on and we came back, and life went on."

The theme of poverty was also prevalent, with many older men and women remembering being hungry and not having shoes or decent clothes to wear. There were exceptions, of course. Alfonso Cataldo remembered how, in his youth, one could buy tortillas or clothing for a peso or less. He worked for six centavos a day as a young laborer, but the money went further.

Gorgona Rendón Felipe fondly remembered her years as a young mother: "I remember when I was young and spent time with my family. That was a special time for me. That would be the most special time of my life."

Malonso Zaponca remembered that, as a young man, he was free and had fun. He recalled: "We used to drink a lot, you know. And then we used to run out and try to meet girls. In those times I would go all over the place. I would stay out all night with my friends. We really had a great time. That was the most memorable time of my life." Whether hangovers and other complications of all night drinking detracted from the memories or not, Zaponca had quit drinking years ago, as had most of the older men.

These pleasant memories contrasted to some extent with recollections about poverty and other difficulties in those years. For the elderly of Tzintzuntzan, life was not seen in strict dichotomous terms of good or bad. Rather, in a way perhaps universal among people, good memories and bad memories were expressed by most informants. Nonetheless, the tendency I observed was to remember childhood and early adulthood as a time of difficulty and challenges in many cases.

<u>What do you look forward to in life?</u>

Most of the elderly did not articulate complex expectations for the future. Absent from future expectations, for example, were any particular goals to accomplish professional or other tasks. As such, I think the elderly of Tzintzuntzan approach aging without expectations of fundamental change in life experience. Rather they view it as a

culmination of a long life experience in which living for the present should be the expectation. There were exceptions, however. For example, Guillermina Uribe Maricopa described the pleasure she derived from working in her store. "My husband is tired of working, but I enjoy it. Working makes me feel worthwhile." Family stores were almost always run by women, suggesting that entrepreneurship may be an emerging vehicle for greater freedom among women in Mexico.

The view of the future was not generally very sanguine. For example, many informants simply answered "nothing" when asked what they expected the future to hold for them. Many expressed anticipation of debility. Gorgona Reposa Felipe said bluntly, "I expect to grow older, become weaker, and then to die." Similarly, Natalia Zaponca Espinosa answered rhetorically: "I expect sickness and death. What else do I have to look forward to?"

Noticeably absent from the narratives of the elderly regarding future expectations were lengthy narratives about religion, life after death, or other metaphysical concerns. I believe this reflects the universality of Roman Catholicism in the community, and the lack of need to express religious expectations in an explicit manner. Similarly, there was less discussion of the joys of spending time with children and grandchildren than I expected to see. Though being with family was clearly important, it did not require recognition in a direct way as a part of growing old. As in the case of religion, being with family was just accepted as a part of the picture, and not directly mentioned. It may be that the emphasis on the importance of children and grandchildren in the dialogues of

older Americans to some extent reflects the absence of extended families, and therefore the longing to be with children and grandchildren. In a culture in which extended families are simply part of the landscape, they do not generate the romantic appeal in conversation that we see in the United States.

In summary, the general outlook for the future among the elderly of Tzintzuntzan was matter of fact and a bit grim. They expected debility and death. They accepted this with equanimity, and did not burden their older years with a great deal of angst, self examination, or anxiety. They came across as stoical and unromantic, though continued happiness derived from work or family still was occasionally mentioned.

Are you happy with your life at present?

All informants reported that they were happy with their lives at present. This was often reported in a matter of fact and unenthusiastic style, and may reflect a tendency on the part of the very polite people of Tzintzuntzan to please the interviewer and not appear to be expecting too much from life. As such, this may reflect equilibrium theory in action. The elderly are reluctant to report extreme well-being, with the attendant risk of eliciting feelings of envy among others. As rugged individuals who have known much hardship, however, they are similarly reluctant to complain about their current circumstances. A view of life circumstances as adequate, though neither excellent nor poor, emerged as a typical self-assessment.

Nonetheless, several lines of evidence emerged from the interviews to suggest that the majority of the elderly do in fact experience old age with calm acceptance and a fair degree of contentment. First, almost all of the elderly when pressed on this issue would point out that they were not poor anymore. Thus, Natalia Espinosa said simply, "I am happy because I am no longer poor. What more can I expect from life?"

Guillermina Villarreal was even more direct: "I am happy because my life was so miserable before." Compared to being a young mother beaten by her husband and living in a state of economic deprivation, living surrounded by economically productive and solicitous adult children was relatively easy to tolerate. Indeed, being with family was a theme that was also revisited with respect to this last question on the anthropological questionnaire I devised. If one is with family and no longer poor, one is generally as happy as one may expect to be. Therefore, the elderly of Tzintzuntzan are overall content with their lots in life.

This perspective, tending to compare the present with a very difficult past, may have some correlation with the lives of our own elderly who grew up in the Great Depression. I think that the experience of growing old in Tzintzuntzan is fundamentally different, however. In the United States the elderly are deluged with advertisements describing older people who are pursuing hobbies, taking cruises, exercising, and generally approaching old age with a list of goals and expectations.

The life of the elderly in Tzintzuntzan is to some extent less disrupted by complex societal expectations of what growing old should be. There is no debate about the relative merits of disengagement from the larger culture, for example, and how to spend time while one is disengaged. Retirement does not really exist as a concept. As such, the process of growing old is gradual and imperceptible, without major landmarks or changes in one's role in the village. One grows old and continues to work, or perhaps gradually works less as children take over. There are no retirement ceremonies, no moving to another part of Mexico to spend one's last years. Growing old in Tzintzuntzan represents, I think, more of a steady continuation of the journey of life, rather than an obstacle to negotiate, define, and get over. In many respects, then, the elderly of Tzintzuntzan offer a model which we can learn from as we deal with the "graying of America" in our own country.

Chapter 7: The Healers

Access

The first challenge in studying traditional healers in Tzintzuntzan was getting to know them, and getting information on their practices from both the healers and the villagers they served. Beyene described her difficulties while performing research on menopause in the Yucatán, before gaining acceptance and completing her research:

> "During my first few weeks in Chichimila, my presence was generally ignored by the local women. My greetings on the street were never returned; women usually pulled their shawls, *rebozo*, over their heads and passed by quickly. At first, most of my contact with women of Chichimila was at a rural clinic, where I asked women who had come for treatment to meet with me later. They all politely said they would come, but no one did," (Beyene 1989:68).

Beyene eventually gained the trust of the women, primarily through gaining acceptance of influential villagers such as the priest. My experience was similar. To some extent I was less successful than Beyene, particularly in learning about the lone *partera* of the village. Childbirth apparently is a function of women in the village, and men are not permitted to intrude except in the context of a delivering physician in the clinic. During the year I was in the village, the clinic physician, or *pasante*, was a woman as well. My response to this situation was to focus on arthritic problems of the elderly, where I had the most expertise and where my inquiries were always welcome. As a result, most of my discussion of healers will dwell on issues related to aging and musculoskeletal

diseases. Future researchers, perhaps better suited to the task, may explore the issues of childbirth and menopause with greater success, as Beyene did in the Yucatan (Beyene 1986, 1989).

I identified healers through interviews with individuals familiar with village life, including health care providers at the clinic. What emerged was an eclectic approach to health care, with villagers conversant with the existence of numerous healers at various levels. Generally, a practical interest in obtaining whatever health care was available predominated, and the care given by a physician was universally viewed as optimal. Stated differently, there was little interest or desire to receive alternative health care from a huesero, curandero, or naturopath if biomedical care was available.

Parallel Tracks of Religious and Corporeal Healing

Table 51 summarizes this array of healers. In a sense, religious figures and deities are supreme, ranked above physicians in terms of their ability to heal. Thus I have listed God (consisting of Jesus Christ, the Holy Father, and the Holy Ghost) at the highest level, followed by Nuestro Señor del Rescate (a local patron saint and shrine). The priest is also considered a healer by his own admission. The importance of religious figures cannot be overestimated in the lives of the devout residents of the village. They routinely pray for healing to God, and offer donations of small gifts at the Shrine of Nuestro Señor del Rescate (Figure 26). However, I believe that in some respects this represents a parallel track to seeking allopathic or alternative care. Stated differently, there is no expressed or perceived need to choose between seeking care from a healer or

through divine intervention. The two routes are complementary, with the religious aspect viewed as one which may be manifested in cures experienced corporeally in this world. As such, there is no contradiction between the two approaches to healing.

Table 52: Hierarchy of Healers in Tzintzuntzan

God

Saints

Priest

MD's

Curanderos

Hueseros

Naturaropaths

Partera

Family

Self

Figure 26. Votive offerings to shrine of *Nuestro Señor del Rescate*, La Capilla de la Soledad, Tzintzuntzan.

Self Care

The majority of ailments are treated with self-reliance and home remedies. An example of this is the application of *pañolanda* leaves to the temples to treat tension headaches (Figure 27). The criteria leading to definition of an illness as more severe, requiring care of a provider outside of the immediate family, generally involve concern about the need for antibiotics to treat infection or a severe musculoskeletal condition causing distress. This process of determining the need to seek care varies from household to household and person to person. In general, however, I would estimate that the majority of mild illnesses, in Mexico as in the United States, do not require that treatment be sought from a healer.

Figure 27. Topical application of a *pañolanda* plant to treat tension headache.

Allopathic Healers

Anthropological investigators have long sought to explore the distinction between allopathic models of disease and traditional explanations in different cultures . For example, Romanucci-Ross, in describing the "hierarchy of resort" which leads residents of the Admiralty Islands to seek medical care under some circumstances, is a description couched in terms of etic illness classifications familiar to physicians, discerning between mild and severe malaria attacks, for example, though not defining exactly how one determines severity of malaria in Manus culture (Romanucci-Ross 1969). Romanucci-Ross suggests that Western medicine is sought only after traditional therapies have been exhausted, often when a patient is dying. Young's work in Michoacán also reflected a process of differentiation between folk illness and medical illnesses, with care being sought by the appropriate traditional or allopathic healer based in part on the nature of the condition (Young 1994).

Kleinman struggled with this distinction, defining *illness* as the "innately human experience of symptoms and suffering," distinct from the pathological definition of *disease*, or the concept of *sickness* as a "macrosocial." Scheper-Hughes and Lock distinguished between illness experience at the level of the body, society, and political implications of illness (Scheper-Hughes, Lock 1987). More recently other investigators likened the experience of illness to a literary one, with Kirmayer constructing an epistemology of illness experience which distinguishes between what he calls the "order of the body" versus the "order of the text" (Kirmayer 1992). A recent publication on chronic disease outcomes in rheumatic diseases argued that the "biomedical model" for

arthritis neglects the importance of the disease sufferer in determining his or her own prognosis, tending to privilege the influence of physicians instead (Callahan, Pincus 1997).

In Tzintzuntzan I observed a tendency to prefer allopathic care among villagers. This is contrary to the experience of Kennedy and Olson, in which they interviewed 20 clients attending a rural community health clinic in Tlayacapan, Morelos (Kennedy, Olson 1996:41). In Kennedy and Olson's experience, health care seeking behavior was determined in part by "perceived etiology" of illness. Illnesses perceived to be "traditional," such as, *anginas*, or *caída de mollera,* would lead to choice of a *curandero*, *huesero*, or *partero*. In some cases biomedical practioners were deemed less capable of treating illneses, such as non-fracture associated musculoskeletal complaint. The earlier work of Romanucci-Ross is to a large extent replicated by these findings (Romanucci-Ross 1969).

In the Kennedy and Olson study, some physicians stated that they would consult a huesero, a phenomenon considered evidence of "integrative medicine" which had the potential to "return a measure of local control over health care, counter the hegemonic or imperialistic implications of biomedical medicine, acknowledge the validity and value of local cultures, and offer a more holistic approach to health care delivery than the present biomedically-driven approach," (Kennedy, Olsson 1996:45).

People in Tzintzuntzan do not rely on traditional healers as a first alternative, turning to biomedicine as a last resort, as Romanucci-Ross observed several decades ago in the Admiralty Islands (Romanucci-Ross 1969). Neither do they sort out folk illnesses such as *empacho* or *mal de ojo* from medical illnesses, choosing folk healers when appropriate for the illness category. Rather, they go to physicians first whenever they are available. Foster noted this trend towards rejecting traditional healing in his epilogue to *Tzintzuntzan* written for the 1979 edition: " ... most members of the younger generation know very little about traditional etiologies, especially the hot/cold dichotomy of humoral pathology ... belief in, or at least fear of, witchcraft and the evil eye has declined dramatically, and progressive people now dismiss them as simple superstitions" (Foster 1979:373). It is not surprising that two decades later the trend towards modernization in health care is even further advanced. The older people I interviewed may have been in middle age when Foster began to see a decline in traditional therapies.

The main obstacle to receiving health care in Tzintzuntzan was economic. People could not afford doctors, and the only free medical care provided by a doctor came at the hands of the M.D. *pasante* who was overworked and sometimes unavailable. At least two other doctors maintain *consultorios* in the village, but they also see patients in neighboring communities where the economic base is more secure (such as the state capital of Morelia). As a result, for practical purposes, the physician at the community clinic is the main doctor the people can see when care is needed. Dr. Romero, the *pasante* present during the period of my major research, was a graduate of the

Universidad Autónoma de Guadalajara. At the top of her class in medical school, she was fulfilling her obligations to perform one year of community service prior to being licensed and undertaking a residency in ophthalmology. Dr. Romero graduated from high school in the United States, though her family was from the state of Sinoloa, where her father practiced ophthalmology. As with the previous two pasantes (Figure 28), whom I also knew, she spoke fluent English. The *pasante* from the previous year, Dr. Stefano Trabaldo, and his immediate antecedent, Dr. Rita Lepe Suastegui, spoke fluent English and also trained at the Universidad Autonoma de Guadalajara.

Figure 28. Physicians at the community health clinic. Dr. Rita Suastegui (on the left) on her last day of a year of community service, Joined by her replacement for the next year, Dr. Stefano Trabaldo.

In the time I spent observing Dr. Romero in clinic, she demonstrated excellent proficiency in providing primary care treatment to the community members. Included in her obligations were all aspects of patient treatment, from pediatrics to adult medicine to minor surgical procedures. She also delivered several babies. As with the previous pasantes, she reported to me that the year of *servicio social* , though viewed with trepidation by most medical students, was a year of valuable personal growth, fostering confidence borne of weathering a year of practicing medicine without the mentors and support found in a hospital environment. Typically, Dr. Romero's clinic waiting room began to fill up in the late morning, and she saw patients into the early evening hours. She was free to visit home on weekends, leading to a period of time in which no care was available. She also frequently took trips to acquire supplies or visit patients, leaving the clinic closed for several hours at a time. Her services were provided free of charge, including the dispensation of medicines when available. The clinic, however, was lacking in even basic medications due to poor supply networks and a tendency for antibiotics to be pilfered en route across Mexico from central supply sources. Though the *pasante* and I both brought in medications to the clinic after trips to cities, patients still sometimes received written prescriptions for medicines not currently in supply. The *pasante* generally recognized that many of these prescriptions would not be filled due to lack of money, though this issue was not typically discussed overtly out of concern for damaging the pride of the patient.

When the clinic doctor was absent, patients could seek care from the two primary care doctors in the community, but this was practically speaking not a realistic alternative, as

mentioned earlier, due to their absence. A veterinarian was available for animal care in Tzintzuntzan, though no veterinary hospital was present. In Quiroga, ten minutes away by bus, there was a small regional hospital. The head of the facility, Dr. Monroy, was a fully trained obstetrician-gynecologist. He was adept at all surgical emergencies, and lived in quarters built into the same building as the hospital.

Dr. Monroy also had access to a radiologist who visited the community twice a week to provide radiographs. It should be mentioned that for both Dr. Monroy and the radiologist, Dr. Edson, medical care was provided on a fee-for-service basis. Thus, with the exception of a small number of Tzintzuntzeños who had private insurance (I only encountered one such individual among the 50 elderly key informants), the care provided by Dr. Monroy was out of reach. The exception was emergency care, such as with Afonso Cataldo's prostate mass. This was provided free of charge, reflecting well on the professionalism of Dr. Monroy. There was also an internist who lived in Quiroga and practiced in Morelia. His professional activities in Quiroga were confined to running a successful leather clothing store.

Health care providers in the region often pursued family business activities as a major source of income. For example, Tzintzuntzan's only dentist also ran a catering business, and his dental practice was largely abandoned as a secondary enterprise. Physicians and dentists, as well as the laboratory technologist in Quiroga, generally lived in quarters attached to their clinical facilities (Figure 29). Tzintzuntzan's three pharmacies were small shops, run by entrepreneurial families. They lacked most useful medications. One

functioned primarily as a postal facility providing stamps and toiletry goods. The closest pharmacy in Quiroga was run by a successful local family which had also constructed a four story hotel in the attached building. A physician owned another pharmacy in Quiroga, next to the medical facility which he directed. In no case did I encounter trained pharmacists in facilities in either Tzintzuntzan or Quiroga, as dispensing medicine was viewed as a fairly casual affair, with no need for a doctor's written prescription in most cases.

Figure 29. Doctor's office and home in Tzintzuntzan.

In summary, medical care was provided to the members of the community of Tzintzuntzan by at least five physicians: two general practitioners, one *pasante* performing *servicio social*, and an obstetrician-gynecologist and radiologist in neighboring Quiroga. The majority of medical care was provided by an over-worked but dedicated young *pasante*. A significant gap in medical coverage of the community emerged from this arrangement, with the elderly being obliged to travel to Quiroga for emergency care, where transfer to the federally supported regional hospital near Patzcuaro might ensue for critical cases.

Most striking in my analysis of the healers in the village was the ascendancy of biomedicine, the relegation of traditional healing to a second tier status, and the lack of concern with Hot and Cold as direct etiological factors affecting health. Hot and Cold did sometimes emerge as retrospective factors explaining arthritis, as when a principal informant with rheumatoid arthritis attributed his condition to exposure to motor oil, which was viewed as literally and metaphorically cold. Thus the concept of the "prescriptive fallacy" as outlined by Foster was borne out. Also borne out was the tendency of emerging industrializing societies to choose biomedical care when given the option (Foster and Anderson 1975). Traditional humoral beliefs might be invoked to explain an illness, but were not given much credence up front as factors to avoid or engage to maximize health.

disease.

Hueseros

Hueseros are traditional bonesetters. In Tzintzuntzan there are two active hueseros: Don Felix and Don Fidel. I observed both bonesetters treating patients, and also experienced their healing techniques as a patient. Don Felix treated me for neck strain, and Don Fidel treated me for low back strain. A third huesero, José Montañez, was absent whenever I called on him, having apparently emigrated.

Huber and Anderson, working in Hueyapan, described bonesetters in Mexico as naturalistic healers, distinct from the more supernaturally-oriented healers known as *curanderos* (Huber and Anderson 1996). They also reported that curanderos may provide bonesetting services on rare occasions. The tendency for *curanderas* to be women and *hueseros* to be men was also noted. We will see that in Tzintzuntzan at least one major *curandero* is a man, who also provides bonesetting services. During my time in the village I undertook participant observation studies of two *hueseros* and one *curandero*. Let us know turn to a discussion of the *hueseros* of Tzintzuntzan.

Fidel Ramos Geronimo possessed a skill for adjusting broken bones and strained backs, developed largely through trial and error (Figure 30). As such, his approach to healing is naturalistic rather than personalistic and without supervening concern with spiritual aspects of health care. This was true of all the healers I interviewed in the village, with the exception of the priest, who will be discussed below. Don Fidel practiced in spite of advanced osteoarthritis of the knees, which did not prevent him from lifting a full grown man into the air in order to stretch out a sore back (Figure 31).

Figure 30. Fidel Ramos Geronimo, traditional bonesetter, treating an ankle strain

Figure 31. Advanced bone-on-bone osteoarthritic knees, seen on weight bearing AP radiographs of traditional bonesetter Fidel Ramos Geronimo. Lifting patients into the air to stretch out the back was accomplished in spite of this condition.

Both Don Felix and Don Fidel entered the huesero field for practical purposes. They discovered they had some healing ability by assisting people with strained joints and broken bones. Both advised seeing physicians if possible for grossly fractured bones, but Don Felix indicated that when he was young he would tackle such problems. Neither seemed to have sophisticated understanding of neurovascular compromise as a potential complication of closed or open fractures.

Don Felix began his career as a huesero as a young man, when he went to Patzcuaro to attend a social function and saw a young man fall off a railing. As others milled around not knowing what to do, he stepped in and fanned the man's face until he regained consciousness. A local physician was sufficiently impressed to offer to train him in the management of musculoskeletal conditions, apparently so that people in Tzintzuntzan could receive first aid for fractures. For about a year, Don Felix visited Pátzcuaro about once a week and observed how the doctor treated musculoskeletal conditions, and since then used that in his own huesero activities. He also continued to work as a potter over the course of his life. Like Don Francisco, he accepted money only when offered, never demanded payment, and generally presented himself as a humble, self-effacing, and even somewhat reluctant healer who offered services when asked to do so.

Don Francisco told me that his parents died when he was young and he grew up in severe poverty with poor dietary intake. Most impressive about Don Francisco was his egalitarianism and lack of avarice. He sought no money for his treatments but accepted payments when offered "as much as people want to give me." I also videotaped and

observed Francisco treating acute ankle strain. Don Francisco worked full time as a potter. This was a consistent theme among the hueseros and curanderos I observed. They worked as healers part time, but maintained their primary identities as non-healers. This is consistent with prior anthropological investigations of bonesetters and curers in Hueyapan, Mexico (Huber, Anderson 1996). Huber and Anderson found that bonesetters were naturalistic healers, predominantly male, and of lower social status than curers. The latter were primarily women and took a spiritualistic approach to treating illness. As a result, curers were accorded greater respect "because they deal directly with powerful and potentially dangerous supernatural beings," (Huber, Anderson 1996:34). *Hueseros* tended to be men, and *curanderas* women, though typically high status positions in Mexico are accorded to men. Huber and Anderson explain this paradox in terms of continuity of other role-specific behaviors. Men tended to be in fields and other environments in which bone injuries occurred. Women, by contrast, tended to be nurturers in the home.

Don Fidel's approach to treating painful joints was tailored to the specific needs of the patient, suggesting extensive experience and insight into anatomic alignment and function. First the visitor seeking care was welcomed into his yard and chairs were brought out. A discussion of the cause of the illness was then undertaken. Don Fidel believed that all joint problems which were not due to direct trauma (such as a broken bone) could best be explained as "arthritis" or "rheumatism." The cause of arthritis was "nerves out of alignment." As Don Fidel explained, "once the nerves do not work, the joints begin to cramp up and become arthritic." Beyond this, Don Fidel demurred when

asked about Hot and Cold and other etiological issues. He could not say that Hot or Cold caused arthritis and did not consider this a major issue. Of course, once one already had arthritis cold should be avoided. Food consumption was not considered an important variable in understanding arthritis.

The next step in Don Fidel's treatment was to bring out a large mat and have the afflicted individual stand at attention. The hand and arm length, posture, and symmetry of the pose were carefully assessed by direct inspection. Symmetry was especially important, as leaning to one side or another was a cause of imbalance which could lead to back pain. Don Fidel then asked the individual to follow him in doing deep knee bends and stretching exercises. This treatment was prescribed irrespective of the condition being treated and seemed to be a "warm up" necessary before undertaking bone adjustments. It was followed by pulling on the fingers and by so doing "cracking" them loudly, an act which corresponds to separating the synovial membranes lining the interphalangeal joints with an audible release of potential energy. The effect, beyond causing trepidation about possible finger dislocation, was to elongate the soft tissues of the arms and trapezius region, leading to a sensation of relaxation and rest.

For back pain, the patient was physically lifted into the air and the lumbar intervertebral spaces were distracted. This is analogous to chiropractic care in some respects. The approach did not involve counter-balancing the body against Don Fidel's own hips, and as such exposed himself to back strain as an occupational hazard. Following this treatment, the patient was adjusted by direct thrusting motions into the paraspinal region

while lying in the lateral decubitus position, and also pulled by outstretched arms while lying supine in a directly superior direction, stretching the soft tissues of the shoulders and again subjectively loosening the tissues of the back and neck. This was followed by a deep massage to the lumbar region with rubbing alcohol. The subject was then encouraged to lie quietly for fifteen minutes and instructed to wear a lumbar brace and return for follow-up evaluation in one day.

Don Fidel's approach to ankle strain was undertaken in a methodical manner, as was the treatment of back pain. Interview, exercises, and finger stretching at the onset, then followed by passive stretching and exercising of the ankle, followed by having the subject roll the foot back and forth on a drink bottle, thus massaging the plantar fascia. Rubbing alcohol and follow-up appointment in one day was also employed.

Don Felix's approach to the treatment of cervical strain was similar, and a solution containing alcohol and a green herb was employed. Follow-up was not arranged, and the history was obtained in a more cursory fashion. This suggests that hueseros are not uniform in their practice techniques, and also suggests that efficacy may vary from healer to healer.

In summary, hueseros are practical and naturalistic healers who alleviate musculoskeletal pain in a public-serving manner with little regard for their own reimbursement. They appear to hold physicians in high esteem and to practice in a manner influenced directly or indirectly by contact with physicians. The approach of Don Francisco is characterized

by history taking, examination, manipulation of joints, use of alcohol, and follow-up examination. Don Felix, by contrast, has a more problem-focused approach with less of an overall health assessment. There is clearly no single description of the healing methods of a *huesero* in Tzintzuntzan, and an appreciation for the diversity of techniques employed by traditional healers emerged from the research I performed. I would characterize both bonesetters as valuable health care providers in a community which lacks easily accessible health care facilities for fractures, sprains, and other musculoskeletal injuries.

Don Felix is also more religious in his practice of bonesetting than is Don Francisco. After setting an injured wrist he will concentrate intently with eyes closed, praying for the assistance of God in assisting him in making a cure succeed, and then make the sign of the cross over the injured body part. In fact, Don Felix uses an approach to healing which is at once practical and spiritual, and he is held in high esteem in the community. His prestige derives not only from his age and respected character traits, but also from his healing abilities. As such, the distinction between spiritual and high status *curanderos* versus mechanistic low status *hueseros* does not apply in his case.

Curanderos

Don Anastasio is one of a family of curanderos. His grandparents were also curanderos. As he relates the story, "I inherited the ability to heal from my ancestors, though it skipped one generation." His wife was a partera in the community, limiting her practice to delivering babies and caring for pregnant women. Healing, according to Don

Anastasio, is both spiritual and physical. The extent to which healing is spiritual may vary with the condition being treated. The end result of treatment, however, usually involved the application of pressure directly to the body in a manner similar to that undertaken by hueseros. Don Anastasio always used prayer and "concentration" and frequently prescribed herbal teas from his garden to supplement his treatments. He considered himself a *"medico de campo"* who incorporated aspects of the practice of both *curanderos* and *huesero*, though primarily identifying himself as a member of the former group.

Don Anastasio came to appreciate his healing powers when he was nine years old. He did not report a specific spiritual event which transformed his life, as is often the case with curanderos (Huber, Anderson 1996). He also denied any specific incorporation or adoption of the spirit of any other healing agents, such as Christ or a specific saint. Rather, he reported, he came to realize gradually that he had a power to affect successful treatment of various conditions through applying his hands to individuals seeking his care, massaging appropriate parts of the body, and using prayer. Though he firmly believed that he was assisted in curing by divine intervention, he did not require an extensive religious indoctrination or prayer session on the part of his patients prior to undertaking a cure.

Anastasio's courtyard veranda was generously decorated with photographs of Don Anastasio's voyages to Nicaragua, Panama, and other parts of Mexico participating in forums of alternative healers, and he was comfortable treating people who were not from

Tzintzuntzan. Unlike treatments sought from hueseros, Don Anastasio only treated patients by appointments made in advance. In most cases he refused to allow any observations of his treatments, though I eventually observed several sessions. A charismatic figure with long sleeve shirt and flowing scarf, appearing in robust good health and early middle age, his physical appearance and manner contrasted markedly with the self-effacing and modest hueseros. Don Anastasio viewed himself as a great healer, advertised the fact with photographs throughout his courtyard, and considered his time to be valuable. His manner was serious and taciturn, and guests were not welcomed enthusiastically or offered food or drink at his residence.

Treatment began with evaluations in the courtyard, and subsequently involved moving into a private room inside his living quarters. Initial evaluation of a subject involved asking about the problem, or *molestia*, for which help was being requested. This did not require elaborate history taking. As such, Anastasio's approach was different from that of the more garrulous bonesetters discussed earlier. Anastasio believed that it was his job to tell the subject what was wrong, not the other way around. As such, his approach was more consistent with traditional Chinese healing, for example, than with allopathic medicine. Anastasio's first activity was to examine the wrist of the person seeking care, and to palpate the wrist. This was not a reading of the pulse, however, as often occurs in China, for example. Rather, Anastasio believed that palpating the wrist allowed him to determine the condition of *los nervios*, or nerves, which would guide this therapy.

After perfunctory questioning and palpation of the wrist for about thirty seconds, Don Anastasio would announce his diagnosis. In most conditions this involved the nerves being out of adjustment. This was the case for gastrointestinal conditions, back pain, neck pain, and was by his admission the most usual diagnosis he made. In fact, almost all conditions were caused by nerves being out of place. As such, his job was to adjust the nerves and get them back into the proper location, alignment, and state of activity. His emic model for curing to a large extent corresponded to the *principle of contraria* outlined in the Introduction. Indeed, his use of herbs also was intended to adjust nerve imbalances through administration of various teas and plants grown in his garden.

After palpation of the wrist, the subject was instructed to enter a dark room containing a bed, a painting of Jesus, and little else. The patient, man or woman, was instructed to disrobe to underwear only. This was a contrast with the treatment of the hueseros, who were assiduous in maintaining the modesty of patients with towels or by only asking subjects to remove outer shirts. It also was consistent with Don Anastasio's gruff and officious style of curing. He then instructed the subject to lie on the bed on his or her side and began to apply pressure to the body in a highly ritualized and stereotyped manner which varied little from patient to patient.

First, the dorsum of the foot was massaged, then the lateral pre-tibial surface of the lower legs. Pressure was applied in a direct and forceful manner to the tender periosteum of the subcutaneous aspect of the tibia, and he stroked his finger up the leg in firm manner, using a small amount of Nivea cold cream as an emollient. This process was

significantly painful, as I can attest to through participant observation in treatment for low back strain.

The next step was to apply similar pressure to each arm, again emphasizing pressure on bone prominences extending from the lateral wrists to the proximal arms. Unlike accupressure massage, this was also a painful sensation. It occurred to me while observing it that a physiological mechanism by which it might be useful in alleviating pain could be postulated, namely a counter-irritant effect caused by blocking pain receptor being stimulated by other sources of pain. But this treatment was undertaken for pain in areas of the body far removed from the sight of pressure application. For example, this approach was used to treat menstrual cramps as well as neck pain. Moreover, Don Anastasio's manner appeared intentionally rough, with no verbal warning or apology for causing pain with these procedures.

Next, Don Anastasio would apply pressure to the lower back from a standing position over the patient, who remained prone on the bed in the healing chamber. Serially, he pushed firmly on the back with ballistic thrusts delivered to para-thoracic and para-lumbar soft tissues with both hands. This had the effect of eliciting an audible grunt from patients, who expelled air from the lungs in a manner similar to that intentionally induced with the Heimlich maneuver. Subsequent to this, the neck was pulled in a traction-like manner, with the subject directed to lie supine while Don Anastasio pulled from the head of the bed. The neck was thrust in lateral rotation in a manner similar to that of a chiropractor, once to either side, and the temples were then massaged with firm pressure bilaterally, again somewhat painfully. Finally, Don Anastasio placed his thumb and index finger on the frontal region of the skull in a gesture of benediction, closed his

eyes, and prayed intently for five seconds. Having done so, he opened his eyes, announced "listo," and signaled the patient to get up and dress. A fee was then expected, which varied depending upon the ability of the patient to pay.

Don Anastasio's therapy varied little from this ritualized format, which takes about ten minutes to complete. No follow-up appointment was prescribed in most cases. As Don Anastasio explained, he cured through intense concentration, rather than relying on prayer or massage alone. By concentrating, he rectified abnormalities in nerve alignment which cause most disease states. As such, the concentration might vary depending on the specific diagnosis, but the physical interactions with the patient were generally fairly similar. All patients underwent neck and low back adjustment, for example, regardless of whether or not there was an underlying cervical or low back strain. There were a few exceptions to this, however. For example, an acute episode of menstrual discomfort might lead to pressure being applied to the buttocks region "to lift the nerves up which are falling to cause the problem."

Don Anastasio represented a curandero who undertook extensive physical manipulations of the body in a manner reminiscent of that observed in hueseros. Important differences existed between his approach and that of Don Fidel or Don Felix, however. He considered himself a spiritual healer, whereas they did not. He manipulated the body in a standard repetitive manner which was stereotyped and not geared towards a specific condition in most cases. He did not take an elaborate history, relying on examination of the wrist instead. Don Anastasio demanded respect, expected financial remuneration,

and cultivated a somewhat gruff style of interaction which seemed to contradict the spiritual approach he professed to use in healing. Why is this?

I believe his dismissive and aloof manner reinforced Don Anastasio's image in the community as a high status healer with special skills. In Tzintzuntzan, political officials, government ministers, and in many cases physicians are outside of the sphere of daily life. They are geographically and financially removed from the daily lives of the people of the village, with the exception of the *pasante*, who must remain accessible. Don Anastasio cultivated a remote and superior attitude as a way of conveying his high status to the community, though he was not politically influential. His photograph gallery, insistence on appointments, and gruff manner with patients were part of an effort to be viewed as important and high in status (Figure 32). His nearly empty waiting room suggested that this approach was not entirely successful. Moreover, though well-known in the community, Don Anastasio was no more respected than the more easy-going and gentler hueseros. Nonetheless, the example of the regal Don Anastasio supports the idea that curanderos consider themselves to be in a higher social class than hueseros, supporting the impressions of Huber and Anderson (Huber and Anderson 1997).

Figure 32. Portrait of Don Anastasio and Doña Teresa, curandero and partera, surrounded by photographs of patients they have treated (photograph by Camille Castro).

Naturopaths

One naturopathic physician, Dr. Oliveras Soto, came to the community every Wednesday to run a clinic at the house of a local resident. The impact he had on the family of this octogenarian was impressive. Due to his exhortations to prevent disease through dietary restraint and exercise, Doña Mariana and her daughters had nearly eliminated fat and sugar from their diets. Though the daughters remained obese, they reported subjective well-being as a result of these interventions.

Dr. Oliveras Soto began his clinic work in the village because he had worked with the half-brother of a local family while in Mexico City. He visited the home of Doña Mariana and her two daughters, each in their sixties, every Wednesday for lunch. After eating he began to see patients who waited patiently in the courtyard outside the dining room. This pattern developed over a couple of years in the 1990s, and soon a pharmacy dispensing herbal teas was added as the clinic became more successful. On a typical Wednesday the courtyard was filled with patients who came from miles away seeking the care of Dr. Oliveras Soto. I had the opportunity to videotape and observe this charismatic individual, and learned something about his past and the source of his appeal to the population.

Dr. Oliveras Soto a medical degree in Mexico, but subsequently spent several years in England, becoming exposed to naturopathic medicine in that context. He returned to Mexico and changed his practice style dramatically. He still considered himself an allopathic physician and believed in the utility of intensive care units, antibiotics,

surgery, and other high technology interventions. In fact, he admitted patients to a hospital in Morelia when indications were appropriate. What changed, however, was that Dr. Oliveras Soto branched out beyond his traditional interests and began to eagerly embrace alternative medicine. He particularly came to view diet and exercise as critical to maintaining health, and began to devote more time to this preventive approach to health care.

Doña Mariana led the patients from her courtyard into the dark bedroom where Dr. Oliveras Soto waited, in a manner consistent with the British style of patient interaction (in America, by contrast, the doctor goes from room to room to see different patients). Seated behind a small table wearing a white laboratory coat, a black physician's bag before him, he represented a figure of quiet authority. His first words were generally *"Dígame,* " which translates literally as "speak to me," but has more of a connotation of "what can I do for you?" He then listened attentively with little facial expression as the patient recounted the difficulties leading to the visit. In one case a woman with her child in tow discussed her abdominal bloating at length on a return visit.

The formal history taking process was rather short, a style not atypical for follow-up evaluations, with no systematic review of past medical history, but Dr. Oliveras Soto did listen for a long time without interrupting. He then performed no examination, moving instead to inquire, "Are you following the diet I recommended?" When the patient answered hesitantly that she was doing it in part he inquired, "Why not exactly as I told you?," and instructed the patient again in the rather draconian dietary limitations he

prescribed, including complete vegetarianism and supplementary herbal teas. Thereafter, the patient went to the clinic and purchased an herbal tea and left.

Dr. Oliveras Soto also ran a clinic outside of Morelia which I visited, where patients were instructed in aerobic exercises, and underwent treatments including aroma therapy, massage, and color therapy. Each treatment involved a separate room. The aroma room involved aerosolizing essences of fruits and perfumes, the color room involved exposure to a single color light. In both cases massage might be employed. While exercising and receiving treatments, patients would stay for several days at a time. All meals were vegetarian and low fat, prepared in the clinic's kitchen. I interviewed an elderly couple from Mexico City who came for treatment. They viewed it as a health-maintaining process which should be undertaken about once a year, and they were highly satisfied as they walked barefoot through the closely cropped grass of the compound in their jogging suits. Dr. Oliveras Soto also employed exercise trainers and massage therapists who guided visitors through therapy sessions of calisthenics (Figure 33), or massages in the aroma room or light therapy room. Staying at the clinic was not inexpensive, and visitors traveled from other regions of the country to seek therapy at this resort, located 30 miles from Tzintzuntzan, near the state capital of Morelia.

Figure 33. Exercise class of Dr. Oliveras Soto, naturopathic physician. The facility is a clinic 30 miles outside of Tzintzuntzan, near Morelia.

In summary, Dr. Oliveras Soto represented a naturopathic approach to healing which emphasized prevention rather than treatment of acute illness. He nonetheless believed in the utility of care of endstage acute illness, although his practice did not seem to involve treatment as much as prevention. Dr. Oliveras Soto's dietary restrictions were so severe that no one could fully follow them. As a result, lack of efficacy of treatment generally was attributed to patient non-compliance rather than ineffective therapy. This had the effect of leading to a kind of reproachful physician-patient interaction, in which Dr. Oliveras Soto criticized patients for eating meat or some sugar or alcohol. It also seemed to result in endless follow-up visits, as patients were instructed to try harder and return again. I could not help thinking that Dr. Oliveras Soto's approach to prevention led to endless intense involvement in the doctor-patient interaction, and to an evasion of accountability on his part for any adverse outcome. Balancing this criticism, however, I think it is also important to note that his emphasis on prevention of heart disease, diabetes, and other diseases through diet and exercise was clearly salutory in many respects, and an approach we need to adopt increasingly in the United States.

Dr. Oliveras Soto embraced the biomedical model in his style of interaction with patients. His starched white coat and black bag made it clear that he was a physician, not a *curandero*, though his prescription of herbal teas overlapped to some extent with the mode of practice of Don Anastasio. This emphasis on biomedical appearance contributed to the success of his practice, again demonstrating the extent to which allopathic medicine is preferred over traditional healing in the village today. In fact, Dr.

Oliveras Soto simply identified himself as the *doctor*, downplaying his naturopathic identity.

In summary, Dr. Oliveras Soto was a highly successful allopathic physician whose busy practice extended from a clinic outside of Morelia to a once a week clinic in Tzintzuntzan. He also had a practice in Mexico City. He emphasized strict adherence to a vegetarian diet, avoiding sugar and alcohol, and regular aerobic exercise. Beyond this, his style of practice embraced the traditional biomedical approach with lack of rejection of tertiary care when appropriate and strong role-identity as a physician. He represented an interesting contrast to the curanderos and hueseros already discussed, and demonstrated the eclecticism of medical practice in the village.

Priest

Padre Antonio was a firm believer in the power of God to cure disease, and often traveled into the village to perform bedside cures for the ill, as well as delivering last rites and anointing of the sick. He also was a firm believer in the need to improve public health measures in the village, decrying the lack of calcium in the diet and supporting any effort to perform research on the health of the village. As such he personified a dedication to the poor deeply rooted in religiosity, while at the same time supporting advancement of medical intervention. I accompanied the *pasante*, Dr. Romero, to meet the priest on her first day in the village. He warmly welcomed her. Padre Antonio supported my efforts to study the health of the community, and without his approval the villagers would surely not have cooperated so enthusiastically. Padre Antonio expressed

little interest in the activities of traditional healers such as bonesetters and *curanderos*, tending to view them as largely less important than modern medicine.

In summary, Tzintzuntzan's priest plays a critical role in ministering to the emotional needs of the ill, and also promotes public health efforts (Figure 34). Though the Church's opposition to contraception could be criticized on public health grounds, I nonetheless believe that with respect to the elderly he provides a kind of emotional solace which deserves mention in this chapter on healing. He represents a figure who demonstrates to some extent the distinction between curing and healing, tending to palliate suffering among all parishioners, even when a therapeutic resolution involving eradication of disease is not likely. It is also clear that any efforts to perform public health research in Tzintzuntzan can only go forward with the approval of the priest, whose position is highly respected.

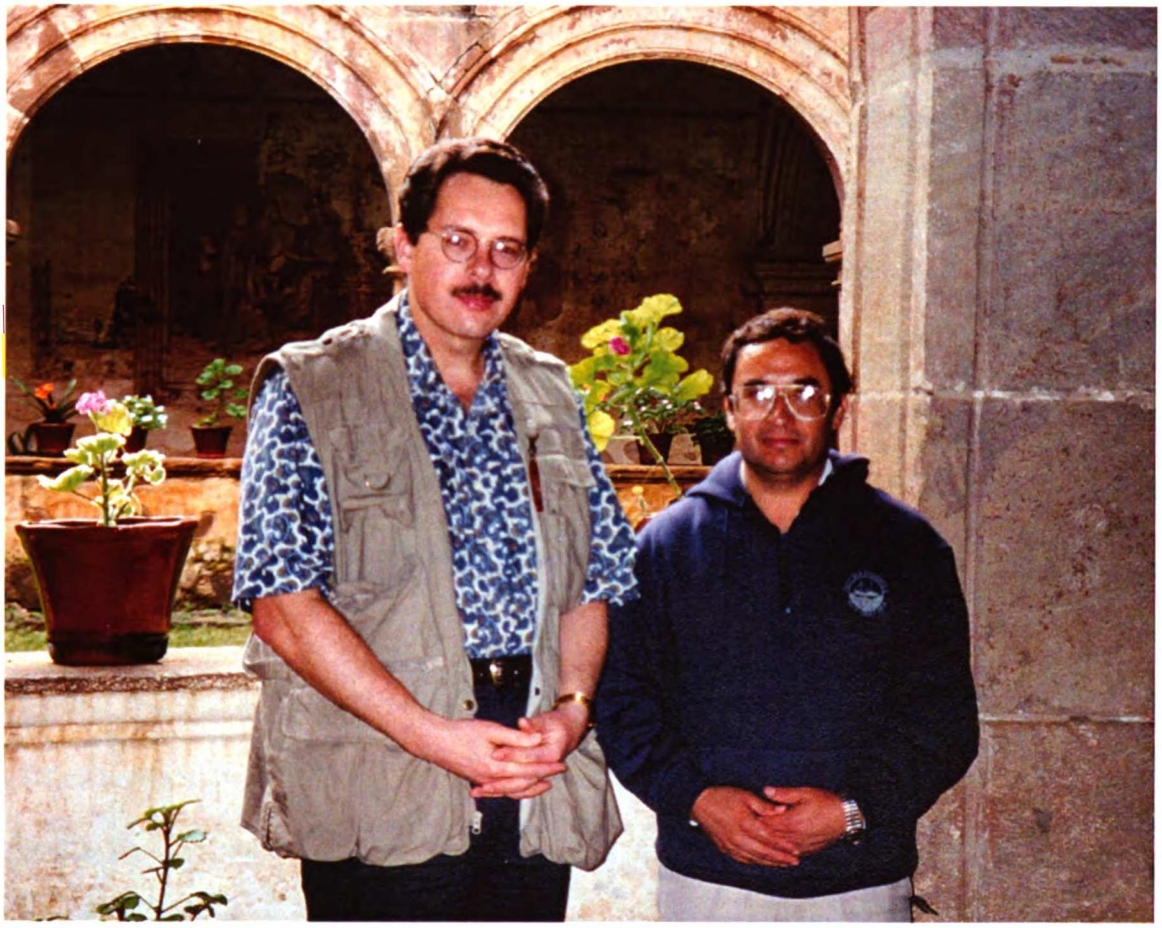

Figure 34. Anthropologist (left), and Father Antonio, the local priest (right), in courtyard of parish church La Parroquía (Photograph by Camille Castro).

Conclusion

In conclusion, Tzintzuntzan is a community with a rich tapestry of healing options for sick persons. Poverty renders allopathic medical care a distant option for many, as in the case of the woman with the broken ankle who was turned away from several clinics. Religious intervention through God, the saints, or the priest, represents a "parallel track" which is pursued in nearly all cases of illness and in no way contradicts seeking care elsewhere. Most alternative healers provide care in a cost-effective manner when biomedical care is unavailable. They consist of hueseros, curanderos, parteros, and naturopaths. The majority are surprisingly secular in their approach to illness, with hueseros and naturopaths taking a naturalistic approach to treating disease. The curandero and priest alone consider themselves spiritual healers. The emphasis on joint manipulation on the part of the curandero suggests that there is an eclecticism and cross-fertilization among healers which may render classification difficult.

Further research is needed to elucidate health-related behaviors and beliefs in Tzintzuntzan. Perhaps future researchers will address the issue of child and adolescent health, in particular. Frequent cases of bronchitis and poor dental hygiene were observed in children. Though I did not address nutritional status in children systematically, it may well be suboptimal in many families. Lifelong attitudes towards preventive medicine, diet and exercise no doubt begin in childhood. An effort to better understand the roots of geriatric health problems among the children of Tzintzuntzan would be a welcome addition to the anthropological literature in this area (Figure 35).

Figure 35. Young girl in Tzintzuntzan (photo by Camille Castro).

Chapter 8: The Paradox of Growing Old in Tzintzuntzan

The health of the elderly of Tzintzuntzan presents a paradox. Tzintzuntzeños do not age gracefully as measured by the state of their bodies. The enter old age in small numbers, some nearly blind from cataracts, many hard of hearing, sun weathered, nearly all hobbled by arthritis, osteoporosis, heart disease, cirrhosis, or some other chronic illness. Yet they seem to suffer little depression, alienation, or loneliness. They are surrounded by attentive relatives ranging in age from infancy to old age. They participate in community activities, such as church posadas and fiestas. They seem to suffer less depression and loneliness, though the prevalence of depression may be underestimated in this study. In summary, Tzintzuntzeños manifest poor overall health from an allopathic point of view, except in the area of psychiatric illness. In spite of deterioration of eyes, ears, hearts, lungs, livers, skin and joints, they persevere with little overt depression or social alienation.

Perhaps it is not surprising that incongruities emerged from this research. Brandes found that fiestas paradoxically enforce social control while being superficially carefree events (Brandes 1984, 1988). Foster explained, via the image of limited good, the paradoxical observation that Tzintzuntzeños often frustrate efforts to improve village life through suspicion and inability to cooperate on public projects (Foster 1967a). Kemper observed that Tzintzuntzeños migrating to Mexico City might paradoxically embrace traditional beliefs, such as compadrazgo, to an even greater extent than might be expected while expressing these traditional concepts in new ways (Kemper 1971, 1977, 1981, 1979b, 1996).

Growing old in Tzintzuntzan does not require sophisticated explanatory models of disease causation, an explanation of the processes underlying aging, or even a great interest in them. There were exceptions, of course, such as Antonio Gonzalez's explanation for his rheumatoid arthritis, and the explanation of aging as being due to diminished body heat or cumulative injuries. Nonetheless, there was less interest in explanatory models for disease causation than I would have expected. The prospect of growing old was viewed as inevitable and expectation of disease and death was universal. Disease, however, tended to be defined in terms of symptoms of pain, stiffness, or weakness, and there was little articulation of fear of terminal illness. Moreover, they manifest little interest in expounding on explanatory models for disease causation and generally expect ill health in the near future with little concern about avoiding disease. Why is this? I believe the answer to these questions lies in the meaning of age in rural Mexico. For Tzintzuntzeños, being old is a process which is willed by God and part of the natural unfolding of life. As such it is not a fruitful undertaking to question its meaning in great detail. Rather, one experiences it with as much dignity and reserve as possible, neither complaining excessively nor bragging about good health. The overall picture is one of a community aging peacefully, attempting to maintain equilibrium and avoid envy, manifesting a sense of powerlessness over the winds of life which buffet all of us.

As such, I think my research tends to verify and confirm some theoretical postulates of prior researchers. The image of limited good was valuable in explaining self-

descriptions of health status. The dyadic contract emerged as an explanation for why hueseros are not preoccupied with making money. Traditional Hot and Cold beliefs appear to be on the wane in Tzintzuntzan, and allopathic medicine is on the rise. These observations are also consistent with Foster's general impressions, as outlined in his work on Tzintzuntzan, especially his subsequent epilogues to the original edition (Foster 1979, 1987), and in his medical anthropology textbook co-authored with Barbara Anderson (Foster and Anderson 1978).

Among the elderly in the U.S., by contrast, objective health is fairly good (with far less illness than one sees in Tzintzuntzan), but aging is marred by social alienation, isolation, and fear of being old. In the U.S., we view our bodies as deficient when deterioration occurs with age. The goal, therefore, is to control our bodies and fix the problems which arise in them. This is, of course, ultimately a losing battle. Tzintzuntzeños, by contrast, view aging as an experience of life rather than as something to control and avoid. Their example of growing old with a quiet dignity and a tendency to live life in the here and now is worth further study as we grapple with the aging of the world's population.

Tzintzuntzeños are handicapped by poor health, whereas industrialized cultures often handicap the elderly by isolating them. As such, both cultures trade off a vital part of good health. The significance of poor health for the elderly in Tzintzuntzan is its effect on subjective well-being and social relationships. Disease causation is generally not a subject of significant inquiry or interest, because the importance of disease derives from its effect on one's role as a person in the community, and disease is viewed as a

manifestation of God's will rather than as an avoidable outcome of aging. We can learn from understanding growing old in Tzintzuntzan, and perhaps begin to grapple with potential interventions to improve the health of the elderly in both Mexico and the United States. A brief review of the public health literature regarding aging statistics in the U.S. may be relevant.

In the United States average survival has increased from 49 years at the turn of the century to the late 70s for women and the early 70s for men, though some ethnic groups such as African-Americans have lagged behind (particularly Black males). Yet chronic illnesses accompany the elderly into these years (US Senate Special Committee on Aging 1991). The majority live alone or with spouses in the community, not in extended families. Moreover, though the elderly are physically able to function along, they are often depressed. Isolation from others may contribute to depression.

Among community-dwelling elderly people in the U.S., women suffer from depression twice as often as men. Though the reason for the disparity may be in part physiologically mediated by lack of estrogen in the post menopausal period, it has also been observed that whereas one in seven men between age 70 and 75 is widowed, half the women in the same age group are left without a spouse (Tan, Bransghrove 1997). The loneliness of being widowed may contribute to depression among the elderly.

The elderly also may be prone to depression due to concomitant chronic illness. Up to 30 percent of nursing home patients are depressed, presumably in part due to chronic

illnesses which initially necessitated nursing home placement (Tan, Bransgrove 1997). Any effort to treat depression in the elderly should involve both aggressive treatment of underlying chronic illness and consideration of the deleterious effects of medications which may cause depression, particularly corticosteroids used to treat arthritis, cimetidine, anti-hypertensive medications, and hypnotics (Hall 1997). A quarter of patients with diabetes suffer from depression, roughly twice the prevalence seen in non-diabetic controls (Kovacs 1997). Diabetes may cause depression because of the complexity of its management, or due to neuroendocrine manifestations of chronically abnormal serum glucose levels. Other diseases, such as chronic obstructive pulmonary disease and coronary artery disease, may also either cause depression. Many patients in the older years complain of physical "vegetative" symptoms of depression, rather than the typical dysphoric mood associated with depression (Tan, Bransgrove 1997). These include loss of appetite and insomnia. The *Diagnostic and Statistical Manual of Mental Disorders* (4th edition) lists sleep disturbances and body weight change among the presenting symptoms of depression (American Psychiatric Association 1994).

Chronic conditions causing pain lead the list of diseases of the elderly causing depression, and the importance of pain as a complaint of the elderly is enormous. Pain is a presenting symptom in over 80 percent of physician visits, and a significant problem for almost 20 percent of the United States population, in serious cases resulting in chronic pain syndromes in which depression may play a role (Holman 1997). An increased prevalence of depression is found in rheumatoid arthritis patients (Anderson et al. 1985; Frank et al.. 1988). A brief exploration of the mechanisms by which chronic

rheumatoid disease causes depression may allow us to understand how Tzintzuntzeños deal with the experience of chronic illness fairly gracefully. We will see that the loss of role-defined behaviors, due to inability to perform activities involved, is a problem associated with rheumatoid arthritis which causes social alienation and depressed mood.

Katz and Yelin studied 822 patients with arthritis recruited from the practices of 40 rheumatologists in the Northern California area (Katz, Yelin 1994). Among these patients, Patricia Katz of the Arthritis Research Group of the University of California studied 512 members of the UCSF Rheumatoid Arthritis Panel. These patients, studied since 1983, were surveyed by annual telephone questionnaires, with an 8.5% attrition rate and some additional patients being added in 1989 (Katz 1995). Yelin, Katz and colleagues also compared 158 patients with rheumatoid arthritis, 150 with osteoarthritis, and 100 controls with no arthritis in an effort to isolate the impact of each disease on depression and functional capabilities (Yelin et al. 1987). *Domains* of life activities were studied, including household chores, shopping, social relationships, religious activities, leisure, public service, transportation, and work. The authors' Activity Enumeration Index (AEI) revealed that depression resulted from losses in ability to perform activities in these domains, with fewer losses occurring in patients with osteoarthritis (OA) than in those with rheumatoid arthritis (RA) (Yelin et al. 1987).

Compared to age-, sex-, and geographically-matched controls, RA patients exhibited more depression, and those who were depressed also experienced a decrement in the frequency of performing valued activities (Katz, Yelin 1994). Over a 5 year period, RA

patients lost about 10% of the activities they valued, suggesting that the depression which occurs in the disease is mediated by social withdrawal leading to depression (Katz 1995).

In a recent analysis of the RA Study Panel cohort, Katz and Yelin employed a short form of the Geriatric Depression Scale (S-GDS), a valid and reliable indicator of depression in the elderly (Katz, Yelin 1995). Using a multivariate logistic regression analysis, they concluded that the component of functional decline which was a risk factor for depression was loss of ability to perform valued activities (Katz, Yelin 1995). Katz and Yelin conclude that the higher incidence of depression in RA patients may be partly due to inability to perform valued activities (Katz, Yelin 1994, 1995). Increasing social isolation and diminished self-esteem due to work loss, decreased income, and divorce seem to conspire to create depression in the RA patient, with the loss of function in various domains of life begin critical (Felts, Yelin 1989; Yelin et al. 1979). In short, rheumatoid arthritis patients suffer psychosocially due to loss of ability to perform role-appropriate behaviors. In Goffman's sense, they lose their front-stage and back-stage selves, and become more frail and vulnerable as a result. Are the domains of life activity better preserved for the elderly and infirm in a traditional Mexican village than in modern industrialized societies?

With respect to household chores, there appears to be less obligation placed on the elders of Tzintzuntzan to contribute to these activities. If they do participate, the activity is self-paced with solicitous relatives contributing to the endeavor. Shopping, transportation, and work do not represent the kind of obstacles that may be experienced

by the elderly in the States as they attempt to negotiate interstate freeways and shopping malls. Participation in religious activities and social relationships, such as is seen in *carguero* obligations or *compadrazgo* relationships, is not as physically strenuous as might be expected due to the proximity of church and assistance of relatives.

By contrast, 70% of female rheumatoid arthritis patients surveyed in the U.S. reported difficulty with hobbies and 70% reported decreased sexual activity as a result of their disease (Reisine, Goodenow, Grady 1987). Though sexual activity was not an issue I could easily explore within the confines of conservative Mexico, the social activities which correspond to "hobbies" in America appear to be less diminished among the elderly of the village. As such, I believe that the elderly of Tzintzuntzan suffer fewer "domain losses," to use the language of Katz and Yelin, and thus are less prone to social alientation in the face of health status which is in fact much worse than that seen in the U.S.

It may also be that the sense of self-identity which Goffman addressed in his work, and which Kaufman found to be "timeless" among retired physicians, is maintained more readily in a culture which values the elderly than is seen in the youth-oriented world of the U.S. (Goffman 1959; Kaufman 1986). I favor an eclectic approach in furthering our understanding of growing old in Tzintzuntzan. Such an approach incorporates the symbolic interactionism of Goffman, the narrative insights of Kaufman, and the sophisticated population sampling of the Arthritis Group of U.C.S.F., in attempting to understand why Tzintzuntzeños hold up so well in the face of chronic ill health. It

appears that the elderly in Tzintzuntzan are biologically less well, but they are less depressed due to social engagement, lack of isolation, and perpetuation of their sense of self, which is more of a "timeless self" (Kaufman 1986) than may be the case in our own country.

Anthropologists and geriatricians, working together, have explored what it means to age in a healthy manner, and the data from Tzintzuntzan explored here must be understood in the context of this rich theoretical framework. Three contrasting theories of successful aging which have gained currency are *disengagement theory*, *activity theory*, and *continuity theory* (Sloane 1992:37). Let us examine these three paradigms, and then ask the question, "Where does Tzintzuntzan fit in?"

Disengagement theory, first proposed by Elaine Cumming and W.E. Henry in the early 1960s (Cumming and Henry 1961), suggests that "...normal aging is a mutual withdrawal or 'disengagement' between the aging person and others in the social system to which he belongs -- a withdrawal initiated by the individual himself, or by others in the system" (Cummings 1963:377). A prototypical disengaged elderly person would sit around the local coffee shop, fully retired, greeting others cheerfully but no longer working or pursuing other goals. This is viewed as salutory, since attempting to continue prior role behavior leads to conflicts arising from the inability of the older person to meet his/her obligations due to aging. *Activity theory*, by contrast, emphasizes continued activity in professional or social activities, attempting to "stay in training," performing earlier life activities as consistently as possible (Pfeiffer 1974). A physician who

practices medicine until he drops dead of a heart attack at age 80 would be described by this model. *Continuity theory*, viewed by Sloane as a kind of bridge between disengagement and activity theory, advocates "allowing one's personal preferences from earlier years to manifest themselves as one responds to the stresses and challenges of older age" (Atchley 1992, Sloane 1992:37). A lawyer who is too frail to practice trial law but still attends professional conferences and mentors younger lawyers might fall into this category. Adelman describes involvement in multiple undertakings which challenge an individual as a "role enhancement hypothesis" in keeping with continuity theory (Adelman 1994). This view of aging as a time of redefining activities in terms of meaningful new roles dates back at least to the publication of *Culture and Aging* (Clark, Anderson 1967). In that study, based upon interviews with forty San Francisco Bay Area residents over age sixty, Clark and Anderson concluded that five adaptive tasks define successful aging, including acceptance of aging, redefining physical and social life space boundaries, substitution of new interests for old ones, learning to judge one's achievements in the here and now, and pulling these efforts together in a way that gives life coherence (Clark, Anderson 1967).

Activity and disengagement theory tend to assume a normative aging process which is not cross-culturally valid. Criticisms of disengagement emphasize the diversity of the aging process worldwide, and also point out the changes generationally between the modern aging enterprise and what went before. For example, Myerhoff's study of Eastern European Jews in Southern California, *Number Our Days,* described the struggle of these elders as they attempted to survive in a world radically different from that of

their childhood's, in which the elderly were generally more respected and integrated into community life in rural villages (Myerhoff 1978). Anderson's *The Aging Game: Success, Sanity, and Sex after Sixty* also addressed this: "The old live with different images, born of a different past, a different cultural heritage" (B Anderson 1979:209). Ostor decried the tendency of Western social scientists to lend a "seeming objectivity" to aging as a kind of linear process, when such a view is not universal in all cultures (Ostor 1984). Foner describes this view of aging in terms of disengagement as part of a "modernization model" of aging in which the elderly are devalued as traditional societies are lost (Foner 1984). All of these arguments suggest withdrawal from society in old age occurs at significant cost to the elderly, leading to an erosion of self-identity and worth.

Disengagement may also have adverse health consequences. Among 6,257 municipal employees in Finland, the prevalence of cardiovascular disease increased after retirement (Tuomi 1991). Part of this may involve the isolation which follows disengaging from social ties, particularly if a spouse also dies. Seventeen-year mortality data from the 7,000 adults studied since 1965 in the Alameda County Study revealed that presence of strong social ties, with marital status being the most important, predicted significantly diminished rates of mortality, even after adjusting for age, sex, race, baseline health status, perceived health, depression, and health practices as possible confounding variables (Seeman et al.. 1987). Depression may contribute to this mortality. Among 1,962 noninstitutionalized persons 65 years of age and older in New Haven, loss of social support networks or loss of spouse significantly contributed to the onset of depression (Oxman et al. 1992). Depression, in turn, can contribute to a dementia-like syndrome

originally called *pseudodementia* , which is really a misdiagnosis of dementia when depression leads to altered cognition (Ham 1992:276). A study of 2,200 elderly Japanese persons revealed that social participation strongly impacted mortality, with disengagement and the attendant loneliness associated with this tending to contribute to mortality through linkages with chronic diseases and declining functional status (Sugisawa, Liang, Liu 1994).

Physical disability arising out of disengagement may contribute to what Luborsky calls the "erosion of full adult personhood," a social devaluation of persons with disabilities characterized by a childlike state, dependency, and incompleteness (Luborsky 1994). Anthropologist Becker views this as a threat to the autonomy of the oldest old associated with frailty (Becker 1994a). Age prejudice may contribute to this, especially when chronic illnesses reinforce negative stereotypes of the elderly, as outlined by Becker in her work with stroke patients (Becker 1994b). Becker and Kaufman found that a feeling of uncertainty characterized the experience of stroke victims, becoming a central feature of the illness trajectory (Becker and Kaufman 1995; Becker 1993). Mitteness and Barker draw attention to the stigma of urinary incontinence as a central feature of a biomedical paradigm of aging which suggests a kind of moral incompetence in those afflicted with this common condition (Mitteness, Barker 1995). Much as Ablon's little people were stigmatized for not being taller (Ablon 1984, 1988), the elderly are stigmatized for not being young.

A frightening potential consequence of disengaging, especially if one's spouse dies and social supports completely disintegrate, may be institutionalization in a nursing home. This was absent in Tzintzuntzan. American studies of nursing homes emphasize disenfranchisement and loss of control of one's own life and body (Laird 1979, Savishinsky 1991). Henry's pioneering work on nursing homes in the 1960s described personal dignity was lost in a world dominated by preoccupation with food, excretion, defending one's bed, and becoming a kind of "child-animal" (Henry 1963).

The anthropological tendency to view non-Western cultures in a rosy light has given rise to what may be romanticized views of aging in other cultures, and it has been pointed out that some of these studies lack sufficient empirical data to justify their conclusions (R Anderson 1996:295) describing multigenerational households in which the elderly are valued and integrated into family life (Goldstein and Beal 1981:48; Holmes 1978; Holmes and Holmes 1992). With modernization and industrialization, societies with broad social safety nets for the elderly may come under increasing pressure (R Anderson 1996:296). For example, abandonment of the elderly is more common now in India (Cohen 1992:124), among the elderly Jewish of London's East End (Hazan 1982:355), and among the Sherpas of Nepal (Goldstein and Beall 1981:51). Foster's view of aging in Tzintzuntzan, representing a balance between pros and cons (Foster 1981), is in many respects replicated by the findings of this dissertation.

What does Tzintzuntzan tell us about the normative aging process in rural Michaocán? Does it contribute to the criticism of the theory of disengagement described above,

following in the footsteps of prior ethnographic investigators? I think the short answer is yes -- Tzintzuntzan's elderly do well in spite of physical infirmity because they are integrated into their community, continue to work (even if at a much slower rate), are appreciated and loved by family and peers, and escape institutionalization. As such, this study of aging in Tzintzuntzan may be another nail in the coffin of disengagement theory.

There were individuals with characteristics of all three strategy types, but that the overall Tzintzuntzeños maintain a high profile of involvement and participation in community life, suggesting that *activity theory* best correlates with aging in Tzintzuntzan. This is consistent with the work of other anthropologists who have examined this issue. Moreover, the relative lack of depression and isolation of the elderly in Tzintzuntzan demonstrates the importance of not disengaging for one's mental and physical health in old age. Anthropologists have reached similar conclusions from research in other settings. For example, Johnson and Troll studied 150 individuals 85 years of age and older in the San Francisco Bay Area longitudinally over 3 years (though 19% of the cohort died during this time), and found that, despite high levels of disability, the majority of subjects maintained active contact with friends (Johnson and Troll 1994), suggesting that the oldest old do not wish to disengage even when they are confronted with major illnesses.

Do we now know what it means to grow old in Tzintzuntzan? I think it would be presumptuous to argue that this dissertation answers the question. Aging is a process

which reveals itself in both cultural and biological manifestations, while being imbued with philosophical and highly personal meaning for those individuals grappling with the experience. In this dissertation we examined some aspects of growing old in Tzintzuntzan, relying on interviews, photographs, life histories, and medical evaluations. What emerged is a model for successful aging worth emulating in some respects, troubling in other respects.

The elderly of Tzintzuntzan overcome considerable physical disability to age with grace and equanimity. The relative lack of societal and structural obstacles to continued social integration allows the elderly to live meaningful existence's in the face of multiple chronic diseases. The same disease states, defined in allopathic terms, would surely lead to "handicapped" status, and perhaps even to institutionalization, in industrial societies such as the United States. Where Tzintzuntzan fails as a model for maintaining good physiological health among its elders, it succeeds in allowing the elderly to persevere as valued members of the community into advanced old age.

MEDICAL GLOSSARY

Ab: Abbreviation for number of pregnancies resulting in miscarriage or abortion.

Anserine bursitis: Inflammation of a bursa, or fluid filled sac normally occurring in the body, located between the tendons of the sartorius, gracilis, and semitensinosus muscles in the knee.

Anterior cruciate ligament: Connective tissue band joining anterior tibial plateau to posterior distal femur. It keeps the knee from slipping forward underneath.

Arcus senilis: Also called arcus corneae, a whitish-gray ring around the outer cornea, due to cholesterol deposition, often seen in people over age 50.

Auscultation: Listening with a stethoscope.

Babinski's reflex: Dorsiflexion of the big toe with stroking of the foot's plantar surface. Normal in infants, Babinski's reflex is a sign of central nervous system disease in adults.

BP: Blood pressure, expressed as systolic (heart contracting) over diastolic (heart relaxing).

Bronchitis: Inflammation of the bronchial tree of the lungs.

Carpal tunnel syndrome: Impingement of the median nerve at the wrist.

Chemistries: Serum levels of glucose, sodium, creatinine, and other compounds.

Coccyx: Tail bone.

Colles' fracture: Broken radius, deviated posteriorly just above the wrist.

Consolidation: Solidification of the lung due to pneumonia, picked up on auscultation.

Crepitus: A grating sensation found between articular surfaces in arthritic joints.

DNA: Deoxyribonucleic acid, the genetic material of cells.

Distal: End of bone furthest from trunk

Dullness: Diminished resonance on auscultation (tapping) on the chest, seen when there is an underlying pneumonia

Edentulous: Missing all teeth.

Elastosis: Loosening of the skin, often made worse by sun damage. Also called actinic elastosis, senile elastosis, solar elastosis, or farmers' skin. Nearly universal among the elderly of Tzintzuntzan, none of whom wear sun screen.

Erythrocyte sedimentation rate: A measure of the rate at which red blood cells sediment in a tube of well mixed venous blood , increased in inflammatory states.

Fibrin: The end product protein of the coagulation cascade, causing blood to clot.

Gravida: A pregnant woman, or number of prior pregnancies (when followed by a number, i.e Gravida II for pregnant twice).

Hematologic: Pertaining to blood.

High frequency hearing loss: Hearing loss due to nerve and inner ear damage, often due to noise, as opposed to hearing loss caused by obstruction of the ear with cerumen.

Hypertension: Chronically elevated blood pressure.

oropharynx: The back of the throat, often infected by viruses or bacteria.

Insulinoma: A tumor of the pancreas which secretes insulin, lowering blood glucose levels.

Intention tremor: Rhythmic oscillation of a body part with purposeful movements.

Jugular venous distention: Dilation of neck veins seen in heart failure.

Lachman's test: A maneuver demonstrating a looseness of the anterior cruciate ligament, performed by pulling the lower leg anteriorly while flexing the knee 20 degrees.

Laxity: Looseness, said of ligaments damaged due to injury or arthritis.

Leukopenia: Low white blood cell count (less than 4,000 cells mm^3.

Lumbar: From 1st to 5th lumbar vertebral region, i.e. low back.

Lumbosacral: Low back, from lumbar to sacral regions.

Lymphocyte: White blood cell, of either T or B subset type, which is immunologically competent and involved in the pathogenesis of autoimmune disorders

Lymphopenia: Lymphocyte count less 1,500 cells/mm^3.

Osteoarthritis: Non-inflammatory "wear and tear" arthritic disease.

Osteophytes: Bone spurs, palpable on examination at times, seen in osteoarthritis.

Patrick's Test: Pain in the sacro-iliac joint with flexion, abduction, and external rotation of the leg. Used to diagnose arthritic disorders affected the low back.

Para: Number of pregnancies resulting in viable offspring, used with Roman numerals, i.e. Para V for five previous offspring. Multiple births count as just one.

Phalen's maneuver: Minimizing the space available for the median nerve to traverse the wrist by flexing the wrist fully, used to detect carpal tunnel syndrome.

Pharyngitis: Inflammation of the pharynx, requiring antibiotic therapy when caused by *Streptococcus*, which can lead to rheumatic fever or kidney inflammation if not treated.

Platelet: Disc-like blood component, containing enzymes but lacking a nucleus or DNA, which is involved in blood clotting.

Pterygium: A benign tumor extending across the eye from conjunctiva to cornea, often compromising vision.

Pulse: Heart beats per minute. Normally between 60 and 100.

Purulent: Containing pus.

Radius: Forearm bone on thumb's side of arm.

Rate: Cardiac pulse, either normal, fast (tachycardic), or slow (bradycardic)

Regular: Steady, not varying.

Rhythm: The normal heart sound sequence, called "sinus" rhythm after the sinoartrial node

which controls heart contraction, beginning in the atria and progressing to the ventricles.

Respiratory rate: Breaths taken per minute, usually between 12 and 20.

Rhoncus: A rattling sound heard on auscultation of the lungs in bronchitis, caused by obstruction of the bronchial tubes by mucous.

Romberg's sign: Loss of balance seen when standing with eyes closed and feet together, seen in tabes dorsalis and other diseases of the dorsal columns of the spinal cord.

Rouleaux formation: Stacking of red blood cells with inflammation, increasing erythrocyte sedimentation rate, mediated by increased levels of inflammatory proteins such as fibrin.

Sacral: Extreme low back, extending below lumbar vertebral region, ending in coccyx.

S1: First heart sound, caused by closure of mitral and tricuspid valves

S2: Second heart sound, corresponding to closure of aortic and pulmonic valves.

S3: A pathological third heart sound heard in early diastole, due to altered ventricular filling. Absent in this patient, as one would expect. Seen in heart failure.

S4: A pathological fourth heart sound auscultated in patients with altered ventricular compliance, not seen in this patient. A complication of hypertension.

Shotty: Like shotgun pellets, said of lymph nodes enlarged by infection

Sinusitis: Inflammation of a sinus. The condition may involve ethmoid, frontal, maxillary, or sphenoid sinuses, be acute or chronic, caused by bacteria, viruses, or allergies.

Tabes dorsalis: The neurological condition of the spine seen in advanced syphilis.

Tinel's sign: Tingling in the hand when the median nerve is tapped with a percussion hammer, seen in carpal tunnel syndrome.

Thrombocytopenia: Low platelet count in the blood.

Westergren Method: The most reliable technique for obtaining an erythrocyte sedimentation rate, not available in the field.

Wintrobe Method: The method used in the field to obtain erythrocyte sedimentation rates, fairly reliable but tending to underestimate inflammation compared to with the Westergren Method.

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