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California Demographic Trends: Implications for Transportation Planning

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by

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California Demographic Trends: Implications for Transportation Planning

Summary

Major investments in highway or transit infrastructure often require a decade or more to move from planning to completion. Therefore, a solid understanding of California's future transportation infrastructure needs implies a critical evaluation of the projections of the state's total population, what this population will look like, where they will live and work, their lifestyle choices, and most importantly, the combined impact of these factors on travel demand. Additionally, any serious evaluation of the future must consider the impact of technology, how it may change travel patterns and how it may be used as a tool for improving the effectiveness of transportation infrastructure. The following is the first in a series of working papers that will explore precisely this set of issues.

The first section of the report provides an overview of the basic demographic trends that will help shape future travel demand in the state. First, the section provides a historical overview of the relationship between demographic trends and travel behavior in the U.S. Next, an overview is provided of the major trends within California over the past 20 years in terms of population growth, immigration, transportation infrastructure, and travel demand.

With this overview of the past as a backdrop, attention is then turned to the forecasts of California's future and the issues they raise for transportation planning. The major highlights include:

- Estimates of the State's future population in 2025 range from a low of 41.5 million to a high of 52.5 million

- Although differences exist among such projections, they generally agree that...
    - Migration out of California to other states will continue to be roughly equal to migration from other states to California
    - International migration will continue to be a significant contributor to the state's growth
    - However, the largest source of growth will be from births outnumbering deaths within California

- Senior citizens and racial/ethnic minorities will increase as a share of the State's population
    - The travel behavior of these groups has been and is expected to continue changing
    - However, the precise implications of these trends for transit ridership, total vehicle miles traveled and other travel patterns remain unclear
    - Additionally, although the number of senior citizens in California will dramatically increase, the State will still have the smallest share of population over 65 in the country
        - By 2020, 15% of California's population will be over 65 (roughly equal to Florida's current share of population over 65)

- The distribution of growth within the State will also have important implications for future transportation needs:
    - Although many counties will grow rapidly in percentage terms, Los Angeles, San Bernardino, Riverside and San Diego counties are expected to account for the overwhelming share of the State's total population growth.
    - In addition, a few Central Valley counties (Kern, Fresno, Stanislaus, and Sacramento) are each projected to increase by more than 250,000 over the next 20 years.
    - Assumptions about fertility rates, particularly among Latino women are a significant source of uncertainty that could alter such predictions.
    - Additionally, public policies to substantially restrict the growth of housing and jobs in major urban areas could have substantial spillover effects on neighboring counties.

Finally, this analysis has implications for the development of the state's transportation plan.

- Given the considerable uncertainty that long-term forecasts imply, scenario planning, ongoing monitoring, and the flexibility to respond to unpredicted events would be useful plan attributes.

- Perceptions of how rapidly population and transportation needs are growing is somewhat subjective and the plan must make some attempt to establish objective benchmarks to define needs and to evaluate performance.

Introduction

Forecasts are an essential part of long-term planning for transportation and related endeavors. With the lengthy planning horizons required for major projects, using scarce resources wisely means ensuring that investments provide capacity where the greatest long term needs will be. Therefore, transportation planners must consider not only today's pressing needs, but also what the demands on the system will be over the long-term.

Although it is not possible to precisely predict the pattern of population, housing, jobs, and travel patterns in California 20 years from now, an examination of the fundamental trends can provide vital insights for the planning process. Key insights can then be applied to developing a basic set of scenarios and evaluate what each implies for California's future transportation needs.

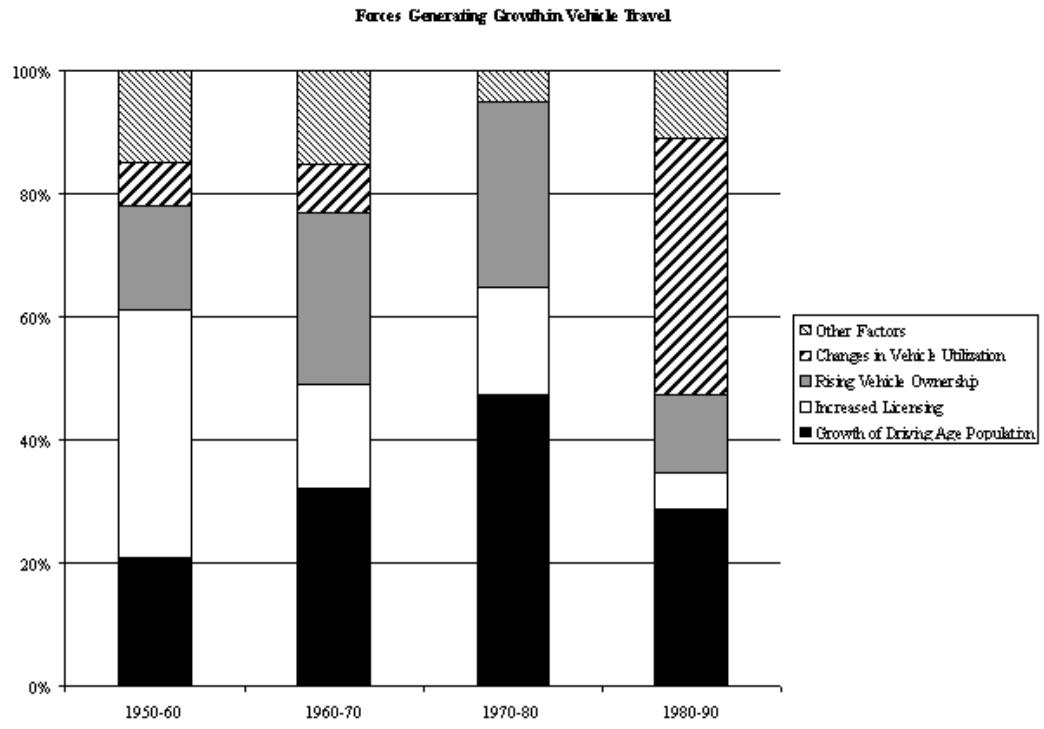
Historical Trends for Travel in the U.S.

Before examining the nature of California's future, it is useful to take a brief look at the past. Examining how demographic factors have shaped travel demand over the past decades provides critical perspective to evaluate current relationships

Over the past 60 years the underlying relationship between total population and travel demand has shifted. At the national level, some analysts have used historical data to evaluate the

contribution of various factors to the growth in total personal vehicle travel over time. (see Figure 1)

Figure 1 - Historic Factors Affecting Growth in Vehicle Travel



Source: Don Pickrell, Paper Presented at NEMS/AEO Conference March 17, 1997

The picture that emerges can be summarized in a few points:

- **1950's -** The dramatic increase in the share of adults with driver's licenses was the largest single factor contributing to growth of Vehicle Miles Traveled (VMT).

- **1960's** - Dramatic increases in vehicle ownership among households became an increasingly important contributor to VMT growth. Additionally, as the children of the baby boom came of age, the increased number of eligible drivers also became an important factor.

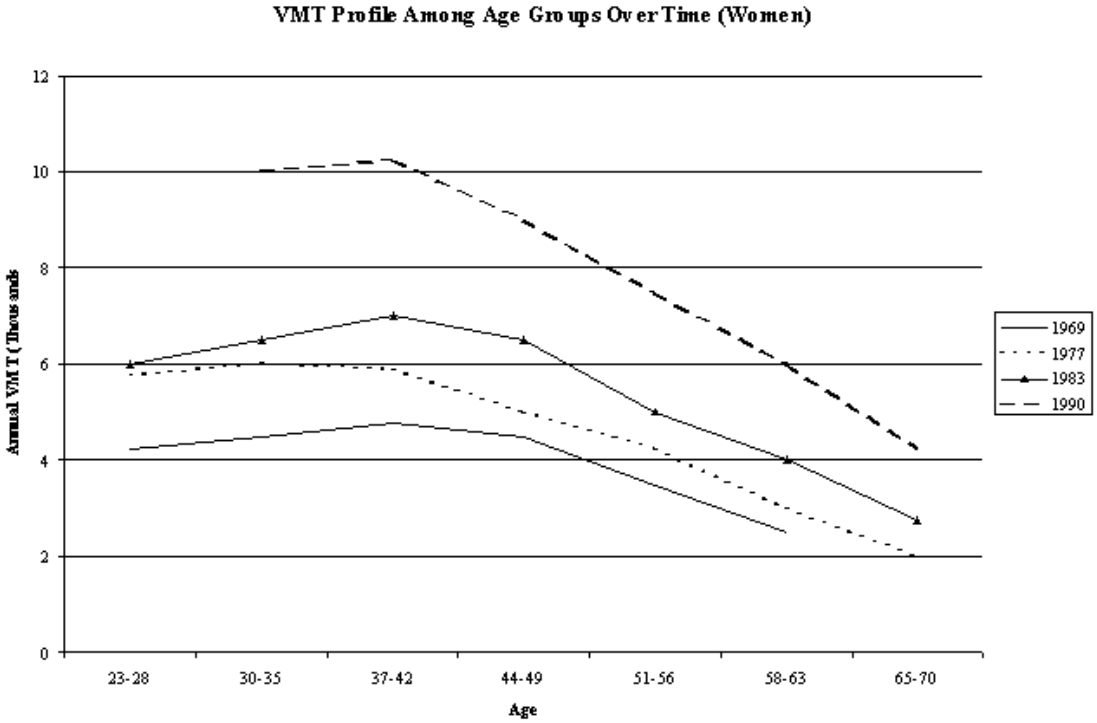
- **1970's** - The increase in the total number of eligible drivers became the overwhelming factor responsible for the growth of VMT. The average number of miles driven per vehicle actually decreased during the decade and the growth in vehicle ownership slowed.

- **1980's and 1990's-** With rates of auto ownership and the share of adults licensed to drive nearing possible saturation levels, the increased number of miles driven per vehicle became the single largest factor behind rising VMT.

Patterns within particular demographic groups have also shifted over time. The most obvious of these shifts has been the convergence of travel patterns between men and women as a whole. Among the baby boom generation the share of women with drivers licenses is nearly equal to the rate among men. Among younger adults the VMT gap between men and women is also showing signs of convergence.

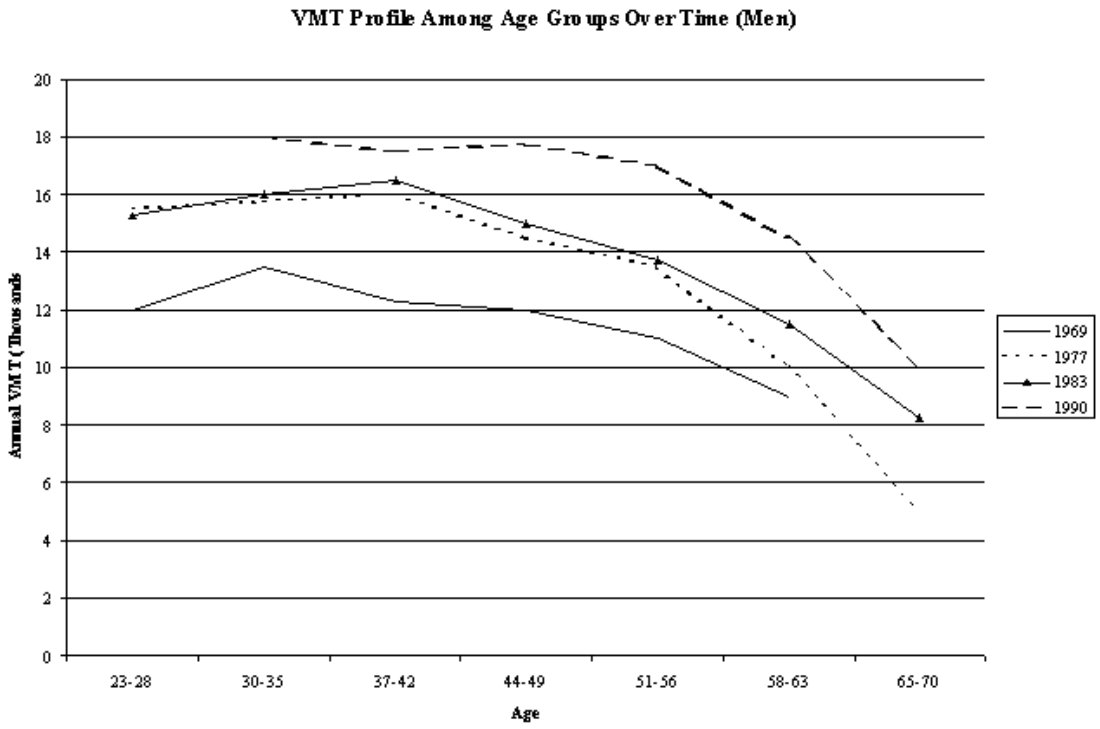
The driving habits of senior citizens represent another important shift in the travel patterns among a key demographic group. Over time, proceeding generations of adults 65 and older have shown increasing rates of annual VMT. More important are the trends that emerge when individual age cohorts are compared over time from national surveys. (see Figures 2a and 2b)

Figure 2a - Increased Driving Among Women of all ages over time



Source: Gennan, John, *Factors Affecting VMT Growth* Paper Presented at NEMS/AEO Conference March 17, 1997

Figure 2b - Increased Driving Among Men of all ages over time



Source: Gennan, John, *Factors Affecting VMT Growth* Presentation to the Annual Energy Outlook -NEMS Conference, March 1997.

Historical Trends in California

Vehicle Ownership and Households

Although many of the patterns highlighted above are consistent with the growth of vehicle travel in California, there are some differences of note. First, the number of vehicles per capita in California has been historically higher than the national average. (see Table 1) However, by 1990 the pattern reversed itself. Demographic changes explain a large part of this shift. Since 1990, average household size in California has increased from 2.8 to 2.9 persons per household, while the figure has declined at the national level from 2.7 to 2.6. [1] This is an indicator of larger families and a greater proportion of unlicensed drivers as share of California's population. Therefore, any per capita measure will reflect this difference.

[1] 1999 California Statistical Abstract, Table E-5.

Table 1 - Number of Vehicles Per 100 People*

	1950	1960	1970	1980	1990
Cars **					
California	37	42	49	56	51
U.S. Average	27	34	44	54	54
All Vehicles***					
California	43	49	59	71	73
U.S. Average	32	41	53	69	76

* Source: FHWA Highway Statistics, US Census Bureau
** Does not include light trucks used as personal vehicle. With the increase of light truck's share of personal vehicles this presents a slightly distorted picture. However, the comparison is still valid since the light truck share of personal vehicles in California is similar to U.S. average.
*** Includes all cars, trucks buses.

In addition to larger families, there are also indications that a lack of housing affordability explains some of the steady increases in household size. Compared to the national averages, California also has a much larger share of over crowded households - defined by the census as more than one person per room. In 1990, 12% of California households had more than 1 person per room, compared to 5% nationally, while 7% had more than 1.5 people per room, compared with only 2% nationally[2]

Demographic Trends within California's Regions

Regional variations have also been an important aspect of the story behind the growth of population and travel demand in California. Over the past 20 years, the population grew overall by more than 40%, but the rate of growth among individual counties varied from 122% in Riverside County, to less than 2% in Inyo County. Additionally, nearly 23% of the State population growth was concentrated in Los Angeles County. Along with LA County, five other counties, Riverside, San Bernardino, Orange, San Diego, and Santa Clara, accounted for approximately 60% of the State's overall growth.

More recently growth patterns have shifted somewhat. Between 1997 and 1999, the same group of counties continues to be the most significant in terms of the State's overall growth. Curiously, the core urban counties, Los Angeles, San Diego, Orange, Santa Clara and Alameda, have accounted for more of the State's growth over the past two years than they did over the past twenty. However, inland counties, such as Riverside, San Bernardino and Sacramento are forecast to account for a much larger share of the State's population growth in the future. In spite of recent trends, population growth is expected to shift somewhat from the coastal counties to inland counties. (see maps)

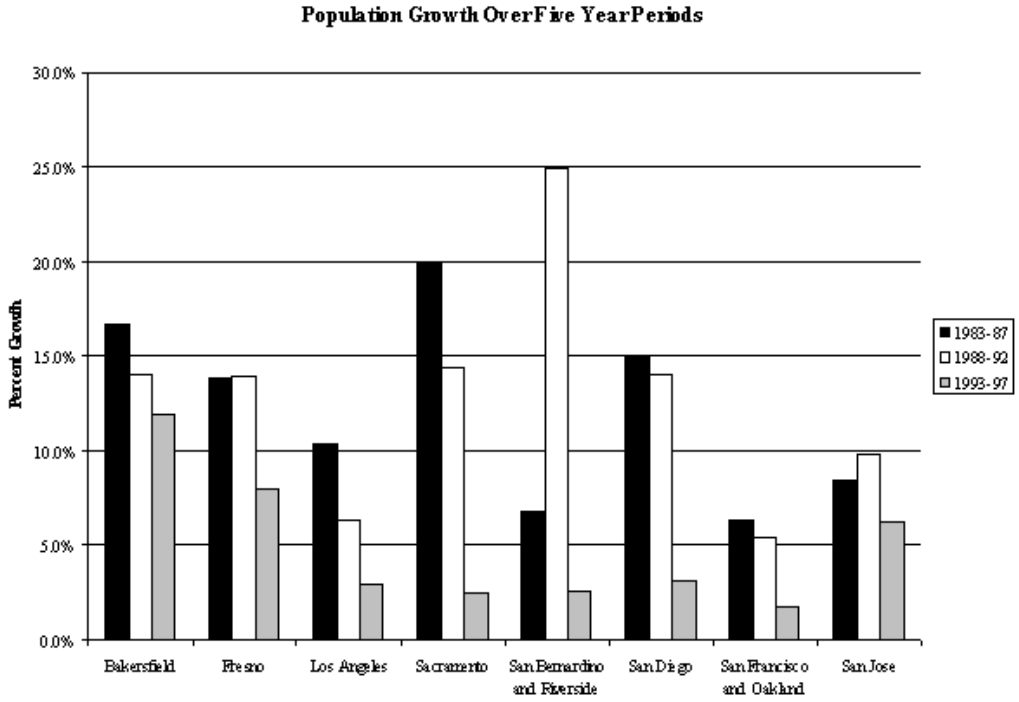
[2] Historical Census of Housing, U.S. Census Bureau, http://www.census.gov/hhes/www/housing/census/historic/crowding.html

Table 2 - Historic and Projected Growth Rates by County

	Past Twenty Years 1980-1999		Most Recent Trends 1997-1999		Forecast Trend 1999-2020	
Fastest Growing Counties	*Growth Rate*	*Share of State's Total Growth*	*Growth Rate*	*Share of State's Total Growth*	*Growth Rate*	*Share of State's Total Growth*
Los Angeles	30.5%	**22.6%**	3.0%	**26.0%**	18.6%	15.6%
San Diego	53.2	**9.8%**	4.6%	**11.3%**	37.3%	9.1%
Riverside	122%	***8.0%***	5.2%	6.6%	88.2%	***11.1%***
Orange	43.6%	**8.3%**	3.7%	**8.9%**	23.6%	5.6%
San Bernardino	84.8%	***7.5%***	3.1%	4.4%	66.1%	***9.4%***
Santa Clara	32.5%	**4.2%**	3.7%	**5.5%**	28.1%	4.1%
Sacramento	50.4%	***3.9%***	3.4%	3.5%	40.2%	***4.1%***
Alameda	29.7%	**3.2%**	3.7%	**4.7%**	25.1%	3.1%

California's major metropolitan areas have also experienced fluctuations in their growth over time. Generally, growth across all urban areas in the state has slowed from the rapid rates experienced in the early 1980's. Two areas of the state bucked this trend. The Inland Empire (San Bernardino and Riverside) and Silicon Valley (San Jose) grew even more rapidly from 1987 to 1992 than they did in the early 80's. With the deep recession in the state economy in the mid-1990s, growth slowed statewide. The one notable exception was San Jose, which continued strong growth during this period. (See Figure 3)

Figure 3 - Growth Rates Among California's Metropolitan Areas

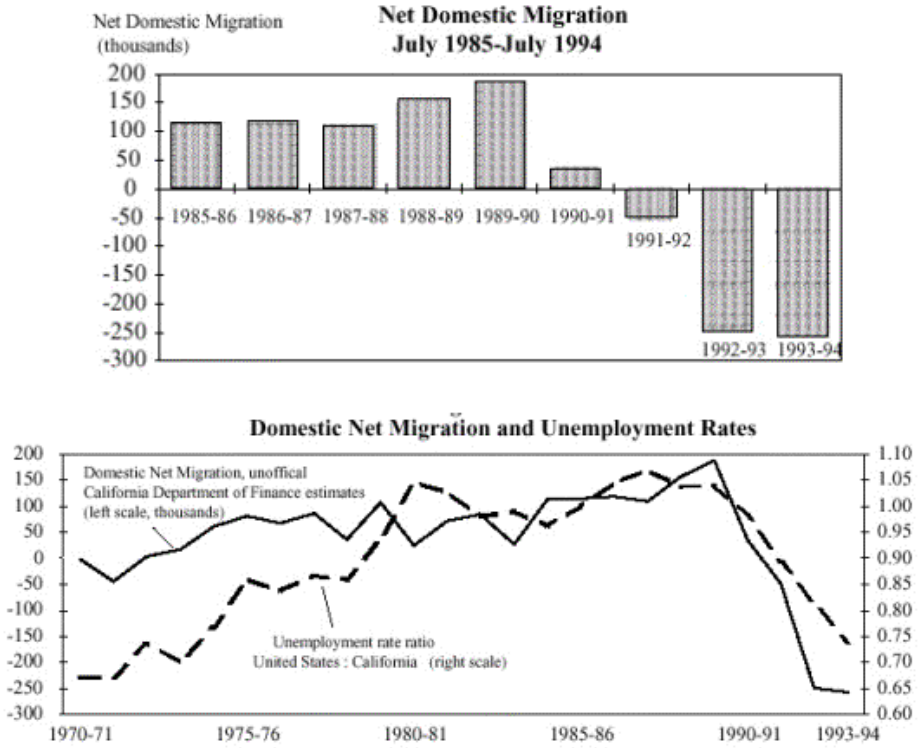


Source: Texas Transportation Institute, Mobility Study, 1999

These shifts in population are strongly linked to the economic cycles experienced by the state economy. Throughout the 1950s and 60s California attracted 200,000 to 300,000 more people each year than moved out to other states. During the 1970's, with unemployment in the rest of the country significantly lower than California in-migration slowed to less than 100,000 people each year. This turned around in the 1980's as increased military spending created a large number of jobs in California, including many blue-collar jobs in the aerospace industry. With other regions in the U.S. maintaining high levels of unemployment, the migration to California from Northeastern and Midwestern states steadily increased. However, when the economy faltered in the early 1990's, California again experienced higher unemployment than the rest of the country. As the aerospace and other defense-related industries declined, the state began to lose significantly more people to other states than it was gaining. This relationship is shown in Figure 4, taken from a study by Johnson and Lovelady (1995).[3]

[3] Johnson, Hans P., and Richard Lovelady, *Migration Between California and Other States: 1985-1994*, California Research Bureau and Demographic Research Unit, California Department of Finance, Sacramento, November 1995

Figure 4 - Domestic Migration and Economic Cycles



Source: Johnson, Hans P., and Richard Lovelady, *Migration Between California and Other States: 1985-1994*

In addition to these movements of population, the economic characteristics of regions in the state have also undergone dramatic changes. California has surpassed the rest of the country in the share of the population living below the poverty line. In 1980, 11% of Californians lived in poverty compared to 13% nationally.[4] By 1994 California surpassed national average with a poverty rate of nearly 18% and compared to 15% for the U.S.[5] Since that point, poverty has declined both nationally and in California, but as of 1997-98, the poverty rates in the State were still 30% above the U.S. average.[6] The state also has higher rates of poverty among families, nearly twice the national rate for two parent households (13.6% compared to 7.2%), and slightly higher for single parent households (45.2% and 39.5%).[7]

The changes in poverty have also been quite uneven across the state. Maps from the *Digital Atlas of California*[8] illustrate this point quite effectively. The statewide map (DAC map 1 - http://130.166.124.2/atlas.ca/CA000023.GIF) of changes in average household income from

[4] Johnson, Hans P. and Sonya M. Tafoya, "Trends in Family and Household Poverty," *California Counts*, v. 1, n. 3, Public Policy Institute of California, San Francisco, May 2000, pg. 2.
[5] ibid. pg. 2
[6] ibid. pg. 2
[7] ibid. pg. 5
[8] Bowen, William, *Digital Atlas of California*, California State University, Northridge, http://130.166.124.2/CApage1.html

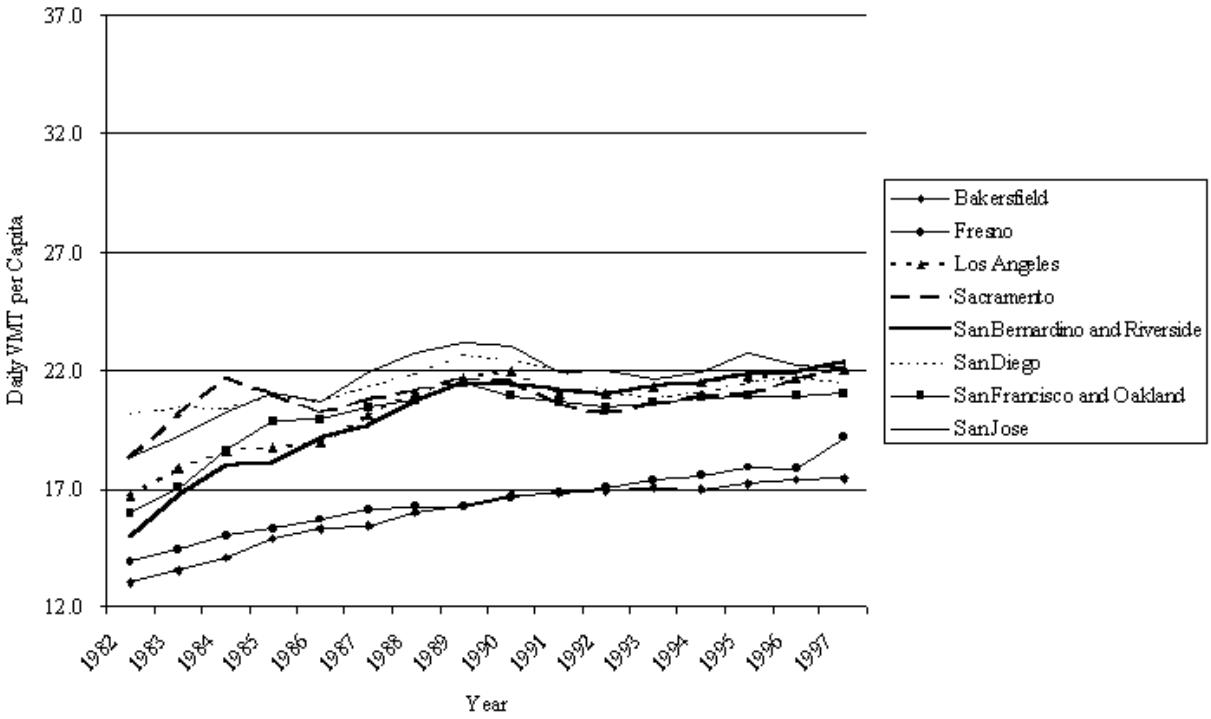
1989 to 1995 shows that incomes increased much more rapidly in the four largest metropolitan areas (Los Angeles, San Diego, the Bay Area and Sacramento) than in the rest of the state. Additionally, coastal areas have generally faired better than inland communities by this measure. Perhaps more striking though is the disparity within major urban areas (DAC map 2, map 3, map 4, and map 5 - http://130.166.124.2/atlas.ca/CASAC023.GIF). Clearly the economic recession of the 1990s hit some communities much harder. The disparities between communities can be seen in larger urban areas San Francisco and Los Angeles as well as smaller urban areas such as Fresno and Bakersfield.

Perspectives on Vehicle Travel and Infrastructure Trends in California Regions

The impact of these cycles on travel demand has also varied across the state. Total travel and traffic delays have increased steadily in every major urban area in the state over the past 20 years. However, it is helpful to take a look at these trends from a few different perspectives to better understand the underlying factors behind the growth. Measured in terms of VMT per capita, all urban areas in the state experienced rapid growth in the 1980's and a decline during the recession in the 1990's. (Figure 5a) Bakersfield and Fresno seem to stand out both in terms of lower VMT per capita and a more steady increase. Among the other areas grouped in the 20 to 22 daily miles per person range, San Jose and San Bernardino/Riverside seem to both be growing most rapidly and experiencing the largest cyclical swings.

Figure 5a - VMT growth measured in per person terms

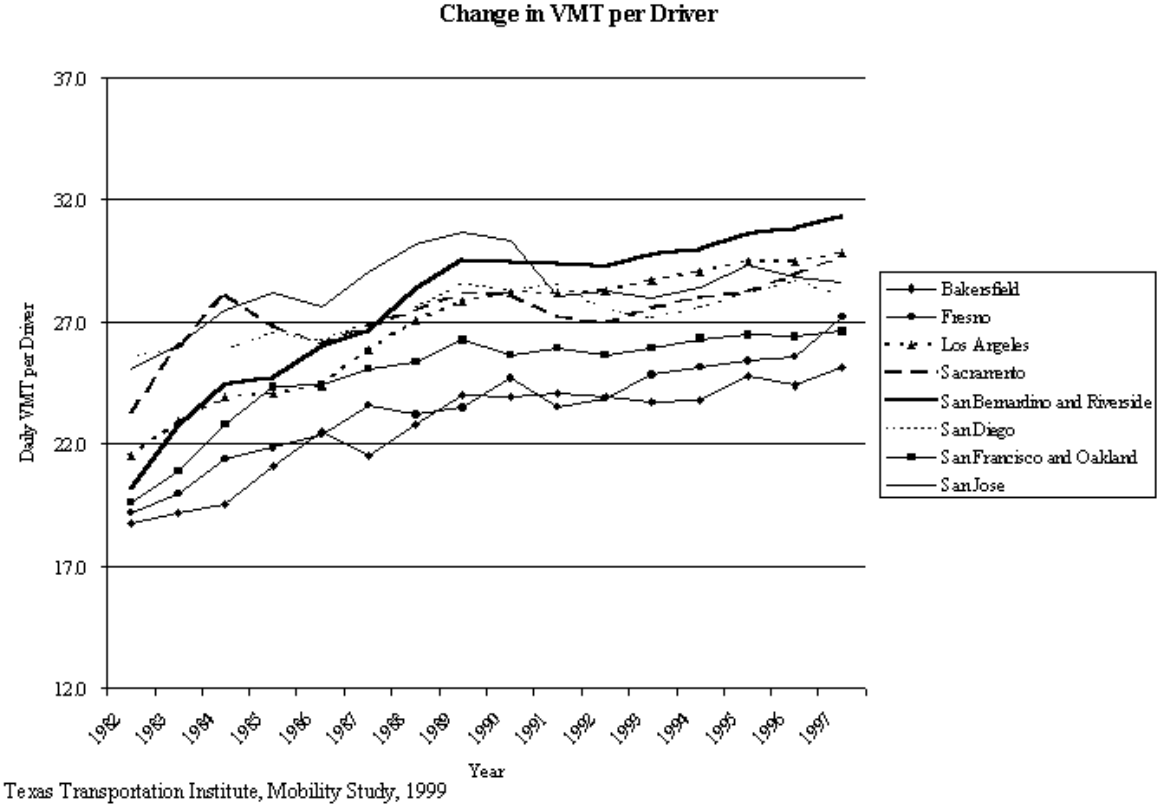
Change in VMT per Capita



Source: Texas Transportation Institute, Mobility Study, 1999

Viewing the growth of vehicle travel in terms of the increase per licensed driver presents a slightly different picture. (Figure 5b) First, the spread among average daily VMT increases is wider (ranging from 31 to 24 rather than 18 to 22). This measure better accounts for differences among the California's urban areas in the share of total population that are licensed drivers. The growth over time is also less cyclical, which is consistent with the linkage we would expect between the numbers of adults entering the labor-force and seeking out drivers' licenses during economic booms or recessions. This metric also changes the view of which regions have the highest rates of travel. Fresno and Bakersfield have rates that are closer to the other metropolitan areas when measured in terms of daily VMT per driver. In fact, Fresno actually surpasses the San Francisco/Oakland area by this measure of relative travel demand.

Figure 5b - VMT growth measured in per driver terms

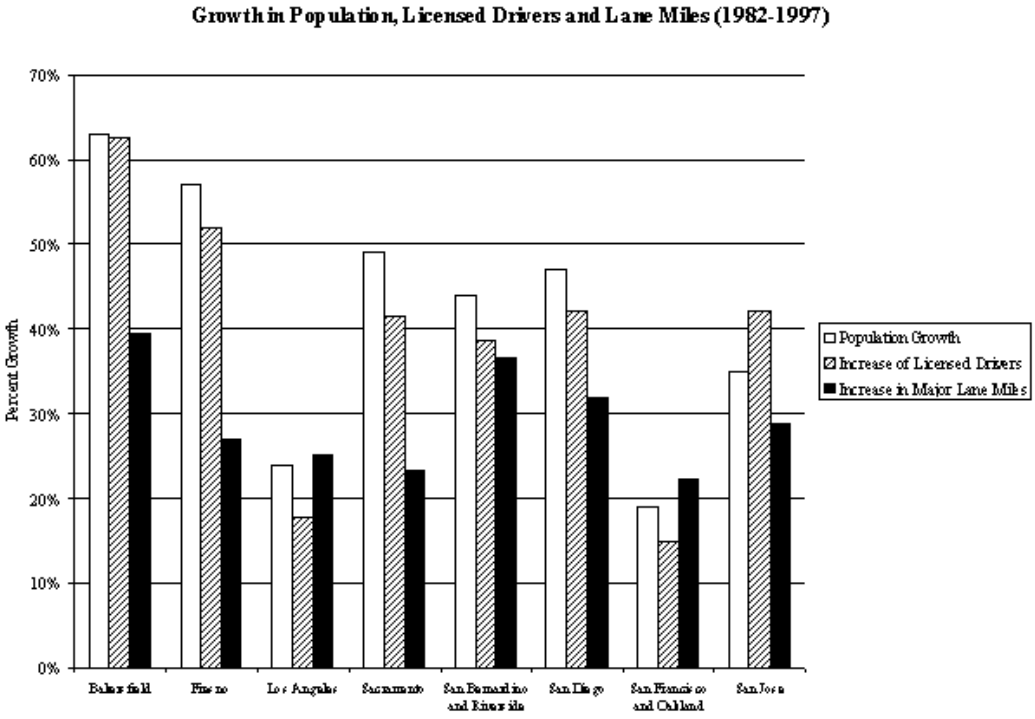


Source: Texas Transportation Institute, Mobility Study, 1999

The degree to which road capacity has kept pace with "growth" is also a complicated question. In part, the answer depends on the measurement of capacity. Therefore, an evaluation of trends across the State reveals an ambiguous picture. First, among the major urban areas in the state the growth in population is not always proportional to the growth in licensed drivers. The demographic factors discussed previously, (e.g. family size and number of immigrants etc.), differ among regions and affect this relationship. If we settle on the growth of drivers as the best measure of demand, then it appears that the increase in lane miles was proportional to the increased demands in only three areas, Los Angeles, San Bernardino/Riverside, and San

Francisco/Oakland. In Fresno, Bakersfield, Sacramento, San Jose, and San Diego growth in licensed drivers far outpaced growth in lane miles. (see Figure 6a)

Figure 6a - Comparing Changes in Population, Licensed Drivers and Road Capacity



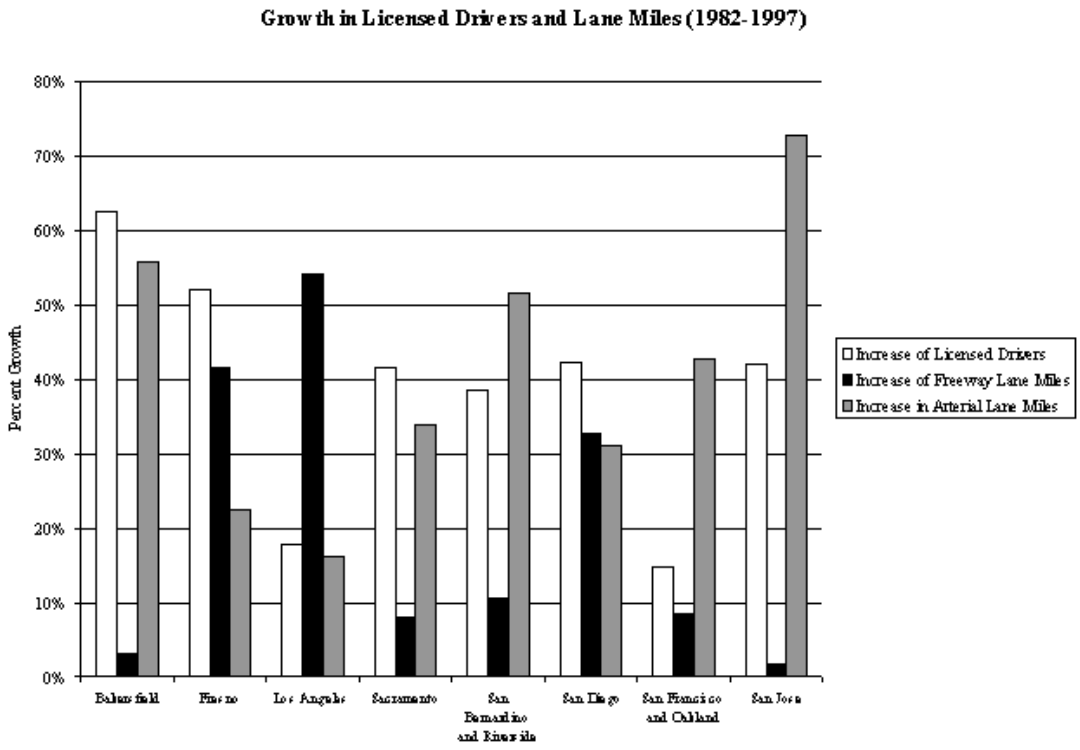
Source: Texas Transportation Institute, Mobility Study, 1999

An example from Figure 6a helps illustrates the complexity introduced by defining demand in terms of population growth versus growth in licensed drivers. In terms of population, the San Diego metropolitan area grew at a faster rate than the San Jose metropolitan area from 1982 to 1997. On the other hand, their rates of growth in licensed drivers were nearly equal. As a result, the addition of lane miles in San Jose seems to have "kept pace with needs" better than San Diego when measured against population growth. Measured against the growth in licensed drivers, it appears that the addition of road capacity in San Jose has not been as "adequate". Whether San Jose's unusual ratio of population growth to growth in licensed drivers is a result of unique demographic characteristics or problems with the underlying data would require further investigation. However, it illustrates the caution that must be used in selecting the demographic metrics by which needs are defined.

Another distinction can be made between the type of road infrastructure provided. Figure 6b compares the growth in licensed drivers with growth of freeway and arterial lane miles. In Los Angeles, San Diego and Fresno, more freeway lane miles were added than arterial lane miles. In the remaining five metropolitan areas, arterial miles were expanded much more rapidly in percentage terms than freeway lane miles. Relating these figures back to Figure 6a raises the

question of just how adequate capacity expansion was in relation to "needs". For example, although the gap between basic travel demand and provision of new capacity is similar for both Fresno and Bakersfield, the effective capacity addition was larger in the former. In other words, since more of Fresno's additional capacity was in freeway miles, more vehicles are served per additional lane mile than in Bakersfield.

Figure 6b - Growth in Drivers Compared to Increases in Highway and Arterial Capacity



Source: Texas Transportation Institute, Mobility Study, 1999

Additionally, comparing simply the growth of population or drivers within an area does not capture the increased demand generated by traffic originating outside the region. Other factors such changes in the jobs/housing balance must be considered to predict the growth of travel demand that often spills over jurisdictional boundaries. In some urban areas, cross commuting is growing rapidly. For many years residents of San Francisco have traveled to San Jose and vice versa. Increasingly, longer inter-regional commutes such as Stockton to San Jose and Riverside to San Diego are becoming more significant.

Defining needs for the future can also begin with a discussion of the growth of traffic congestion. However, characterizing the growth in traffic congestion across California suffers from similar measurement issues. The charts in Figure 7 show a consistent trend of increasing traffic delays across the State's metropolitan areas, regardless of size. However, when we turn to a comparison of the growth in traffic delay per capita and per driver the story becomes more complex.

Figure 7 - Growth in Traffic delays

Source: Texas Transportation Institute, Mobility Study, 1999

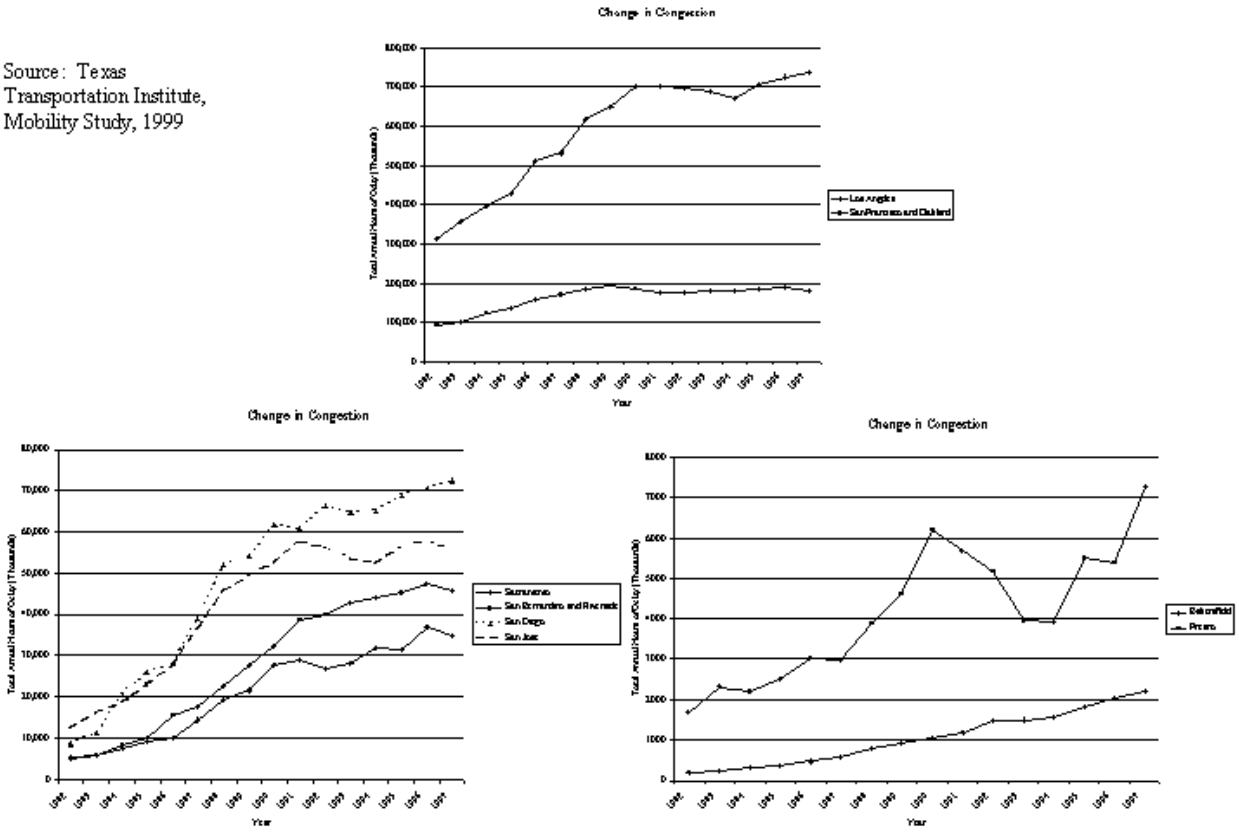
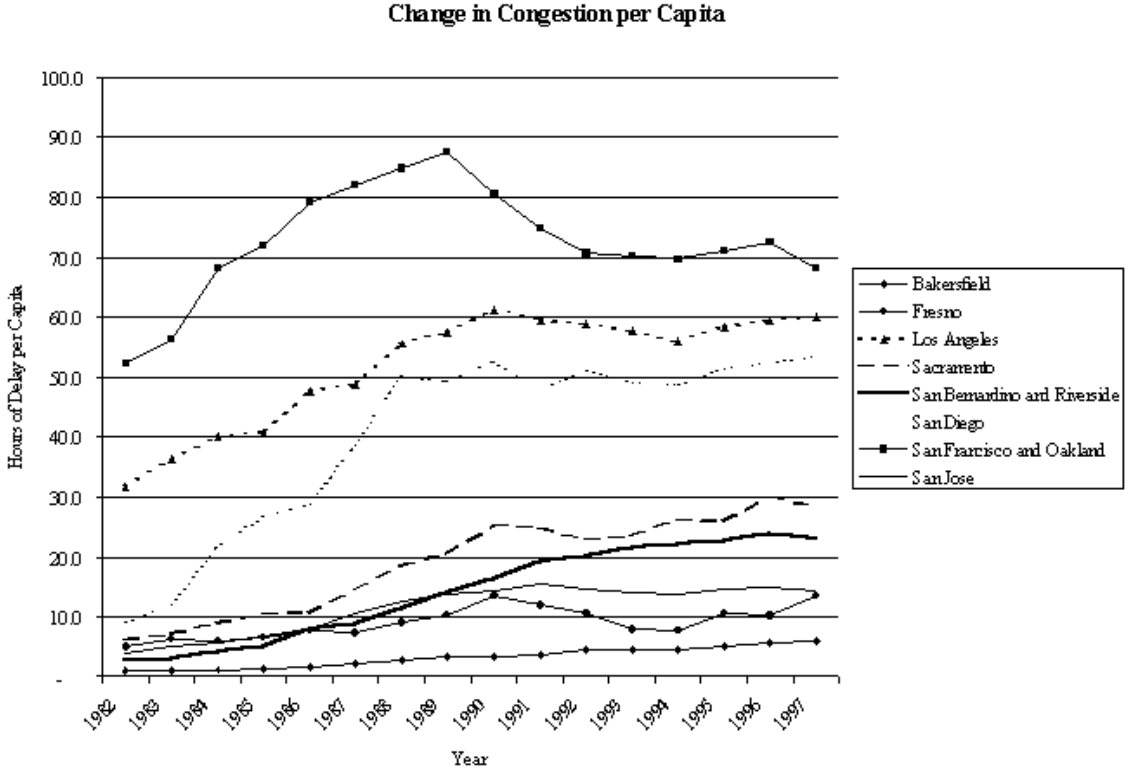


Figure 8a reveals a somewhat surprising pattern. Traffic congestion per person has grown much less dramatically in most cities. One interpretation of this trend is that the underlying growth of population has been largely responsible for the increase in total delay. The three largest urban areas in the state experienced the most dramatic increases in traffic delay per person. However, their growth in delay per person was much more modest throughout the 1990s, with the San Francisco region actually experiencing a decline in delay per person. Among the other major urban areas, the Sacramento and San Bernardino/Riverside have experienced the most dramatic growth.

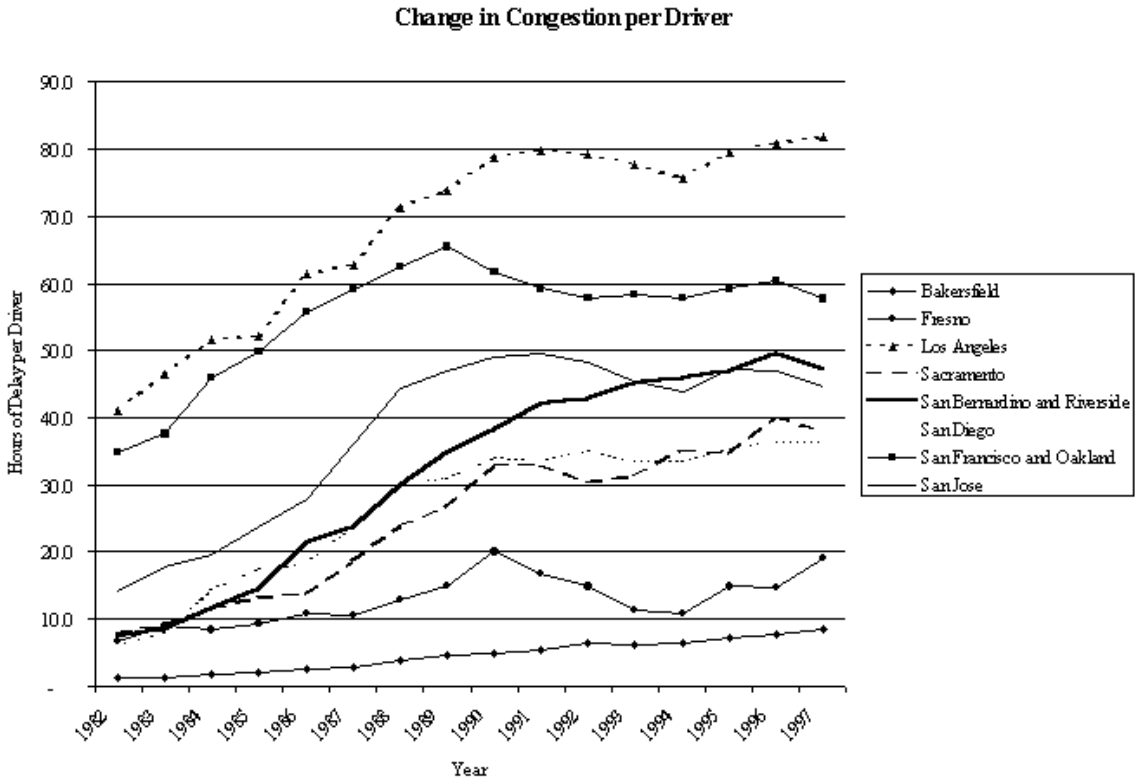
Figure 8a - Change in Traffic Delay Measured Per Person



Source: Texas Transportation Institute, Mobility Study, 1999

Evaluating the changes in congestion in per driver terms, the picture becomes somewhat different. (Figure 8b) The trend lines for individual areas look quite similar regardless of the metric. However, the level of delay relative to the other urban areas shifts when measured per driver. Los Angeles overtakes San Francisco as the "most congested area". Additionally, San Bernardino/Riverside and San Jose surpass San Diego by this measure of traffic congestion.

Figure 8b - Change in Traffic Delay Measured Per Driver



Source: Texas Transportation Institute, Mobility Study, 1999

Some important insights can be drawn from these various views of population travel demand and traffic congestion trends. Rather than present contradictory information the different summary measures reveal distinct pieces of the puzzle. From the various points of view it is possible to identify patterns and better understand the forces driving the key trends.

In terms of planning for the future, identifying these underlying relationships is essential. So many long-term forecasts miss their mark because the basic assumptions upon which they are based often change. Identifying the fundamental forces behind trends is the first step to developing scenarios rather than predictions. This issue will be discussed further in the concluding section of the paper. However, before turning our attention to scenarios and their implications for California's future transportation needs, an examination of current forecasts of the State's demographic future is needed.

Demographic Forecasts of California's Future

Perhaps the most basic question defining California's transportation future is... How many people will the infrastructure need to serve? Surprisingly, the answer to this question is far from simple. Among, the major forecasts that have recently been conducted, the estimates of the State's population in 2025, vary by more than 10 million.

The methodology employed by the various forecasts account for some of the difference. The U.S. Census Bureau and the California Department of Finance both use demographic models that rely primarily on what are called "cohort components". In other words, they form estimates based on birth and death rates among specific age and racial groups over time. Other estimates combine demographic and economic modeling techniques to arrive at a population growth estimate, (Census Alternative forecast, BEA and Center for the Continuing Study of the California Economy). In one case current trends are extrapolated to arrive at an estimate (UCLA).

The timing of the forecast is another factor explaining some of the differences. As the State recovered from the severe recession of the 1990's, domestic migration to California increased and almost as many people were moving to California as were leaving. Previously, the State was losing a net of more than 200,000 people per year. The more dated forecasts (Census 1995 and BEA 1996) therefore, tend to forecast more out-migration in the near term and slow in-migration in the long term.

The assumptions within the forecasts also lead to differences in the racial and ethic composition they predict. The Census Bureau's forecast assumes higher rates of domestic migration out of California. Larger shares of current domestic migrants are white, and the forecast also assumes this pattern will continue. The combined effect of these two assumptions leads to higher estimates of Hispanic and Asians as a share of the state population. (See table 3)

Table 3 - Current and Forecast Racial/Ethnic Composition of California

	1995 Population	DOF 2025	Census 2025	Census Altern. 2025
White	54%	37%	34%	30%
Latino	28%	41%	44%	47%
African American	7%	6%	5%	5%
Asian / Pacific Islander	10%	15%	17%	18%

Source: *Hans P. Johnson, "How* Many Californians? A Review of Population Projections for the State" Public Policy Institute *of* California , *California Counts*, POPULATION TRENDS AND PROFILES Volume 1 Number 1 • October 1999, pg. 7

However they do agree on several points.

- Future growth rates will be lower than the past, but large numbers of people will still be added to the population
- California's growth rate will exceed most of the rest of the country
- Natural increase will contribute more to growth than immigration
- International immigration will be larger than domestic migration to California

An additional point should be made with respect to international immigration to California. Contrary to some perceptions, immigration is largely an urban phenomenon. Between 1990 and 1996, 78% of immigrants to the State settled in eight urban counties: Alameda, Los Angeles, Orange, Sacramento, San Diego, San Mateo, San Francisco, and Santa Clara. (see Table 4)

The destination of international immigrants also has significant indirect implications for future population. A study comparing fertility among California women found that, over their lifetime, foreign-born women had on average 2.9 children each while native-born women averaged only 2.4 children each.[9] Higher fertility rates mean that areas with large immigrant populations will most likely experience more growth from natural increases (births outnumbering deaths) than areas will smaller immigrant populations.

Table 4 - Legal Immigration to California by County, 1990-1995

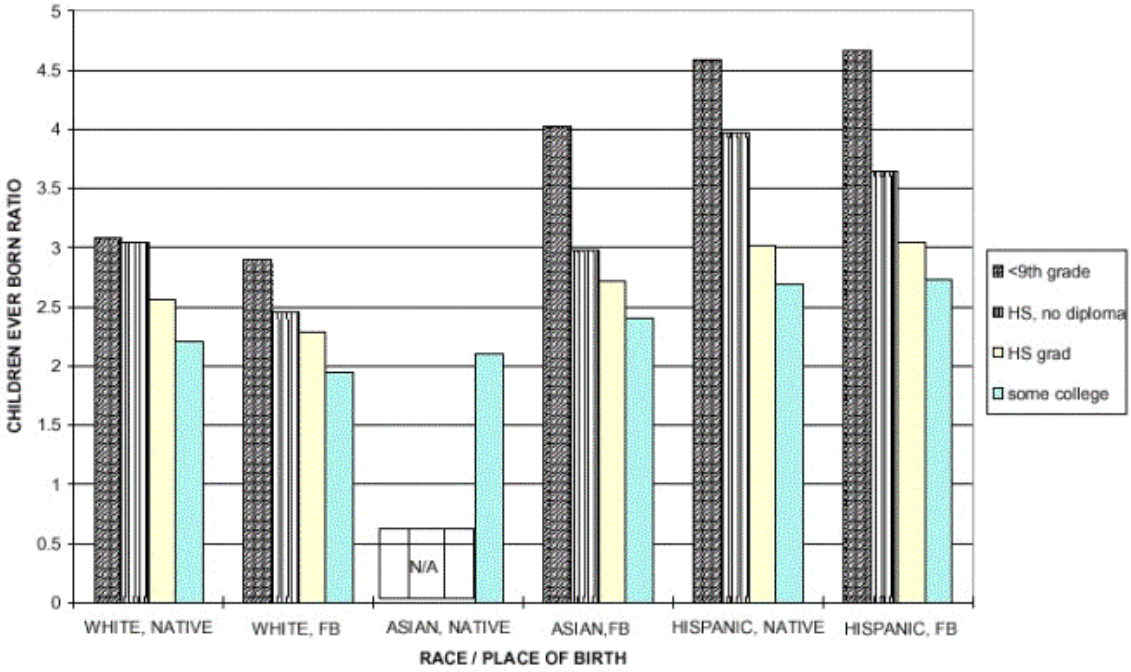
	1990	1992	1995	Total	Share of State Total
Los Angeles	76,185	93,186	54,498	475,577	38.4%
Orange	16,490	26,223	18,070	115,756	9.4%
Santa Clara	13,904	21,141	12,798	98,559	8.0%
San Diego	10,923	15,432	11,820	80,470	6.5%
San Francisco	11,188	11,935	9,879	71,323	5.8%
Alameda	8,690	10,425	8,512	58,820	4.8%
San Mateo	5,079	6,186	5,028	34,491	2.8%
Sacramento	4,348	7,086	4,277	33,488	2.7%
San Bernardino	3,858	5,413	3,998	27,773	2.2%
Fresno	3,167	4,530	3,737	27,180	2.2%
Contra Costa	3,673	4,202	3,546	23,681	1.9%
Riverside	2,432	3,909	3,424	20,481	1.7%
Ventura	2,459	3,549	2,654	18,948	1.5%
San Joaquin	2,701	3,422	2,318	16,229	1.3%
Monterey	1,346	1,877	2,329	12,195	1.0%

Source: Department of Finance, *Legal Immigration to California by County: Federal Fiscal Year (FFY) 1990-1995.*

Hispanics, the state's largest ethnic group, also had the highest fertility rates. The number of children per woman for both native and foreign-born Latinas was higher than the average for foreign-born women as a whole.[10] However, the study also found that differences in education levels accounted for a large share of the difference in fertility. Less educated Latinas, whether they were born in the U.S. or abroad, had higher fertility rates than other groups. As education levels increased for Latino women, the differences in fertility rates relative to other groups narrow. Among both foreign-born and native-born Hispanic women receiving at least a high school education dropped the average number of children per woman over her lifetime from over 4 to less than 3. For whites, a high school diploma dropped fertility from around 3 children per woman to less than 2.5. (See Figure 9)

[9] Heim, Mary and Nancy Austin, *Fertility of Immigrant Women in California,* Department of Finance Demographic Research Unit, April 1995, pg. 1.
[10] ibid, pg. 6

Figure 9 - Differences in Fertility Rates by Race/Ethnicity and Educational Attainment



Source: Heim, Mary and Nancy Austin, *Fertility of Immigrant Women in California* Department of Finance Demographic Research Unit, April 1995

This relationship has important implications for California's future population growth. Most of the State's growth over the next 20 years is expected to come from internal growth. Additionally, Hispanics have become the largest single racial/ethnic group in the State. Therefore, there is an important link between changes in educational attainment among Latino women and the rate at which various areas of the state will grow.

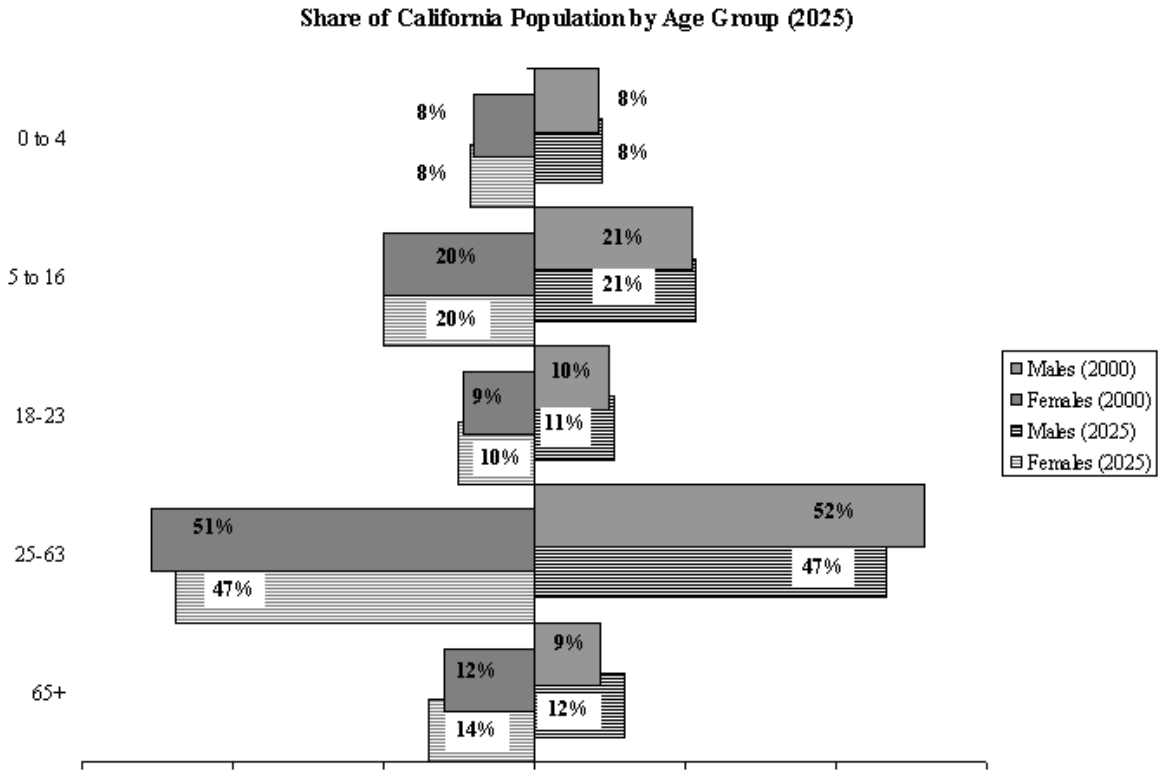
Additionally, fertility rates are a major imbedded assumption that drives predictions of the State's future population. Experts agree that fertility rates for Latinos will fall over time. However, there is substantial disagreement over *how much* they will fall. In an interview with the author, one demographer argued that forecast fertility rates among Latinos are probably too high because they fail to take into account the changes in immigration patterns.[11] Since the end of the immigrant amnesty program, larger shares of immigrants from Mexico now come from urban rather than rural areas or arrive with higher levels of education. Therefore, the fertility rates among this group of immigrants will likely be much lower than the trend over the past 10 years would indicate.

Finally the aging of California's population is another demographic trend of note. According to the State Department of Finance projections, the share of the population over 65 will increase

[11] Interview with Hans Johnson, Demographer, Public Policy Institute of California, July 17, 2000.

while the share of the working age population will decline. Among women, the share over 65 will increase from 12% to 14% and the share of women age 25 to 64 will decline from 51% of the State population to only 47%. The changes for men will be similar. (See Figure 10) These shares will also vary by community and region.

Figure 10 - Share of State Population by Age and Gender



Implications for the State Transportation Plan

The Travel Patterns of Key Demographic Groups

Having discussed the historic trends and future forecast for California, the next task is to consider what the demographic, geographic, and socio-economic trends imply for transportation needs. First the travel characteristics of low-income households will be briefly discussed. Next, the travel behavior of Latino's will be covered with particular attention to what we know about differences in travel behavior accounting for income differences.

A critical point covered in the second section of the paper is the challenge of serving the transportation needs of low-income communities. Not only has poverty been growing more rapidly in California than it has in the country as a whole, but the geographic distribution of poverty is becoming more concentrated.

Table 5a - Comparison of Travel by Low Income Households

	Low Income Households	Single Parent Low Income	Other Households
VMT per Household	11,594	9,203	23,437
Annual Person Miles	9,060	8,927	14,924
Person Miles by Transit	430	547	274
Person Miles Walking	74	118	41
Average Length of Family and Personal Trips	5.94	-	6.86
Average Length of Social and Recreational Trips	8.05	-	11.16

Source: Murakami, Elaine and Jennifer Young, *Daily Travel by Persons with Low Income*, Study based on NPTS data-set, 1997

Table 5b - Comparison of Modes of Travel for Non-work Trips

	Low Income Households	Single Parent Low Income	Other Households
Social Recreational Trips			
By Personal Vehicle	72%	65%	85%
By Transit	4%	5%	1%
Walking	13%	15%	7%
Family & Personal Business			
By Personal Vehicle	82%	78%	92%
By Transit	4%	5%	1%
Walking	9%	12%	4%

Source: Murakami, Elaine and Jennifer Young, *Daily Travel by Persons with Low Income*, Study based on NPTS data-set, 1997

The Complex Nature of Defining "Needs"

Three points should be made with respect to defining the future needs for transportation investment.

1. Substantial uncertainty exists along a number of dimensions. Changes that alter one or more of the fundamental assumptions built into demographic forecasts will result in inaccurate predictions of trends that are basic inputs for travel demand forecasting models.
2. Assuming transportation needs are tied in some fashion to growth of population and travel demand, the perceptions of "growth" is an important consideration.
3. Demographic characteristics will vary among the communities and regions in the State and imply different definitions of transportation needs.
4. Growth of economic output and personal income also has a strong influence on transportation needs.

On the first point of managing uncertainty, the implied proscription is flexibility. This does not imply that planning and forecasting should not be done within a long-range plan. Rather, the objectives of a plan with a 20-year horizon should be tied to scenarios based on a range of

forecasts rather than a single set of predictions from the "best forecast". The practice of scenario planning has been widely used by corporate and military institutions for some time. Planners are increasingly turning to such methods as a response to the risks associated with uncertainty. However, beyond planning, managing uncertainty through strategic planning implies that flexible policies exist to respond to unexpected changes. Addressing policy reforms that increase flexibility is perhaps the greatest challenge in developing a long-range strategic transportation plan for the state.

The perceptions of growth among various political interests within the state should also be considered in preparing the transportation plan. Two maps help illustrate this point in very simple terms. The first shows the expected growth in population each county can expect over the next 20 years in percentage terms. The second shows the expected population growth in terms of total population added. The contrast between the two maps is consistent with how local governments perceive growth. Small counties with rapid growth tend to focus on how fast their communities are growing in percentage terms. Counties in large metropolitan areas on the other hand, tend to focus on the sheer numbers of new constituents they will need to serve in the future. For example, while a doubling of the size of Tracy is shocking for local residents it is tough to equate in terms of transportation needs with the number of new Angelinos added to the population every year.

Additionally, as was discussed in the section outlining transportation trends in the state, the measure selected to summarize growing travel demand can affect the conclusion reached about transportation needs. This implies that the plan should clearly define the benchmarks by which needs will be established. For example, simple benchmarks of existing lane miles and expected VMT are likely to be woefully inadequate for some of the areas of the state that will grow most rapidly in terms of sheer numbers.