Final Technical Report

Research Report 0-5392-2

IMPACTS OF FUTURE DEMOGRAPHIC TRENDS ON TRANSPORTATION PLANNING IN TEXAS

Conducted for the Texas Department of Transportation

In cooperation with the
U.S. Department of Transportation
Federal Highway Administration

By the

INSTITUTE FOR DEMOGRAPHIC AND SOCIOECONOMIC RESEARCH
THE UNIVERSITY OF TEXAS AT SAN ANTONIO
AND
THE CENTER FOR TRANSPORTATION RESEARCH
THE UNIVERSITY OF TEXAS AT AUSTIN

September 2008

Form DOT F 1700.7 (8-72)

<table>
<tr><td colspan="2">1. Report No.
FHWA/TX-06/
0-5392-2</td><td>2. Government Accession No.</td><td colspan="2">3. Recipient's Catalog No.</td></tr>
<tr><td colspan="3" rowspan="2">4. Title and Subtitle
Impacts of Current and Future Demographic Change on Transportation Planning in Texas: Final Technical Report</td><td colspan="2">5. Report Date
08/2008</td></tr>
<tr><td colspan="2">6. Performing Organization Code:</td></tr>
<tr><td colspan="3">7. Author(s): Cline, Michael E., Steve H. Murdock, Jolanda Prozzi, John McCray, and Robert Harrison</td><td colspan="2">8. Performing Organization Report No.
0-5392-2</td></tr>
<tr><td colspan="3" rowspan="2">9. Performing Organization Name and Address
The Institute for Demographic & Socioeconomic Research
The University of Texas at San Antonio,
1 UTSA Circle
San Antonio, TX 78249-0704</td><td colspan="2">10. Work Unit No.</td></tr>
<tr><td colspan="2">11. Contract or Grant No.
0-5392</td></tr>
<tr><td colspan="3" rowspan="2">12. Sponsoring Agency Name and Address
Texas Department of Transportation
Research and Technology Implementation Office
PO Box 5080
Austin, TX 78763-5080</td><td colspan="2">13. Type of Report and Period Covered
Technical Report – 09/2007 – 08/2008</td></tr>
<tr><td colspan="2">14. Sponsoring Agency Code</td></tr>
<tr><td colspan="5">15. Supplementary Notes Project performed in cooperation with the Texas Department of Transportation and the Federal Highway Administration. This report is part of an expanded study: Impacts of Future Demographic Trends on Transportation Planning in Texas. The methods and findings of this study are summarized within this research report (0-5392-2), and are presented in full in Technical Research Reports 0-5392-1 and 0-5392-3.</td></tr>
<tr><td colspan="5">16. Abstract: This report provides an overview of the project objectives and methods and summarizes key findings about the demographic trends impacting Texas transportation. In addition, this report summarizes key findings concerning the use of demographic data at TxDOT and related agencies and provides a technical guidebook for the One-Stop Demographic Data Analysis Tool created as part of this study.</td></tr>
<tr><td colspan="3">17. Key Words
demographic data, statistics, transportation planning, population, database</td><td colspan="2">18. Distribution Statement
No restrictions. This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161, www.ntis.gov</td></tr>
<tr><td>19. Security Classif. (of this report)
unclassified</td><td colspan="2">20. Security Classif. (of this page)
unclassified</td><td>21. No. of Pages
88</td><td>22. Price</td></tr>
</table>

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Disclaimers

Acknowledgments

The authors recognize the assistance of the following individuals who served on the project monitoring committee for FY 2008, including:

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Project Director: Gregory O. Lancaster, Transportation Programming and Planning Division
Project Advisors: Gilbert Sanchez (San Antonio District), John Sabala (Government & Public Affairs Division), and Sarah Stroman (Environmental Affairs Division)

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Chapter 1 : Introduction and Overview of Research

The Texas Department of Transportation (TxDOT) utilizes population data extensively, primarily in referencing data on population size, employment, and income in various analyses; however, data on population characteristics could be usefully expanded to more effectively guide district and state-level policy development. This project was intended to improve TxDOT planning by: 1) examining the broad implications of demographic change for Texas' transportation system and TxDOT; 2) reviewing the demographic data use and needs for transportation analysis; and 3) developing demographic data sets in easy to use forms.

The research was divided into three major phases. In the first phase, the research team reviewed the uses of demographic data at TxDOT and in related agencies. This review consisted of an inventory of demographic data resources available to and useful for transportation planners; interviews and a survey of a cross-section of TxDOT and Metropolitan Planning Organization (MPO) staff. This phase of the research was completed in order to understand how demographic data is used and to uncover any needs for data content or access. The results of this research were reported in *Research Report 0-5392-1: Demographic Data Use and Demographic Data Needs at the Texas Department of Transportation and Related Agencies[1].* These findings helped guide the development of a CD-ROM based demographic database program – *The TxDOT One-Stop Demographic Data Analysis Tool* during the second phase of the research. The program provides a central location from which demographic data could be accessed with relative ease. The initial program, which included data for TxDOT Districts and Texas Counties was completed at the end of Year 2 and distributed in Year 3. In addition, the *One-Stop Demographic Data Analysis Tool* was modified in Year 3 to include data for places of 5,000 or more people, Census Tracts, and Urbanized Areas; to add projections of selected socio-economic characteristics; and to augment program functionality. Finally, the research team reviewed demographic trends and their implications for the demand for and delivery of transportation services in Texas. The result of this review was reported in *Research Report 0-5392-3: Impacts of Current and Future Demographic Change on Transportation Planning in Texas [2].*

1.1 Demographic Data Use at TxDOT and Related Agencies

In addition to cataloguing demographic data resources during year 1, the research team interviewed a small sample of TxDOT and select MPO staff in order to understand how demographic data are used for transportation planning and other uses and to uncover any gaps in data availability and any other limitations transportation professionals may have in using demographic data. In addition, the research team surveyed a sample of TxDOT and MPO staff that was identified as potential demographic data users. A full accounting of the methods used and the results of the interviews and survey are reported in *Research Report 0-5392-1*[1]. In summary, demographic information is important for planning and other purposes at TxDOT and related agencies but the number of people using demographic data on a regular basis range from between 50 and 60 persons. Demographic information is incorporated mostly within transportation planning and in environmental justice analysis. How demographic data are accessed and incorporated into models, plans, and other documents are not always consistent and limited data use means that resources accessed previously may be forgotten. The information from these interviews and surveys informed the development of the *One-Stop Demographic Data Analysis Tool* and the assessment of demographic trends.

1.2 The Implications for Demographic Change on Transportation in Texas

Those interviewed and surveyed were also asked their opinions about demographic trends that are impacting transportation in Texas. From the perspectives of those interviewed and surveyed, the most pressing demographic trends impacting transportation in Texas include: population growth, suburban population growth, dispersion of employment nodes within metropolitan areas, and increases in the number of vehicles per household. Some of these trends, among others, were explored by the research team and reported in *Research Report 0-5392-3: Impacts of Current and Future Demographic Change on Transportation Planning in Texas [2]*. In order to emphasize the likely demographic trends and their implications for transportation in Texas, the Executive Summary of *Research Report 0-5392-3* is repeated in the next chapter of this report.

1.3 The One-Stop Demographic Data Tool

In Years 2 and 3 of the research project, the *One-Stop Demographic Data Analysis Tool* was created and revised. The *One-Stop Demographic Data Analysis Tool* is designed to provide TxDOT personnel and other professionals quick and easy access to general demographic information for selected geographic areas in Texas and serves as a starting point for reporting and general trend analysis. It is intended for professionals who may not work with demographic data on a daily basis. In addition, it can be useful to other data users who may wish to use it as a way to report on and compare demographic characteristics of selected areas. The CD-ROM includes selected data items from the 2000 Census; 2007 population estimates and population projections to 2040 from the Texas State Data Center; and highway, vehicle miles traveled (VMT), and vehicle registration data from TxDOT. Reports can be generated for one or more counties, one or more districts, or for the state as a whole. In addition, the latest version of the *One-Stop Demographic Data Analysis Tool* includes information for places, Census Tracts, and Urbanized Areas (where data is available). Since research methods and results from the research related to two of the three phases of the research were reported in the aforementioned reports, this report is primarily devoted to providing an overview of the *One-Stop Demographic Data Analysis Tool* and the methods used to develop and expand this database program. An overview of the methods for developing the *One-Stop Demographic Data Analysis Tool,* the data content, and suggestions for future development are included in Chapter 3.

Chapter 2 : Summary: Impacts of Current and Future Demographic Change on Transportation Planning in Texas

The goal of one phase of this research was to examine the broad implications of demographic change for Texas' transportation system and TxDOT. The results of this research were reported in *Research Report 0-5392-3: Impacts of Current and Future Demographic Change on Transportation Planning in Texas [2]*. The summary of the findings from this report are repeated here. In general, the implications for demographic change were examined by applying historic rates of transportation related factors onto two sets of population projections – one that assumes that the rapid population growth experienced by Texas during the 1990s continues through 2040 (Scenario 1.0), and another which assumes that a more moderate pace of growth experienced during the post-2000 period continues through 2040 (Scenario 2000-2004). Although the future will not be determined by demographic changes alone, the goal of the research was to understand the potential impacts of demographic change. In sum, the findings from this phase of the research point to several major challenges that have different implications for transportation policy. Among the major findings in the report are the following:

Relative to General Patterns of Population Growth and Distribution

- The State of Texas will continue to experience rapid population growth, increasing in size from 20.9 million people in 2000 to between 43.6 million and 51.7 million. This is an increase of between 109 and 148 percent between 2000 and 2040.
- Despite continued population growth overall, some areas will grow more rapidly than others while some may even experience population decline. As a result, over 70 percent of the population will live within the 5 largest TxDOT districts of Houston, Dallas, San Antonio, Austin, and Fort Worth by 2040 (up from 64 percent in 2006). During the same period, from 2 to 6 districts will experience population declines under the two population projection scenarios examined.
- By 2040, the population will become even more metropolitan oriented than it is today with an estimated 91 percent of the population living in metropolitan areas by 2040.
- If recent trends of suburban population growth continue, the proportion of the population living in suburban counties will increase to 36 percent in 2040 from 18 percent in 2000.
- The magnitude of the changes projected will substantially increase transportation demand especially in suburban areas of the State where growth is already challenging the transportation infrastructure. In rural areas, more stagnant patterns of growth, and in some cases decline, are likely to lead to challenges in maintaining roadway systems with reduced populations, and related resources.

Relative to Changing Population and Household Characteristics

- The population 65 years of age and older will increase markedly compared to the population as a whole from 9.9 percent of the total population in 2000 to about 16 percent of the population by 2040. Whereas the total population will increase from between 109 to 148 percent, the population 65 years of old will increase from between 220 and 273 percent from 2005 to 2040. Thus, the total population 65 and older will grow from 2.2 million in 2005 to between 7.1 and 8.2 million in 2040.

- During the same time, Texas population will become more racially and ethnically diverse than it is today. By 2040, the Texas population is projected to be between 24 and 25 percent Anglo, about 8 percent African-American, 58-59 percent Hispanic, and about 9 percent of Other racial/ethnic groups. TxDOT districts will vary in how rapidly they diversify but the percent of the total population that is Anglo will decrease in every district under each of the two scenarios presented in this report.

- In general, recent trends in households have shown their numbers to be growing faster than the total number of people until the 1990s, to be decreasing in size and to be showing larger percentage increases in non-family than in family households with the largest increases of all in single-adult family households. The extensive growth of the Hispanic population which has larger households and households that are more likely to be made up of married-couples is projected to largely reverse the pattern of the 1990s. At the same time, because of the differences in the distribution of households by race/ethnicity across income categories, the socioeconomic affect of the projected household change is to increase the number of low income and decrease the number of high income households. Household change in Texas will likely have both direct effects on factors such as transportation because family households tend to use fewer services per person than non-family households and indirectly because non-family households tend to have lower levels of socioeconomic resources.

- Overall, the projected change in the race/ethnicity, age, and household characteristics of the Texas population may impact transportation because non-Anglos are less likely to own vehicles and drive fewer miles than Anglos; because slower growth is projected to occur in younger than older populations resulting in potential changes in off-peak travel volumes and increased demand for medical and public transportation; and because the larger household size of non-Anglo households will decrease the higher rate of growth in the number of households which might otherwise occur while reducing per-household resources to pay for transportation and other services.

Relative to Specific Dimensions of Transportation Demand and Use

The demographic trends summarized above are also examined in the research report relative to specific dimensions of transportation. Those examined include impacts on the commuting patterns of workers in Texas, effects on the number of drivers and driver-related crashes, the effects on vehicle ownership and transportation expenditures, the implications for public transportation, and the implications for TxDOT's own workforce recruitment and other employment-related activities.

Among the key findings related to these factors are the following:

- Population growth will lead to a larger number of drivers using Texas roads and to an aging and increasingly diverse population of drivers. Between 2000 and 2040, the number of drivers will increase by 22.2 million (165.2 percent) under the high (1.0) scenario and by 16.8 million (124.9 percent) under the slower (00-04) growth scenario, rates of growth expected to exceed the 148 and 109 percent growth projected for the population.

- The number of drivers aged 65 years and older will increase in conjunction with an aging population. These older drivers will increase from an estimated 1.8 million in 2005 to between 5.7 and 6.6 million drivers. This is an increase of between 218 and nearly 268 percent, changing the percentage of all drivers who would be 65 years of age or older from 12 percent of all drivers in 2005 to an estimated 19 percent of all drivers by 2040.

- The characteristics of drivers will also diversify from 45 percent non-Anglo in 2005 to between 72 and 73 percent non-Anglo by 2040 with between 55 and 56 percent of all drivers being Hispanic. Similar to the population characteristics as a whole, the proportion of all drivers who will be Hispanic will be especially high at younger ages. The percent Hispanic exceeds 66 percent among drivers less than 35 years of age, 63 percent for drivers 35-44, and over 50 percent among drivers 45-64 years of age but only 33 percent among drivers over 65 years of age.

- From 2000 to 2040, the number of commuters in Texas will increase substantially from 9.2 million in 2000 to between 18.7 and 22.2 million (percentage increases of between 104 and 142 percent) by 2040 and the proportion living and working in the same county will decrease from 78 to 70 percent. Although central city counties will continue to have the largest number of commuters in the future under either projection, under both projection scenarios the largest numeric and percentage changes will be in the number of commuters from large suburban county resident areas. By 2040 (under either projection scenario), at least 3l percent of all commuters (compared to less than 17 percent in 2000) will reside in suburban counties, an increase of nearly 5.5 million and 350 percent from 2000 to 2040.

- Demographic change will affect the total number of miles driven in personal occupancy vehicles. A larger proportion of people in the driving ages will mean that there will be more vehicle miles of travel (VMT) in the aggregate. Demographic change will mean that VMT will increase from 184 billion in 2005 to between an estimated 329 and 456 billion VMT by 2040, an increase of between 79 and 148 percent. Because drivers age 65 and older tend to drive fewer miles, increases in the proportion of drivers in these age groups will decrease daily VMT per driver slightly.

- The number of crashes will also be affected by demographic change. Because the rate of crashes decreases with age, the projected aging of the population will lead to lower crash rates but to substantial increases in the number of crashes among particular age groups. The number of drivers involved in crashes will increase from between 91 to 127 percent from 2005 to 2040, less than the 107 to 144 percent increase in the number of drivers. At the same time, the percentage increase in the number of drivers 65 years of age and older involved in fatality crashes will increase by between 231 percent and 284 percent (compared to rates of growth in the number of such drivers of between 218 and 268 percent).

- The results of the analysis of expenditures indicates that unless changes occur which alter the income and related expenditures of the most rapidly growing segments of Texas population--older and more diverse population groups--the net effect of population change will be to reduce the per household rates of expenditures on transportation in Texas compared to those in 2000. According to these projections, although transportation expenditures will increase more rapidly than total household expenditures, the increases in transportation expenditures (in 2000 constant dollars) will be less than the projected increases in the number of households of between 128 and 167 percent. Thus transportation expenditures per household will decline from roughly $7,600 per household in 2000 to approximately $7,100 in 2040 (in 2000 constant dollars), a decline of $500 dollars, or 7-8 percent in real dollar terms. When examined by type of transportation expenditure, it is evident that the largest projected increases in expenditures under the projected population structure of Texas is projected to occur in public transportation which increases between 125 and 163 percent from 2000 to 2040 compared to the 114 to 151 percent increases in total transportation expenditures. In sum, except for expenditures for public transportation, the projected population change will likely reduce expenditures on transportation in Texas at the same time that increased demand may increase transportation costs.

- Demographic change will increase the number of persons who will be dependent on public transportation. Roughly 93 percent of all households had one or more vehicles available to the household in 2000 but the availability varies by age and race/ethnicity. Whereas in 2000 only 6 percent of all households with a householder 15 to 64 did not have a vehicle available to the household, that percentage varied from 3.1 percent of Anglo households to 13.9 percent of Black households and 8.8 percent of Hispanic households and 5.6 percent of households with a householder who was from an Other racial/ethnic group. Similarly the percentage of households without a vehicle available among households with a householder who was 65 years of age or older varies from 9.7 percent for Anglo households to 28.0 percent for African-American and 25.8 percent of Hispanic households with an elderly householder. If such trends continue, by 2040 there will be between 1.2 and 2.0 million households (10 percent) without vehicles compared to 544,585 in 2000 (7 percent), an increase of between 218 and 272 percent.

- The aging of the population coupled with higher rates of disability among some non-Anglo populations will lead to increased levels of demand for specialized transportation. Projections of the number of disabled persons suggest that such demand will exceed the rate of growth of population as a whole with the number of individuals with out-of-home disabilities who are 16 to 64 years of age increasing by between 141 and 182 percent from 2000 to 2040 while the number of elderly with disabilities increases by between 277 and 334 percent.

- Because of differences in ridership between Anglo and non-Anglo groups, demographic changes will mean that the total number of public transit riders on the journey to work could increase from 162 per 1,000 in 2000 to between 417 and 497 riders per 1,000 in 2040, by between 156.7 and 206.4 percent.

- Although technological, contracting and other factors may lead to less sharp increases in the number of TxDOT employees in the future, if the number of TxDOT workers continues to track population change, TxDOT could need between 17,400 workers under a projection of slower population growth (the 2000-2004 scenario) and increased efficiency relative to population and 32,000 assuming the same ratios of TxDOT employees to population as in 2006 and a higher level of projected population growth (1.0 scenario). Although this is a wide range, it is likely that TxDOT workforce will show at least some increases and will have extensive replacement due to retirement. If TxDOT wishes to have a workforce that reflects the population of Texas, extensive efforts will be needed to recruit more women and non-Anglo professionals at all job levels. For example, to reflect the State's racial/ethnic categories by 2040 even with the current legislatively capped size of 14,700, TxDOT would need to replace approximately 5,000 Anglos with an equal number of Hispanics. TxDOT has implemented an extensive program to meet these needs but it is clear that the agency will face extensive challenges in both meeting its technical requirements and in attaining a workforce that better reflects the Texas population.

Conclusions and Implications

The overall findings suggest several broad conclusions with extensive implications. These conclusions and implications are presented below. In presenting these broad conclusions and implications, the authors recognize that a large number of economic, social, political, and other factors may alter them and that their perspective is limited by their experience and academic bases. In particular, the authors are primarily demographers and do not have the technical base of knowledge regarding transportation infrastructure possessed by many TxDOT professionals. In sum, these conclusions should be examined with full realization of the limitations of the authors. We present these as major challenges likely to impact Texas and TxDOT.

The challenges include:

The Challenge of Growth

Although it is obvious, as we examine the implications of other dimensions of demographic change, we tend not to pause sufficiently to recognize the significance of population growth in Texas. Texas past and projected future population growth is simply extraordinary but not unprecedented. Texas population roughly doubled in the 40 years from 1930 to 1970, a period which included the great depression and both WWII and the Korean War, and doubled again in the 35 years from 1970 to 2005. As a result, the slower of the two levels of projected growth which more than doubles the population of the State to nearly 44 million by 2040 would not be an unprecedented level of growth relative to Texas historical patterns. At the same time, it would entail adding another nearly 23 million people to Texas population. The 1.0 scenario would increase the population by roughly 1.5 times the population in 2000 and add nearly 31 million new persons to Texas 2000 population, and this growth, although extensive, is possible given Texas recent demographic history.

Such magnitudes of growth simply stress, and in some cases over stress governmental structures. Although a level of growth in transportation infrastructure equal to the rate of projected population growth is neither likely, nor perhaps even possible, a level of transportation infrastructure development equal to doubling present capacity would represent a phenomenal effort. Technological and other developments will alter the level of demand and the resources necessary to address them but it is essential to begin any examination of what population change means for transportation by simply recognizing the sheer magnitude of the changes needed to simply meet population-growth related demands.

What is equally important relative to this challenge is that of recognizing that meeting the transportation challenges may well be the key to the achievement of the levels of growth projected for Texas. Population projections like those made in other areas are made under the assumption that everything else (including economic development) will occur as it has in the past. If transportation infrastructure cannot be provided as needed the transportation system could, together with other factors, lead to a slowdown in Texas economic and demographic growth. It is essential then to realize that meeting the transportation challenge resulting from population growth may well be essential to the demographic and economic development of Texas.

The Challenge of Population Distribution

The challenge of where population growth is occurring is also significant. Growth is moving increasingly to suburban areas while at the same time, nonmetropolitan areas are, in many cases, struggling to maintain their populations. Among the challenges created by these patterns of population distribution is that of providing levels of services in rural areas sufficient to maintain the transportation infrastructure while at the same time meeting the demands for new infrastructure in the most rapidly growing areas of Texas.

Among the other challenges to TxDOT may be that of evaluating whether its organizational and geographic bases of service delivery require a re-evaluation given the realities created by past patterns of growth and those likely to characterize the future and considerations of the challenge of actuating any changes that are identified as necessary.

The Challenge of an Aging Population

The aging of the Texas population presents its own set of challenges. The number of elderly will substantially increase the number of older drivers and with that increase the number of crashes and the number of people requiring specialized transportation for those with disabilities. However, there is yet other challenges created by an aging population that is more likely to be on fixed incomes and hesitant to increase their level of household expenditures. In those areas where high proportions of the elderly live, or move into to live, the ability to raise additional resources for transportation (and other) services may be more difficult. Maintaining a mix of services that ensures the support of the elderly population may be increasingly important in the coming years.

The Challenges of Increased Diversity

Many of the factors impacted by diversity have been identified in this volume but others are more difficult to quantify but require some discussion. Among these are the need to not only recognize but to incorporate more inclusive cultural, linguistic, and social practices in TxDOT's and other organization's corporate cultures. This is not an evaluation of existing patterns in TxDOT, because no such evaluation has been completed, but rather a recognition that changes in racial/ethnic composition of the magnitude identified above will likely require corporate change in both public as well as private-sector entities throughout Texas.

The challenges of diversity also include elements beyond the control of TxDOT but are clearly extensive challenges for all of Texas. Public and private-sector organizations in Texas with large technical components in their workforce activities need access to well educated non-Anglo populations. Texas is presently producing an insufficient supply of such workers in part because dropout levels and other factors remain very high. This is a very extensive challenge because of the magnitude and the current differentials in education. For example, in Texas in 2000, whereas 30 percent of adult Anglos had a college degree, only 15.3 percent of African-Americans and 8.9 percent of Hispanics had such degrees. Unless the State is able to increase the number of non-Anglo engineering and other graduates substantially it will be difficult for agencies such as TxDOT to reach their diversity goals.

Even more important, unless the most rapidly growing segments of the population obtain the educational levels necessary to compete effectively in the increasingly international labor force, Texas is likely to become poorer and less competitive (Murdock et al. 2003). The historical, discriminatory and other factors that have led to such educational and related socioeconomic differences must not be allowed to limit the production of an educated workforce that can create a competitive and more prosperous Texas.

The challenges created if Texas fails to educate and create a competitive workforce are extensive for transportation and other services as well. One of the most basic challenges is that the increased demand for services created by the growth in the size of the population may not be matched by a commensurate increase in the resources to pay for such services. This was noted above in relationship to household expenditures on transportation but its ramifications are extensive.

The lack of sufficient financial resources to pay for service demands may lead to continuing budget short falls and to a need to search for alternative forms of funding for transportation infrastructure. At the same time, the lack of resources in large segments of the population may create resistance to solutions that require larger household expenditures coupled with resistance to the provision by a public agency of different levels of services to different segments of the public, no matter how they are financed.

The Challenge of An Aging and Diverse Population

There are also potential impacts likely to result from the concurrence of both aging and diversity at the level projected for the Texas population. Texas projected growth is likely to produce an older population that is largely Anglo coupled with a younger population that is largely non-Anglo, particularly Hispanic. This composition seems likely to accentuate support for some types of transportation services, lead to conflicts in regard to others, and to lead to patterns that interactively limit yet other transportation services.

The fact that non-Anglo populations are more likely to live in zero vehicle households and the elderly to be somewhat less likely to drive and to have increasing numbers who will need specialized transportation may lead to an increase in political support by both groups for public transportation. A coalition based on need may lead to areas of cooperation between these groups that overcome racial/ethnic and age differences and accentuate the support for public transportation.

For a second set of services, the fact that non-Anglos are likely to be younger and needing more transportation services related to work and family activities that require additional transportation expenditures while the Anglo elderly are at life stages that make them hesitant to increase expenditures and less likely to use such services may lead to opposition between these groups in areas where there are few perceived direct benefits for the elderly. In such circumstances the confluence of age and race/ethnicity differences may lead to conflicting perspectives.

On yet a third set of factors, the aging Anglo and younger non-Anglo populations may come to act concurrently to limit services. Such might be the case in service areas that are largely used by middle-aged and middle class Anglo constituencies. Although this set of individuals may well have the resources to directly pay for the services they wish to obtain, the financial constraints of the budgets of many elderly and non-Anglo households may make both population segments hesitate to support services that are not directly beneficial to them and that they see as deflecting a public agency from activities that promote more generalized public services.

Chapter 3 : Overview of One-Stop Demographic Data Analysis Tool

The *One-Stop Demographic Data Analysis Tool* was designed to be an easy to use database program that provides a singular source of basic demographic and other statistics about selected areas in Texas. The database program is a free standing application programmed in the Microsoft Visual Basic.NET language utilizing .NET 2.0 frameworks. The program has an embedded SQL Server database that allows quick access to data with no server access necessary. Reports are generated using Microsoft's Reporting Services allowing users to easily export professional documents into both Adobe Acrobat and Microsoft Excel forms. While Internet access is not required to create demographic reports, it is necessary to have Internet access in order to register the product and utilize the embedded hyperlinks throughout the application. A screen-shot of the final version of the *One-Stop Demographic Data Analysis Tool* is shown in Figure 3-1. The following chapter provides an overview of the process taken to develop, evaluate, and modify the *One-Stop Demographic Data Analysis Tool*.

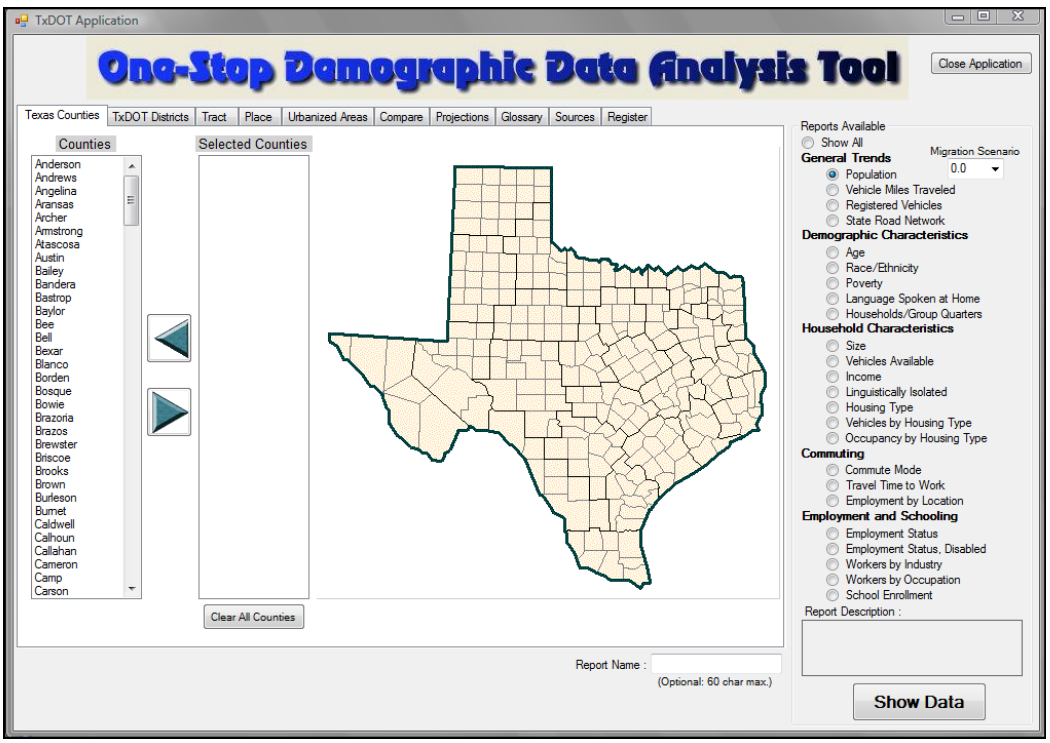

Figure 3-1: Screenshot of One-Stop Demographic Data Analysis Tool (Version 3)

3.1 Initial Design of Database Program

In Year 1, the research team interviewed and surveyed a cross section of TxDOT and Metropolitan Planning Organization (MPO) staff in order to identify demographic data use and needs. One major finding of this research was that "…a number of demographic data sources are available to demographic data users [for transportation planning]; however, users do not always know where to locate those sources or how to evaluate their usefulness [1]." In addition to the survey of data users, the research team reviewed similar database programs created for other state Departments of Transportation and catalogued transportation related demographic data sources. With an understanding of demographic data use and needs and as a result of the additional research completed in Year 1, the research team developed the initial version of the *One-Stop Demographic Data Analysis Tool*. A draft of Version 1 (P1) was completed at the end of February 2007 and evaluated by a cross section of TxDOT data users in March 2007. The results of the evaluation were used to refine and complete a final Version 1 of the program (P2). This was completed at the end of May 2007 and distributed to TxDOT and MPO staff in February of 2008. A screenshot of Version 1 is shown in Figure 3-2. This version included data relative to TxDOT Districts and Texas Counties accessible through two selection tabs; a tab that included a glossary of terms and listing of sources of interest to transportation planners; and a tab that allowed users to register their copy with the Institute for Demographic and Socioeconomic Research (IDSER) at the University of Texas at San Antonio.

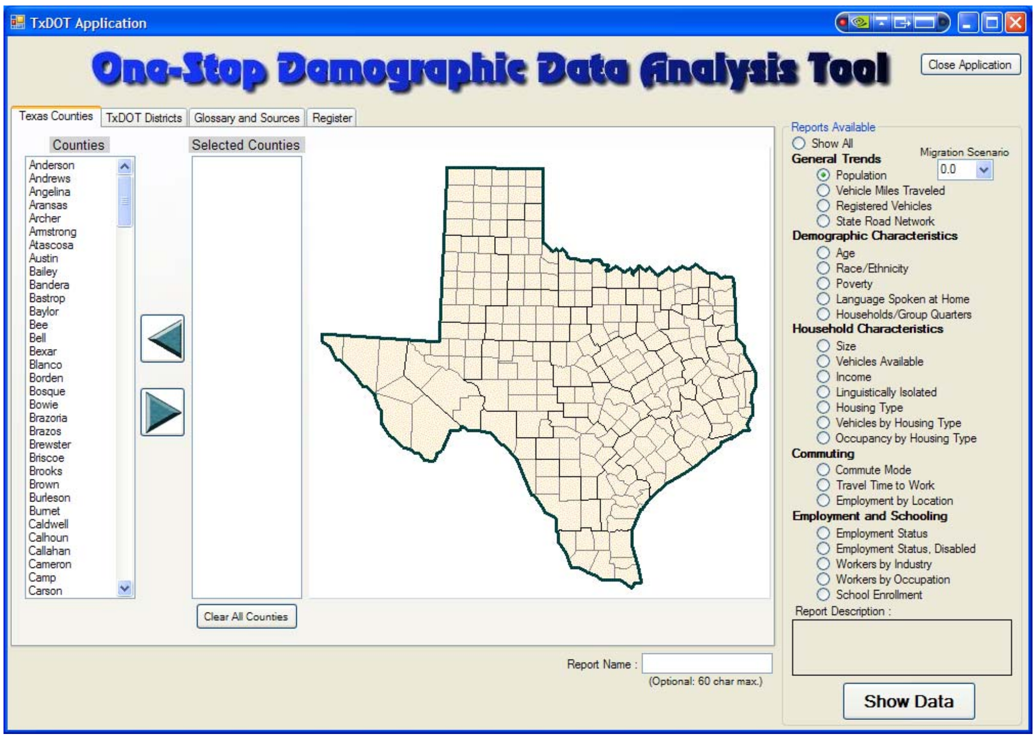

Figure 3-2: Screenshot of One-Stop Demographic Data Analysis Tool (Version 1)

3.2 Program Evaluation and Revision

The research team revised the *One-Stop Demographic Data Analysis Tool* in Year 3 in order to expand the program's data content and augment program functions. Two versions were created in Year 3. The first revision [Version 2(P3)] added data for Census Tracts and Places of 5,000 or more. In addition, another tab was added that allowed users to compare up to five different user-selected areas. A draft of Version 2 was distributed to the Project Management Committee only. Data for Urbanized Areas and projections of selected demographic and socioeconomic characteristics for Texas Counties, TxDOT Districts, MSAs, and COGs, were added for Version 3. A draft of Version 3 was evaluated by a cross section of TxDOT and MPO data users in a workshop held in July 2008. In addition, the research team interviewed registered users of Version 1A final copy of Version 3 (P4) was prepared for delivery to TxDOT at the end of August 2008. These end-user interviews and evaluations from the draft evaluation conference were used to revise the Version 3 draft. Table 3-1 provides an overview of the data content and major functions available in each of these three versions, while Figure 3-3 highlights the major milestones in the program's development. During the development and revision of the One-Stop

Demographic Data Analysis Tool, the research team completed research relative to the other objectives of the research project. This included *Research Report 0-5392-1: Demographic Data Use and Demographic Data Needs at the Texas Department of Transportation and Related Agencies* and *Research Report 0-5392-3: Interim Technical Report: Impacts of Current and Future Demographic Change on Transportation Planning in Texas*.

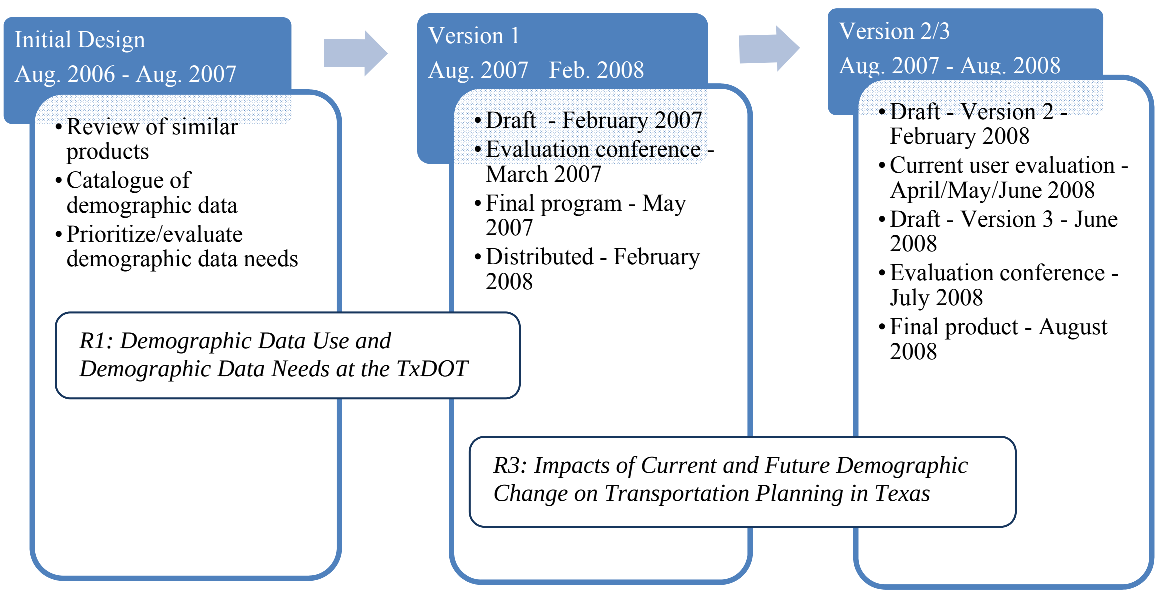

Figure 3-3: Program Development Timeline

Table 3-1: Geographic and Data Content and Major Functions by Program Version

Ver.	Geographies	Content	Major Functions
1	• Counties • TxDOT Districts	• Selected Census2000 Population & Household Characteristics • Population Estimates (2005) • Population Projections (2010-2040) • TxDOT Registered Vehicles, Road Miles, VMT • Links to transportation related websites • Glossary of demographic terms	• Data reported for 1 or more areas (combined) • Select population projection migration scenario • Print reports on printer or export to excel or .pdf file
2	• Counties • TxDOT Districts • Places (5,000+) • Census Tracts	• Selected Census2000 Population & Household Characteristics • Population Estimates (2005) • Population Projections [total population (2010-2040)] • TxDOT Registered Vehicles, Road Miles, VMT • Links to transportation related websites • Glossary of demographic terms	• Data reported for 1 or more areas (combined) • Select population projection migration scenario • Print reports on printer or export to excel or .pdf file • Compare up to 5 user-selected areas
3	• Counties • TxDOT Districts • Places (5,000+) • Census Tracts • Urbanized Areas • MSAs • COGs	• Selected Census2000 Population & Household Characteristics • Population Estimates (2005) • Population Projections (2005-2040) • Projections of household and demographic characteristics • Historical total populations (1980, 1990) • TxDOT Registered Vehicles, Road Miles, VMT • Links to transportation related websites • Glossary of demographic terms	• Report data for 1 or more areas (combined) • Select population projection migration scenario • Compare up to 5 user-selected areas • Print reports on printer or export to excel or .pdf file • Select and report projected household and demographic characteristics by areas (county, district, MSA, COG)

3.3 Program Overview

The following pages provide screenshots of selected features of the *One-Stop Demographic Data Analysis Tool (Version 3.0)*. Overviews of these functions are provided in the user guide included in the Appendices of this report.

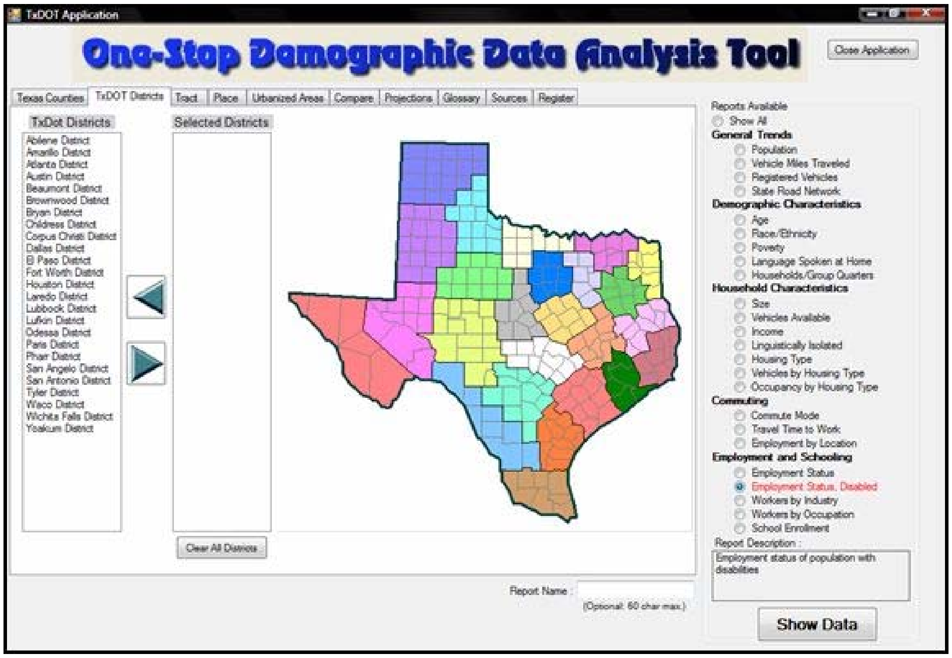

Figure 3-4: TxDOT District Tab

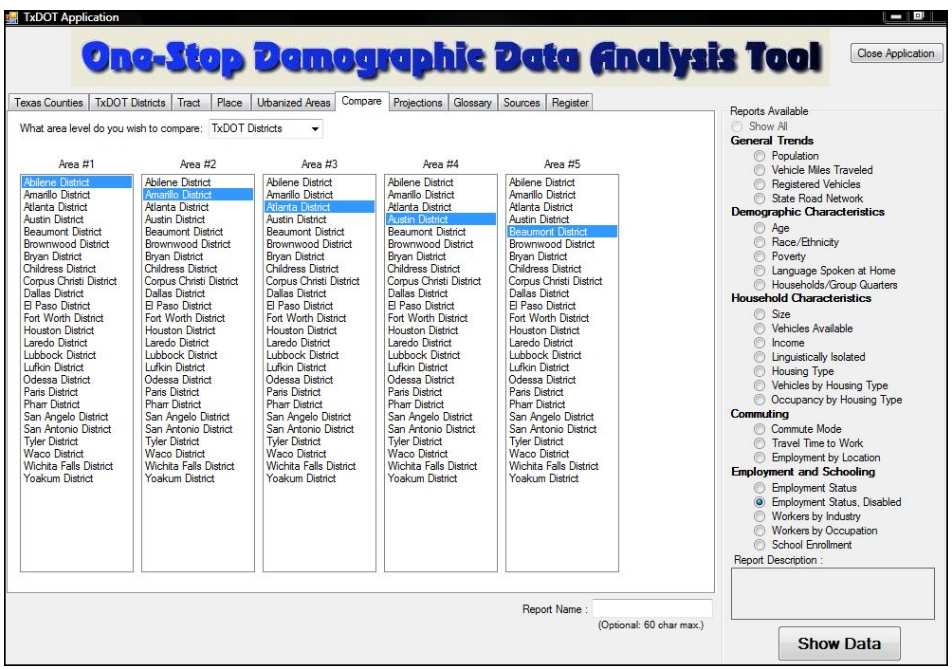

Figure 3-5: Area Comparison Tab

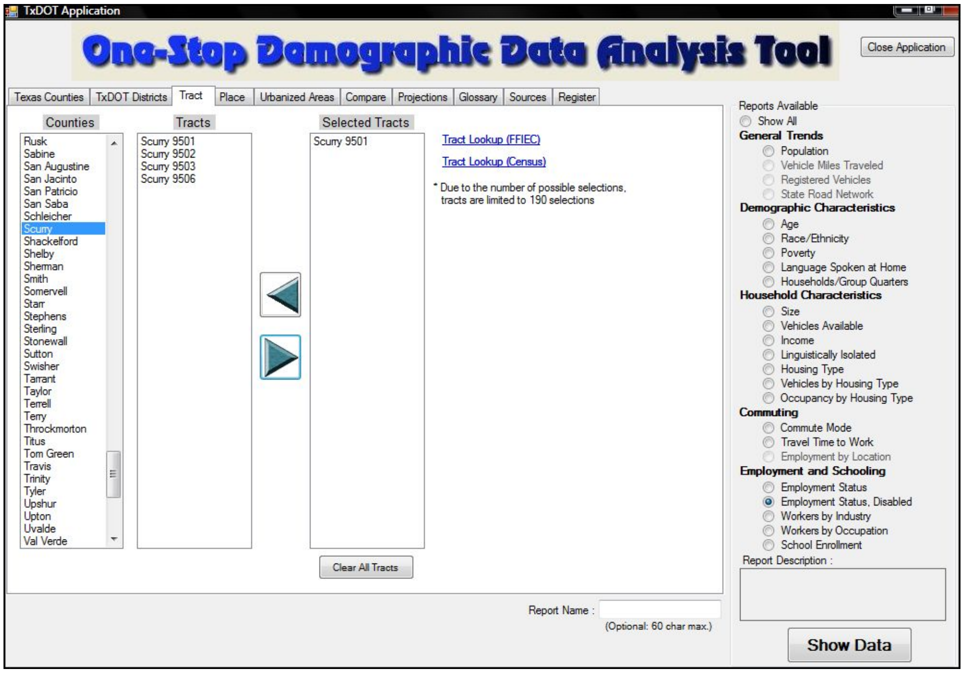

Figure 3-6: Census Tract Selection Tab

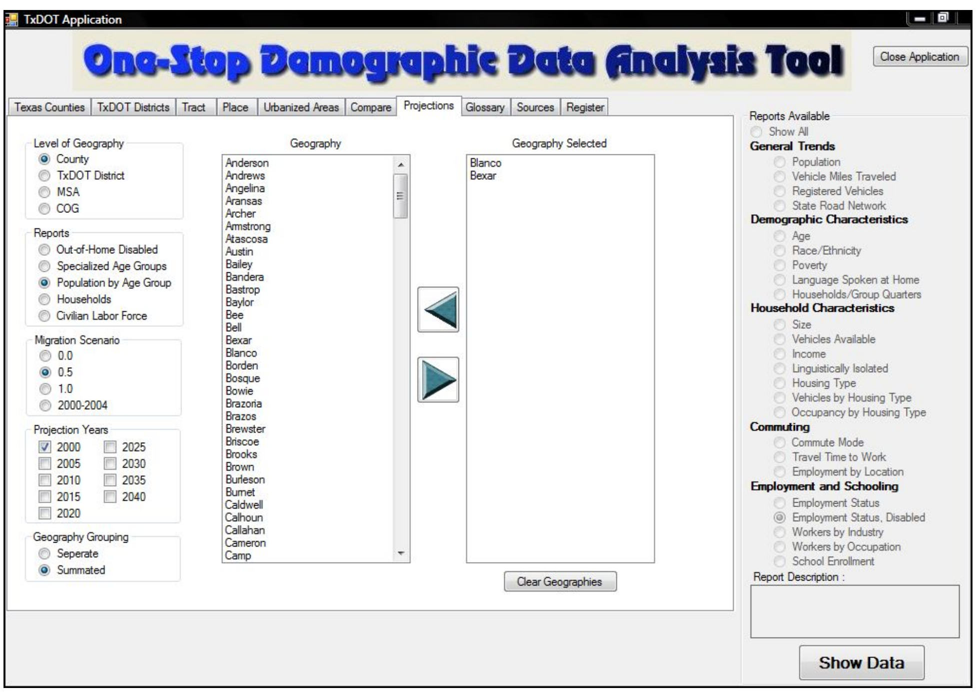

Figure 3-7: Projections Tab

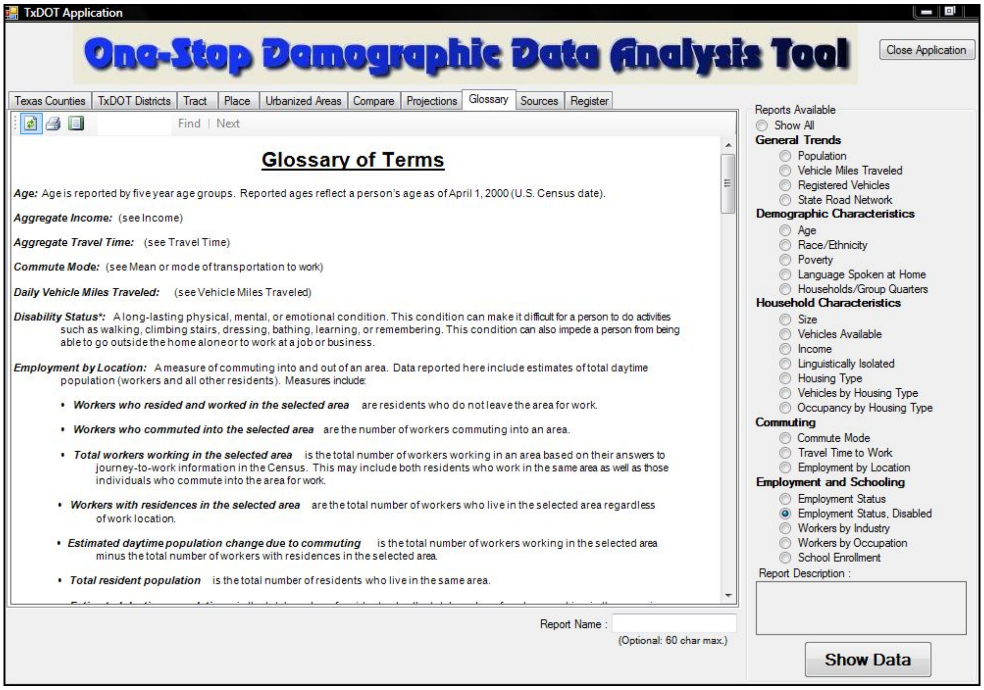

Figure 3-8: Glossary of Terms

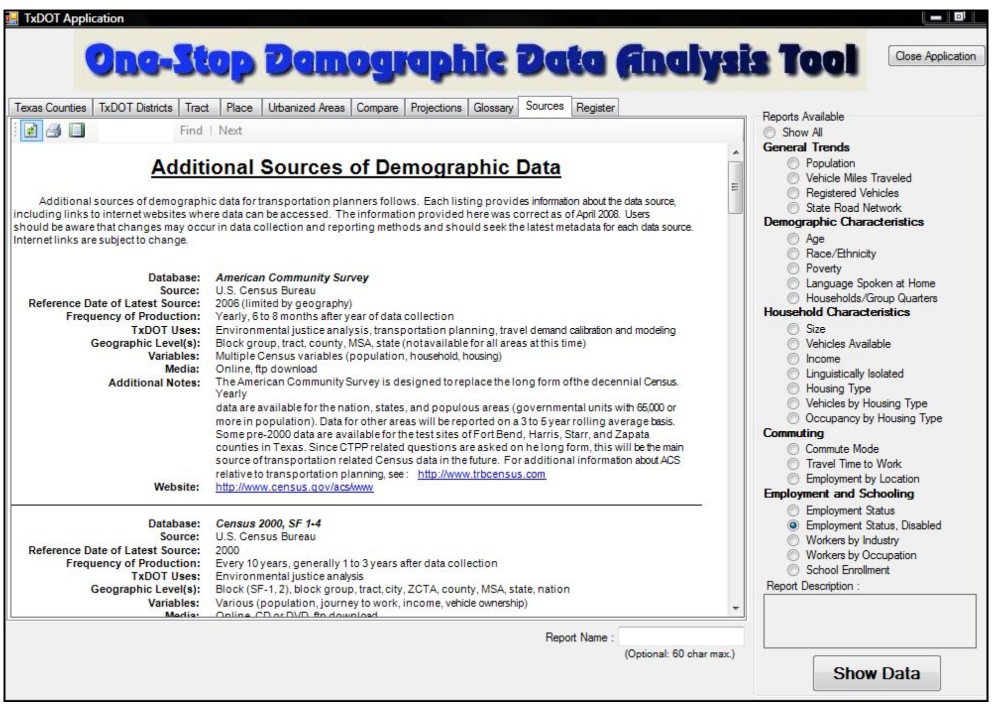

Figure 3-9: Links to Additional Data Sources

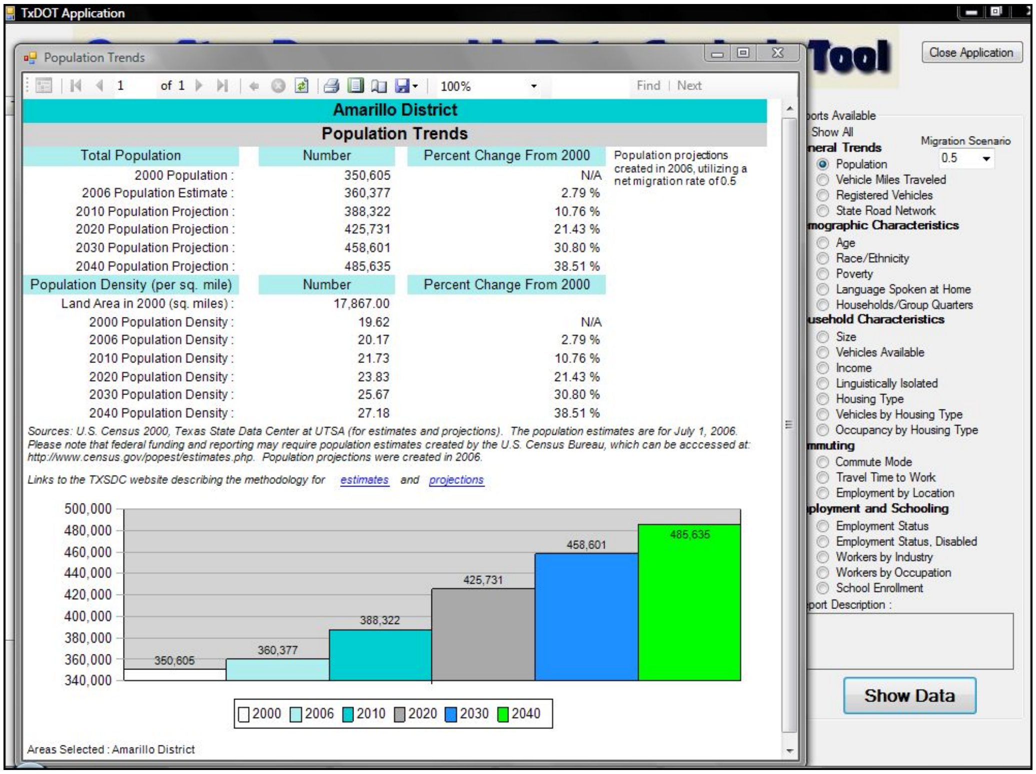

Figure 3-10: Sample Report from One-Stop Demographic Data Analysis Tool

3.4 Data Content

All of the functions available to users of the *One-Stop Demographic Data Analysis Tool* cannot be outlined in a few pages. However, this Chapter provides an overview of the major functionality and the processes undertaken to develop and refine the *One-Stop Demographic Data Analysis Tool*. The following pages provide an overview of the demographic and transportation related data that are included within the *One-Stop Demographic Data Analysis Tool*. Data were selected for inclusion in the *One-Stop Demographic Data Analysis Tool* as a result of input from the Project Management Committee and the review of demographic data uses and needs completed in Year 1 of the research program. Initially, the demographic data were limited to counties, TxDOT Districts, and the State of Texas as a whole. The second version completed in Year 3 included data for Urbanized Areas, Census Tracts, and places of 5,000 or more people in 2000. The final version of the *One-Stop Demographic Data Analysis Tool* completed in Year 3 includes data for Census Tracts, census places (cities) of 5,000 or more people, and Urbanized Areas in addition to the data for County and TxDOT Districts.

The data included within the *One-Stop Demographic Data Analysis Tool* were derived from the following major sources: the Decennial U.S. Censuses of 1980, 1990, and 2000; the 2000 Census Transportation Planning Package (CTPP); the 2007 Population Estimates for Counties and Places from the Texas State Data Center; Population Projections for Texas Counties to 2040 from the Texas State Data Center; and road and vehicle registration data from TxDOT [3-13]. Table 3.1 provides a listing of the variables reported within the program; the sources of the data; and, where applicable, the specific Census Tables from which the items were obtained. In addition to these demographic data, Version 3 of the *One-Stop Demographic Data Analysis Tool* was expanded to include projections of a select set of demographic and socio-economic characteristics. The items included in these projections are described in the following section.

Table 3-2: Data Variables and Sources

Variable	Source	Table or Reference
General Trends - Population		
Total Population (1980)	1980 Census	
Total Population (1990)	1990 Census	
Total Population (2000)	2000 Census	SF1 P1
Estimated Total Population (2007)	SDC Estimates	TXSDC
Projected Total Population (2010)	SDC Projections	TXSDC
Projected Total Population (2020)	SDC Projections	TXSDC
Projected Total Population (2030)	SDC Projections	TXSDC
Projected Total Population (2040)	SDC Projections	TXSDC
Population Density (2000)	2000 Census	SF1 P1
Population Density (2007)	SDC Estimates	TXSDC
Population Density (2010)	SDC Projections	TXSDC
Projected Density (2020)	SDC Projections	TXSDC
Projected Density (2030)	SDC Projections	TXSDC
Projected Density (2040)	SDC Projections	TXSDC
Square Miles	2000 Census	Quick Facts
General Trends - Vehicle Miles Traveled		
Daily Vehicle Miles Traveled	TxDOT	
Vehicle Miles Traveled (DVM*365)	TxDOT	
General Trends - Registered Vehicles		
Registered Vehicles	TxDOT	
General Trends - State Road Network		
Centerline Miles	TxDOT	
Lane Miles	TxDOT	
Note: Centerline mile equals the total distance regardless of the number of lanes.		
Note: Lane miles equals total distance times total number of lanes.		
Age		
Age	2000 Census	SF1 P12
Demographic Characteristics - Race/Ethnicity		
American Indian / Alaska Native Alone, Not Hispanic	2000 Census	
Asian Alone, Not Hispanic	2000 Census	
Black Alone, Not Hispanic	2000 Census	
Native Hawaiian / Pacific Islander Alone, Not Hispanic	2000 Census	SF1 P4, P7, P11
White Alone, Not Hispanic	2000 Census	
Some Other Race, Not Hispanic	2000 Census	
Two or More Race Groups, Not Hispanic	2000 Census	
Hispanic Origin of Any Race	2000 Census	SF1 P4, P7, P11
Demographic Characteristics - Poverty		
In Poverty in 1999, White Alone	2000 Census	SF3 P159A
In Poverty in 1999, Black Alone	2000 Census	SF3 P159B
In Poverty in 1999, American Indian / Alaska Native Alone	2000 Census	SF3 P159C
In Poverty in 1999, Asian Alone	2000 Census	SF3 P159D
In Poverty in 1999, Native Hawaiian / Pacific Islander	2000 Census	SF3 P159E
In Poverty in 1999, Some Other Race	2000 Census	SF3 P159F
In Poverty in 1999, Two or More Races	2000 Census	SF3 P159G
In Poverty in 1999, Hispanic or Latino of Any Race	2000 Census	SF3 P159H
In Poverty in 1999, White Alone Not Hispanic	2000 Census	SF3 P159I
Note: Poverty status for whom poverty status is determined.		

Variable	Source	Table or Reference
Demographic Characteristics - Language Spoken at Home		
Total Population 5 Years or Older	2000 Census	SF3 QT-P16, P19
Speak only English (For Population 5 Years or Older)	2000 Census	SF3 QT-P16, P19
Speak Spanish (For Population 5 Years or Older)	2000 Census	SF3 QT-P16, P19
Speak Other Language (For Population 5 Years or Older)	2000 Census	SF3 QT-P16, P19
Demographic Characteristics - Households/Group Quarters		
Population in Households (2000)	2000 Census	SF1 P16
Population in Group Quarters (2000)	2000 Census	SF1 PCT16
Household Characteristics - Size		
Total Households	2000 Census	SF3 H44, H13
1-person Household	2000 Census	
2-person household	2000 Census	
3-person household	2000 Census	
4-person household	2000 Census	
5-or-more person household	2000 Census	
Household Characteristics - Vehicles Available		
No Vehicle available	2000 Census	SF3 H44
1 vehicle available	2000 Census	
2 vehicles available	2000 Census	
3 vehicles available	2000 Census	
4 vehicles available	2000 Census	
5 or more vehicles available	2000 Census	
Mean vehicles available per household	2000 Census	SF3 H46
Note: Census tabulates vehicles per housing unit versus CTPP: vehicles per household		
Household Characteristics - Income		
Total Households	2000 Census	SF3 P52
Less than $15,000	2000 Census	
$15,000 to 19,999	2000 Census	
$20,000 to 24,999	2000 Census	
$25,000 to 49,999	2000 Census	
$50,000 to 74,999	2000 Census	
$75,000 to 99,999	2000 Census	
$100,000 or more	2000 Census	
Mean household income	2000 Census	SF3 P67
Median household income	2000 Census	SF3 P53
Per Capita Income	2000 Census	SF3 P67
Note: Household Income for 1999 (not adjusted for inflation)		
Household Characteristics - Linguistic Isolated Households		
LIHs where Spanish is Spoken	2000 Census	SF3 P20
LIHs where Asian/Pacific Language is Spoken	2000 Census	SF3 P20
LIHs where Indo-European Language is Spoken	2000 Census	SF3 P20
LIHs where Other Language is Spoken	2000 Census	SF3 P20
Not Linguistically Isolated Households	2000 Census	SF3 P20
Linguistically isolated household is one where no person 14 years or older speaks English exclusively or speaks English very well.		
Household Characteristics - Housing Type		
Population in Occupied Housing Units by Housing Unit Type	U.S. Census	SF3 H33

Variable	Source	Reference & Table
Household Characteristics - Vehicles by Housing Type		
Vehicles by Housing Unit Type	2000 Census	SF3 H44
Household Characteristics - Occupancy by Housing Type		
Owner/Renter Occupied and Vacant	2000 Census	SF3 H7
Recreational & Seasonal Housing Units	2000 Census	SF3 H8
Commuting - Commute Mode		
Workers 16 years and over	2000 CTPP	
Drove alone	2000 CTPP	
Carpooled	2000 CTPP	
Public Transportation (including taxis)	2000 CTPP	CTPP T30
Bicycle or walk	2000 CTPP	
Motorcycle or other means	2000 CTPP	
Worked at home	2000 CTPP	
Note: SF3 P35 does not disaggregate other travel means. Methods of rounding differ between two datasets.		
Commuting - Travel Time to Work		
Workers Age 16+ who did not work at home	2000 CTPP	
Less than 5 minutes	2000 CTPP	
5 to 9 minutes	2000 CTPP	
10 to 14 minutes	2000 CTPP	
15 to 19 minutes	2000 CTPP	CTPP T22
20 to 29 minutes	2000 CTPP	
30 to 44 minutes	2000 CTPP	
45 or more minutes	2000 CTPP	
Mean travel time to work (minutes)	2000 CTPP	CTPP T102
Commuting - Employment by Location		
Total Workers 16 and over	2000 Census	PHC T40
Workers working in County of Residence	2000 Census	PHC T40
Workers working outside of County of Residence	2000 Census	PHC T40
Net In/Out Commute	2000 Census	PHC T40
Employment and Schooling - Employment Status		
Employment Status (Employed/Unemployed)	2000 Census	SF3 P43
Employment and Schooling - Employment Status, Disabled		
Age 5-15 with Disability	2000 Census	SF3 P42
Age 16-20 with Disability Employed	2000 Census	SF3 P42
Age 16-20 with Disability Unemployed	2000 Census	SF3 P42
Age 21-64 with Disability Employed	2000 Census	SF3 P42
Age 21-64 with Disability Unemployed	2000 Census	SF3 P42
Age 65-74 with Disability	2000 Census	SF3 P42
Age 75+ with Disability	2000 Census	SF3 P42
Employment and Schooling - Workers by Industry		
Industry of Worker by Major NAICS	2000 Census	SF3 P49
Employment and Schooling - Workers by Occupation		
Occupation (Major Categories)	2000 Census	SF3 P50
Employment and Schooling - School Enrollment		
School Enrollment	2000 Census	SF3 P36

3.6 Projections of the Population

The *One-Stop Demographic Data Analysis Tool* includes projections of the population for Texas Counties as prepared by the Texas State Data Center and the Institute for Demographic and Socioeconomic Research at the University of Texas at San Antonio in 2006 [4]. Projections of the total population for four migration scenarios are available for each decade from 2010 to 2040 in a population trends report. In addition, data for 5-year intervals and by sex, race/ethnicity and selected age groups are reported for Texas Counties, TxDOT Districts, MSAs, and COGs through the Projections tab in the program. These data represent a subset of the population projections data produced by the Texas State Data Center (which includes data in 1-year intervals for every age through age 85+). Population projections are created in order to illustrate how the total population or characteristics of the population might change should certain assumptions hold true [14, 15]. Cohort-component methods were used to complete these population projections. The cohort-component technique begins with a baseline population of several different cohorts (persons with one or more common characteristic) and applies cohort specific projections of fertility, mortality, and migration using the demographic bookkeeping equation as follows:

$$P_{t2} = P_{t1} + B_{t1-t2} - D_{t1-t2} + M_{t1-t2}$$

Where:

P_{t2} = the population projected at some future date t_1 - t_2 years hence
P_{t1} = the population at the base year t_1
B_{t1-t2} = the number of births that occur during the interval t_1 - t_2
D_{t1-t2} = the number of deaths that occur during the interval t_1 - t_2
M_{t1-t2} = the amount of net migration that takes place during the interval t_1 - t_2

The Texas State Data Center produces four different series of population projections. The assumptions about future trends in fertility and mortality are the same for all of the alternative population projections. The differences between these series arise from the fact that each of the four population projection scenarios incorporates different assumptions about cohort specific net migration rates (the difference between the number of people entering or leaving an area). These differences are as follows:

- ***Migration Scenario 0.0 –*** Assumes that in-migration and out-migration are equal resulting in population change due to natural increase alone (the net change due to births and deaths alone).
- ***Migration Scenario 0.5 –*** Assumes that net migration rates by age, sex, and race/ethnicity will be ½ the rates experienced during the 1990s for counties and the State of Texas.
- ***Migration Scenario 1.0 –*** Assumes that net migration rates by age, sex, and race/ethnicity will be the same as the rates experienced during the 1990s for counties and the State of Texas.
- ***Migration Scenario 2000-2004 –*** Assumes that net migration rates by age, sex, and race/ethnicity will be the same as those rates experienced between 2000 and 2004 for counties and the State of Texas.

All four population projection scenarios are included within the *One-Stop Demographic Data Analysis Tool*. A full description of the methods used to produce the population projections can be found within the Guidebook found in the Appendices.

3.7 Projections of Selected Socio-Economic Characteristics

In addition to the population projections included in the *One-Stop Demographic Data Analysis Tool*, the program includes a series of projections of household and socioeconomic characteristics. These projections of household and socioeconomic characteristics are intended as a means of understanding the potential impacts of population and demographic change on the State of Texas and its counties and regions. With the exception of the data relative to disabilities, these household and socioeconomic characteristic projections utilize prevalence rates from the 2000 Census which are applied to the various population projection scenarios. These methods are often used in projecting long-term trends in socioeconomic characteristics to understand the implications of demographic changes on population based service demand [14-17]. These data were projected for counties and controlled to a separate State projection. These items are available for reporting at county, TxDOT District, Council of Governments (COGs), and Metropolitan Statistical Area (MSA) geographies.

Population change is not the only factor that will influence changes in socio-economic conditions. Changes in policy, the economy, and other social and cultural factors also play a role in future changes in socio-economic characteristics. However, future changes are heavily influenced by demographic change. Thus, these projections are demographically based and may differ from projections of factors based upon other techniques or those using more detailed data for local areas. Like all projections, these demographically derived projections of household and socio-economic characteristics are generally more accurate for periods closer to the base date (2000 in most cases) and become less accurate the longer the period of time is from that base period. Anyone using these projections should take into account these limitations. Following are brief summaries of the projected items available within the *One-Stop Demographic Data Analysis Tool*.

Households and Household Characteristics:

Total Households and Households by Owner/Renter Occupancy: The householder (headship) rates by race/ethnicity and age for 2000 were applied to the different population projection migration scenarios to derive household projections. These resulting household projections were further divided by applying owner/renter occupancy rates by age, sex, and race/ethnicity of the householder for 2000 to the projected households.

Household Population and Average Household Size: In order to account for group quarter population, household populations were estimated by assuming the same ratios of household population to total population as were present in 2000. Average household sizes were obtained by dividing the total household population for a given year by the total projected households for that same year.

Family Households in Poverty: Family households were derived by applying household-type-specific rates for 2000 by age and race/ethnicity. Family households were further characterized by poverty status, by applying 2000 family poverty rates by age and race/ethnicity of the householder to the projected family households.

Households without Vehicles: The number of households without vehicles was derived by applying vehicle ownership rates by age, sex, and race/ethnicity of the householder for 2000 to the household projections.

Households by Income: Projections of the number of households by 12 categories of household income in 1999 dollars are reported within the *One-Stop Demographic Data Analysis Tool*. The number of households by household income was derived by calculating the ratio of households by 16 categories of household income to total households by age, sex, and race/ethnicity of householder for 2000. These ratios were then applied to the projections of households according to the age, sex, and race/ethnicity of householder. Median household income is calculated from the resulting grouped data and is reported for counties, TxDOT Districts, MSAs, and COGs.

Civilian Labor Force:

Total Labor Force, Labor Force by Sex and Race/Ethnicity: Projections of the Civilian Labor Force were obtained by applying rates of labor force participation by age, sex, and race/ethnicity in 2000 to each population projection scenario. These refer to the population living in a county that are employed regardless of the location of employment, and thus will differ from other workforce projections based upon employment location.

Projections of Persons with at Least 1 Disability (Total Disabilities) and Persons with Mobility Impairments (Out-of-Home Disabled):

Projections of the total disabled population age 5 and older and the disabled population age 16 and older who had a "difficulty going outside the home alone to shop or visit a doctor" were prepared for the *One-Stop Demographic Data Analysis Tool*. The projections incorporate the U.S. Census Bureau measures of disability which define a disability as a long-lasting physical, mental, or emotional condition that limits a person's ability to walk, climb stairs, dress, bathe, learn, or remember [18, 19]. The total disabled population is sometimes used as a measure of public transportation demand and is incorporated within some public transportation funding formulas. At the same time, the numbers for the total "out-of-home" disabled have been recommended for public transportation demand planning [20, 21].

Similar to projections of other population and socioeconomic characteristics incorporated within the *One-Stop Demographic Data Analysis Tool*, the projections of the disabled population were prepared by applying prevalence rates to the population resulting from the different projection scenarios. However, the projections of the disabled population differed in two significant ways: 1) prevalence rates were obtained from the 2006 American Community Survey instead of the 2000 U.S. Census; and 2) the projections were based upon age and sex (but not race/ethnicity) specific disability rates. Prevalence rates were obtained from the American Community Survey because U.S. Census Bureau reviews of disability measures, and in particular those related to out-of-home and employment disabilities, indicated that disabilities were likely over-reported in the 2000 Census stemming from possible misinterpretation of written instructions in the mail survey [22, 23]. Although the question contents remained the same, the order of the disability questions and additional instructions were provided beginning with the American Community Survey of 2003 resulting in more reliable reporting of disabilities. In addition, the American Community Survey of 2006 was the first to include both household and group quarter's population which allowed for calculation of prevalence rates for the entire population.

The proportion of the population with a disability is influenced greatly by the presence of older populations since disabilities increase with age [22, 24-27]. Disability rates were calculated by dividing the number of males and females in each age group by the total number of males and females for that same group. These rates were calculated for the State of Texas as a whole and for 63 different regions within the State. The 63 areas were created by modifying the U.S. Census Bureau's Public Use Microdata Areas (PUMAs). PUMAs represent the areas from which the Public Use Microdata Sample (PUMS) data are derived – areas which represent no less than 100,000 people as of the 2000 Census. Since PUMAs can represent areas of more than one county or many Census Tracts within a larger county, PUMAs (and the associated PUMS data) were combined so that the rates were associated with a single county or a combination of counties (see Figure 8). Once area specific rates of total and out-of-home disabilities were obtained, these rates were applied to the four population projection scenarios produced by the Texas State Data Center. Disability rates for each combined PUMA area were applied to the 2000 base population of the covered counties and for 5-year projections to 2040 for each gender and age group combination. Similarly, disability rates by age group and sex were applied to the population projections for the State as a whole. County projections were controlled to the State projects.

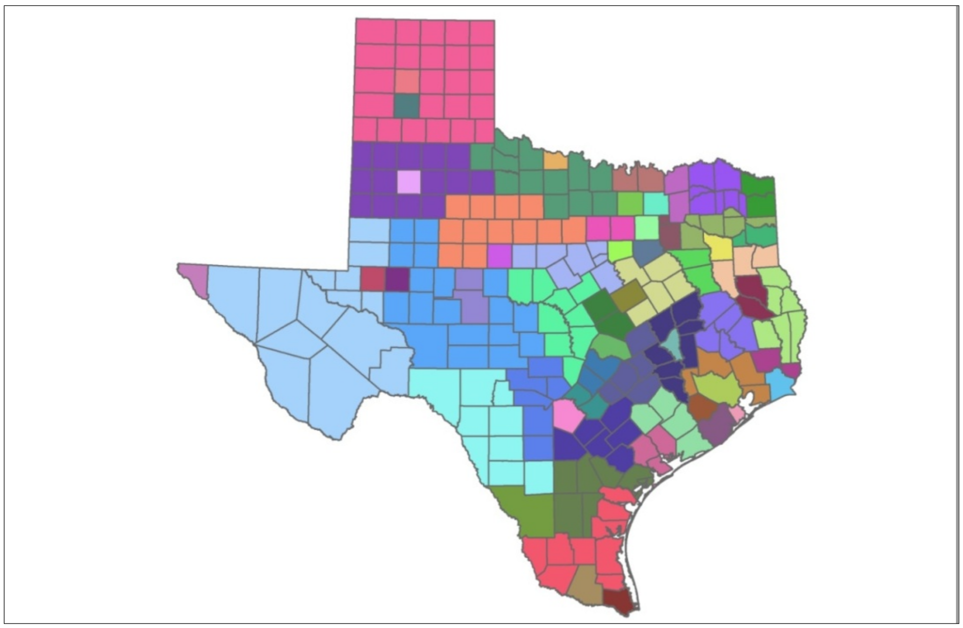

Figure 3-11: Consolidated Public Use Microdata Areas [PUMAs (in Color)] and County Boundaries

Like all estimates and projections of populations and sub-populations, there is a degree of uncertainty assumed based on the difficulty of the task of predicting future demographic characteristics. In addition to these inherent limitations, additional cautions should be noted when using these data for planning purposes. These projections include projected populations of the total and out-of-home disabled. These projections were prepared using rates relevant to the entire population and were applied to the total population within a county, regardless of household or Group Quarters residence. Thus, for some counties with large institutionalized populations, the projected populations reflect the total number of people with these types of disabilities irrespective of their ability to access transportation services should they choose to do so (for instance, prison populations). The two largest of these populations include those living in correctional facilities (typically younger and male) and those living in nursing homes (typically very old and female).

Chapter 4 : Conclusions and Recommendations

Rapid population growth and changes in the demographic and socioeconomic characteristics of Texas will require transportation professionals to pay closer attention to demographic and household characteristics in order to plan for transportation needs. Although the future cannot be predicted with absolute certainty and factors beyond demographic change will influence future transportation needs, this research can be used as a starting point for considering the challenges facing transportation agencies in Texas. By taking into account these challenges, TxDOT and other transportation agencies will be better prepared for Texas' future transportation needs. These challenges are summarized in Research Report *0-5392-3: Impacts of Current and Future Demographic Change on Transportation in Texas[2]*. On a more immediate level, the *One-Stop Demographic Data Analysis Tool* will provide a starting point for accessing, reporting and comparing demographic characteristics of selected geographic areas for transportation professionals.

The Texas Department of Transportation utilizes population data extensively, primarily in referencing data on population size, employment, and income in various analyses; however, because the demographic challenges Texas faces are more varied and broader than before, data on population characteristics should be usefully expanded to more effectively guide district and state-level policy development. Based upon the research, the major recommendations for TxDOT are summarized below. A more detailed summary of findings, conclusions and recommendations can be found within the text of the two previous cited research reports [1, 2]. Among the recommendations are the following:

4.1 Improve Awareness of Demographic Challenges Facing Texas

Like many organizations, when thinking about demographic change, there is a tendency to focus on population size and growth alone. While population growth and the size of Texas' future population will certainly challenge the transportation infrastructure, it will be critically important to understand how other challenges, such as those presented by an aging and increasingly diverse population, may impact Texas' future transportation needs. This should include improving awareness of these challenges among transportation planners and other professionals through educational workshops, presentations and by other means. In addition, because some of these demographic changes are unprecedented and our findings about the implications for transportation limited by the data available, future research on differences and changes in transportation use among demographic groups is warranted. For instance, our understanding about transportation use among the elderly are derived from our knowledge about previous cohorts of the aging population. As the baby boom generation moves into the older ages, automobile use (particularly among women) is likely to be different than previous cohorts with many different implications for transportation use and safety. Future research on demographic implications of transportation use could help prepare TxDOT and other transportation agencies for meeting the needs of future generations.

4.2 Improve professional knowledge about demographic databases and analytical techniques

There is a need to improve professional knowledge concerning demographic information and analytical methods among data users at TxDOT and related agencies[1]. Part of this knowledge consists simply of building awareness about data resources available to transportation planners. Among its many other features, the *One-Stop Demographic Data Analysis Tool* provides a listing of a variety of demographic data resources, including information about their content and Internet links to the original source.

Beyond this awareness, there is a need to educate planners on methods of collecting, developing and evaluating population estimates and projections for local agencies; training on how to access and interpret data from the Census Transportation Planning Package (CTPP) and U.S. Census Bureau programs (decennial Census, ACS, CPS, etc.); and ways to analyze demographic information for Environmental Justice (EJ) documentation. Some of these needs are being addressed by TxDOT and other agencies through training and in the development of guidebooks designed to educate professionals on methods of using data for long range planning [30]; analyzing demographic information for Environmental Justice [31], and in understanding how to use the American Community Survey (ACS) for transportation planning [28]. A continuation of educational materials and training programs will improve professional skills so that transportation planners are prepared to meet the demographic challenges mentioned previously.

4.3 When feasible, standardize demographic data resources and use

Among the findings from the interviews and surveys of demographic data users at TxDOT and other agencies was an inconsistency in the data used for demographic analyses. In some cases, this is unavoidable due to the differences in availability of local data or the intended purposes for which the data are used. In others, data users may not be aware of available demographic data or in how the data may have been used in situations similar to their current needs (for instance, in reporting on Environmental Justice). In addition to the data available for reporting in the *One-Stop Demographic Data Analysis Tool,* the program includes a guide to demographic data resources. Thus, although not a means of standardizing data use, the program does provide a means of informing professionals about the range of demographic data resources available. Current and future training and guidance may help improve consistency of data use within TxDOT and Texas MPOs.

4.4 Prepare for the 2010 Census and the transition to the American Community Survey

Transportation professionals have utilized a variety of data from the Decennial Census in order to plan for future transportation needs. In addition, data from the Decennial Census are often used as a mechanism to allocate Federal and State money for local transportation needs. During previous Census years, the Census Bureau conducted a census of all households and a sample survey consisting of approximately 1 in 6 households. The sample survey was commonly referred to as the “long form” and the results were reported in Summary Files 3 and 4 (SF-3 and SF-4) of Census2000. The sample survey provided information about characteristics of the population and households – including data relative to transportation use. In 2010, only the basic characteristics of the population (such as age, race/ethnicity, and gender) will be collected as part of the decennial Census. Instead, the “long form” sample data are being collected on a continuous basis through the Census Bureau’s American Community Survey (ACS), which was fully implemented beginning in 2005 [28, 29]. With the ACS, transportation planners will no longer have to wait 10 years to be able to report on and track changes in demographic characteristics, including those relative to transportation use. While this will be beneficial, changes in sampling strategies and in the ways that the data are collected will require data users to pay closer attention to the statistical properties of the reported data so that real changes can be distinguished from statistical noise. In addition, data for all areas will not be reported at the same time. For instance, annual estimates for areas with more than 65,000 people were released beginning in 2005. Beginning in 2008, 3-year accumulated averages for areas of 20,000 or more will be released, and in 2010, 5-year accumulated averages for all areas will be released.

-What does this mean for TxDOT?

The ACS is now a part of the statistical program of the U.S. Census Bureau. All of the implications for moving from the previous "long form" decennial sample survey to the ACS have not been determined and the Census Bureau continues to study the results of the ACS to improve data collection and reporting. This research was not tasked to understand the implications for ACS on transportation planning and for TxDOT. However, because much of the demographic data is derived from the U.S. Census Bureau, it is important to note two major areas of concern: 1) a need to improve the knowledge in how to use ACS for transportation planning; and 2) a need for standardization of funding allocation formulas that are partially derived from population and characteristics of the population. The National Cooperative Highway Research Program (NCHRP) has funded research that produced a guidebook for transportation planners [28]. This guidebook provides a broad overview of the ACS and how it can be used for transportation planning. Similar guidebooks or training programs could be developed and presented to TxDOT and other transportation agency personnel in order to educate transportation professionals about the ACS.

Work supported by the National Research Council suggested that a shift from the long-form sample to the ACS will require the development of strategies to use the ACS for Federal allocations of funds [29]. For instance, three Federal Transit Authority (FTA) funding categories for public transportation consider needs based upon characteristics of the population – including measures of the size of the disabled population and number of individuals below 150 percent of poverty. In past Censuses, these data were derived from SF-3 or SF-4. Since these data will be reported on a more frequent basis and in different ways according to geographic area population size (i.e. reported for 1-, 3-, and 5- years), there will be a need to determine how frequently these data are referenced and in what ways they will be used to determine funding allocation. While many of these decisions for transportation funding allocation will be made at the Federal level, it will be important for TxDOT and other transportation providers to understand the implications of and prepare for these changes. At the same time, similar decisions will need to be made for any State level funding formulas.

4.5 Future Enhancements to *One-Stop Demographic Data Analysis Tool*

The *One-Stop Demographic Data Analysis Tool* has been created to assist transportation professionals by providing a "one-stop" source of accessing basic demographic information. The program was designed to be loaded from a single CD-ROM and launched on a PC based desktop. While additional functions or data may be desired for some, no endeavor similar to this project would be able to meet all user needs. Thus, the *One-Stop Demographic Data Analysis Tool* is limited in the amount of data reported; geographic areas referenced; and in the ways in which the data can be reported. The *One-Stop Demographic Data Analysis Tool* has already been revised to expand on the program's data content and reporting functions. The following section provides a list of recommendations for future revisions of the *One-Stop Demographic Data Analysis Tool*.

- Migrate Application to an Internet Based Platform

In interviews with data users, the research team found a preference for online access to demographic data. For a variety of reasons, the first version of the *One-Stop Demographic Data Analysis Tool* was designed to be copied from a CD-ROM and launched on a computer desktop. However, much of the functionality and data reporting of the *One-Stop Demographic Data Analysis Tool* could be adapted to an Internet based platform. By moving the application online, TxDOT (or the Institute for Demographic and Socioeconomic Research) could monitor program use; more easily update data and program elements; and augment data content and program functions. This could include, among other things, the ability to map selected data or download user defined datasets. Examples of similar online applications were presented in Chapter 2 of

Research Report 0-5392-1[1]. Moving the application online would be beneficial for TxDOT and demographic data users at TxDOT and related agencies.

- Add Data for Additional Geographies

Census Tracts are the smallest geographic areas reported in the current version of the *One-Stop Demographic Data Analysis Tool*. Some users may require data for smaller areas. The *One-Stop Demographic Data Analysis Tool* provides links to the original sources where users may obtain the same data for smaller geographies (where available). As can be seen in Table 3-3, there are a large number of Census and TxDOT defined geographic areas in Texas. Including data for the smaller geographies would expand the size of the program substantially and is not feasible within the parameters of the existing program. However, by moving the application to the Internet, these data could be more easily maintained for smaller geographies. This could include data for places smaller than 5,000 people, Census Block Groups, and Traffic Analysis Zones. With input from TxDOT, data for areas around defined highway corridors could be included as well.

Table 4-1: Number and Percent of Areas by State, Central City, and MSA Counties (As Currently Defined)

Geographic Boundary	State	Within Central City Counties		Within MSA Counties	
	No.	No.	%	No.	%
County	254	25	9.8	77	30.3
Census Tract	4,388	3,041	69.3	3,636	82.9
Census Block Group	14,462	9,960	68.9	11,968	82.8
Traffic Analysis Zone	17,860	13,502	75.6	17,229	96.5
TxDOT District	25	NA	NA	NA	NA
Urbanized Areas	34	NA	NA	NA	NA
Metropolitan Areas	25	NA	NA	NA	NA
Micropolitan Areas	41	NA	NA	NA	NA

- Include Data from the American Community Survey

As mentioned previously, the American Community Survey (ACS) will replace the traditional long form sample survey conducted during the decennial Census. The ACS will provide information on characteristics of the population and households. These data will be available on a more frequent basis than was available in previous years. In 2008, data were available for geographic areas of 65,000 or more in population. The Census Bureau is scheduled to report demographic data for areas as small as 20,000 in population by December 2008 (based upon three years of sample data). By 2010 data for all areas and all geographies will be reported (with Census block groups being the smallest geography). For the smaller populated areas, 3 or 5 year rolling averages of sample data will be used to report demographic and socioeconomic characteristics. The ACS data were not included in the current version due to the fact that all areas of Texas were not available at the time the program was developed and due to the differences in sampling and reporting methods that require caution in comparing decennial and ACS data [28, 29]. Instead, Internet links to the ACS are including in the current version. If the limitations are accounted for, future revisions of the *One-Stop Demographic Data Analysis Tool* could incorporate selected data from the ACS and newer versions of the Census Transportation Planning Package [CTPP (which is being developed using ACS data)].

- Training and Education about the One-Stop Demographic Data Analysis Tool

The *One-Stop Demographic Data Analysis Tool* was written to be intuitive and easy to use; however, interviews with users of Version 1 indicated a lack of awareness of some of the data and functionalities included. Short training workshops and other informal methods could be used to increase the awareness of the program in order to encourage product usage. The program could be distributed at transportation planning conferences and related meetings. In addition, the Tool can be distributed at workshops designed to educate TxDOT personnel on the implications of demographic trends for transportation in Texas.

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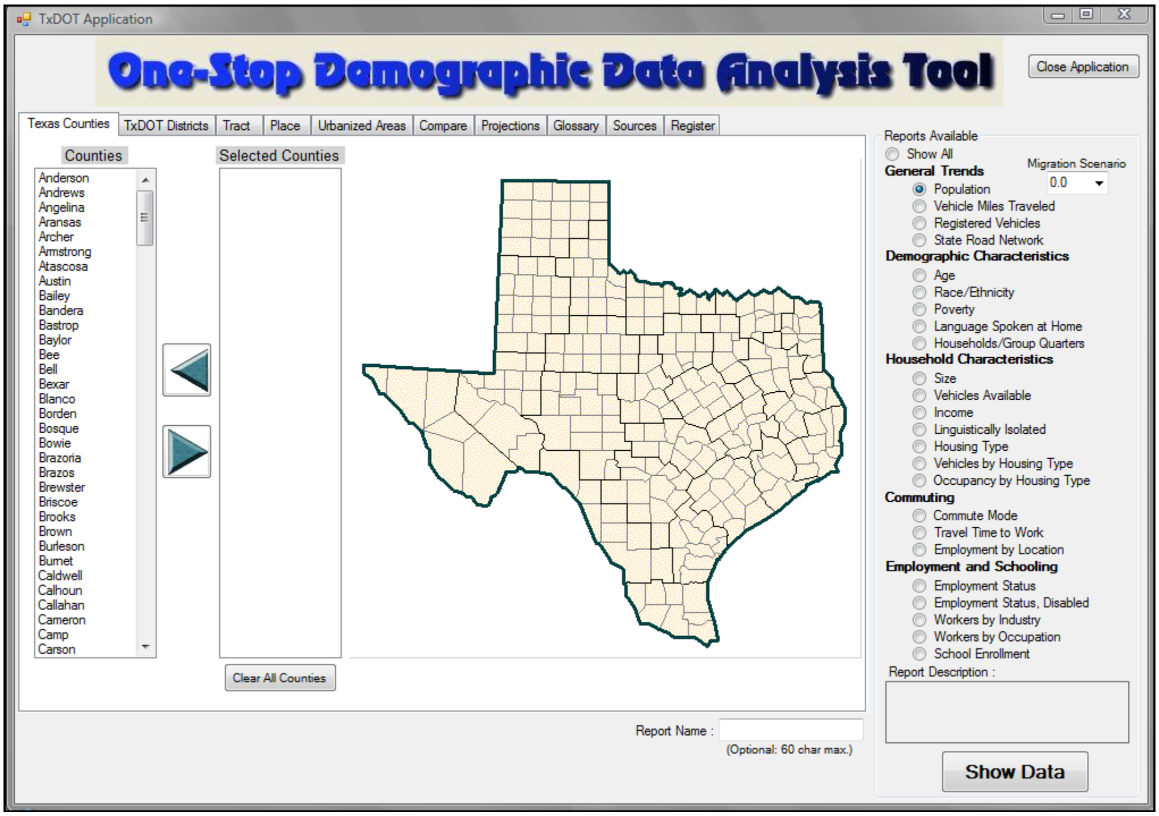
Appendix: Guidebook of the One-Stop Demographic Data Analysis Tool



Guidebook: One-Stop Demographic Analysis Tool

Created by the University of Texas at San Antonio
Institute for Demographic & Socioeconomic Research

Program Overview

General Features and Installation Procedures

The ***One-Stop Demographic Data Analysis Tool*** was created by the Institute for Demographic and Socioeconomic Research (IDSER) at the University of Texas at San Antonio for the Texas Department of Transportation (TxDOT) Research Project 0-5392, "Impacts of Current and Future Demographic Trends on Transportation Planning in Texas". *The One-Stop Demographic Data Analysis Tool* (identified as TxDOT Research Product 0-5392-P5) was designed to provide TxDOT personnel and other professionals quick and easy access to general demographic information for counties and TxDOT districts and serves as a starting point for reporting and general trend analysis. The CD-ROM includes selected data items from the 2000 Census; 2007 population estimates and population projections to 2040 from the Texas State Data Center; and highway, vehicle miles traveled, and vehicle registration data from TxDOT. Reports can be generated for one or more counties, one or more districts, or for the state as a whole. In addition, the latest version of the *One-Stop Demographic Data Analysis Tool* includes information for places, Census Tracts, and Urbanized Areas (where data is available).

The CD-ROM includes several files that are part of the installation program and 2 files that are useful for end-users. These include two files in the home directory: 1) the ***setup.exe*** executable file to install the program and all needed applications on the end-user's computer; and 2) a program overview (***Overview.pdf***) which provides general information about the program.

In order to install the *One-Stop Demographic Data Analysis Tool*, you must first remove any previous version installed on your computer. Then double click on the setup.exe executable file on the CD-ROM. Depending upon your computer network configuration, you may need administrative privileges in order to install some or all of the components on the CD-ROM (you will be prompted if this is the case). Once installed, the program and the included data are accessed directly from the computer. Thus, it will not be necessary to install the CD-ROM in order to access the data subsequently. The *One-Stop Demographic Data Analysis Tool* can also be installed on more than one computer using the same CD-ROM.

In order to access the *One-Stop Demographic Data Analysis Tool* from the desktop, go to ***start>all programs>IDSER>TxDotApp***. Once launched a yellow screen describing the tool will first appear (Figure 1). Following this screen, the application will appear. You will see a grey screen and a map of Texas (Figure 2).

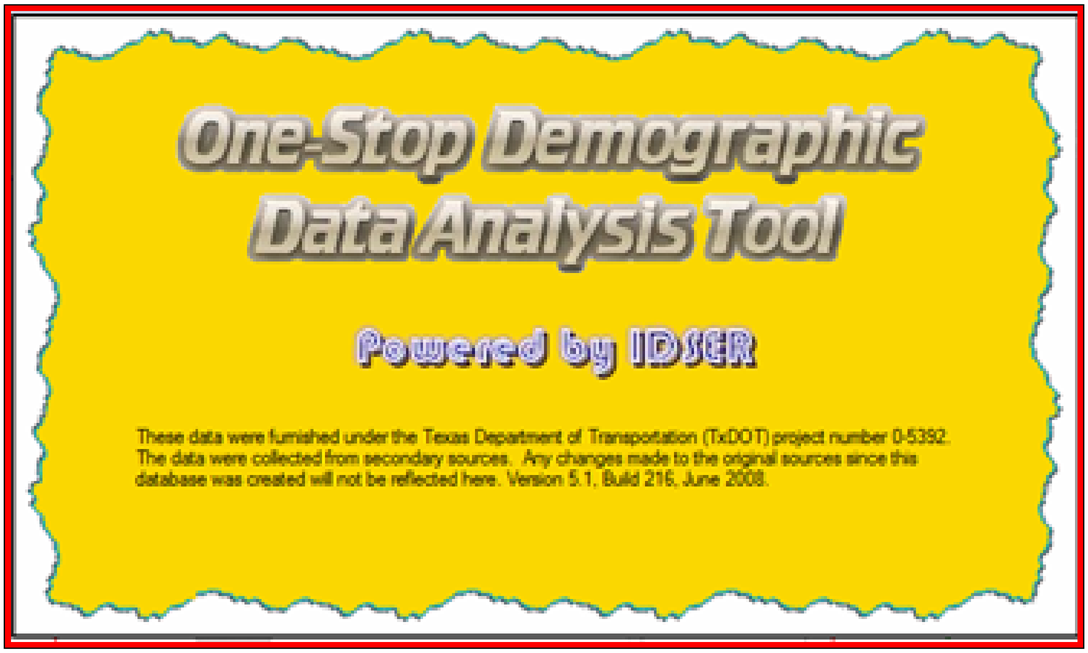


Figure 1: Opening Splash Screen

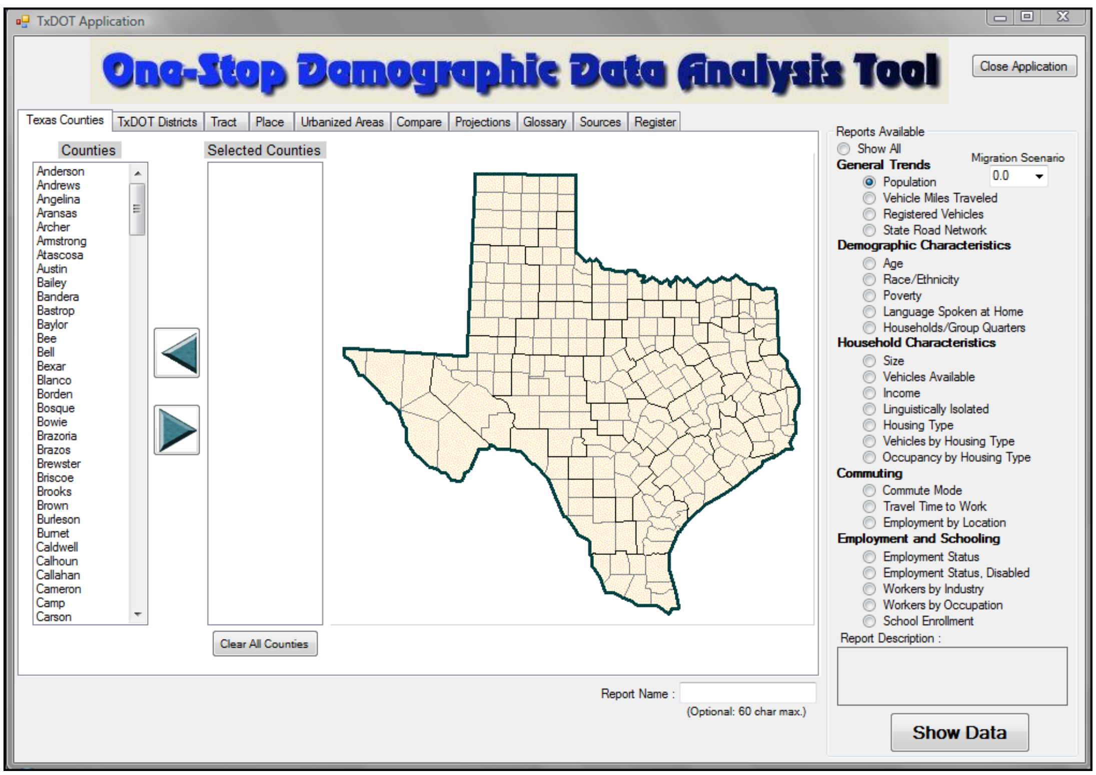


Figure 2: Program Home Page

The *One-Stop Demographic Data Analysis Tool* includes 10 “pages” of information that are accessed through menu tabs. The first five tabs provide data for five different levels of geography: Texas Counties, TxDOT Districts, Places, Census Tracts, and Urbanized Areas. The sixth tab is used to compare up to five different user selected areas. The seventh tab includes projections of population and selected demographic characteristics for Counties, COGs, MSAs, and TxDOT Districts. The remaining tabs provide definitions of demographic variables (Glossary); information about and Internet links to data sources used in the creation of the One-Stop Demographic Data Analysis Tool (Sources); and a registration and “contact us” tab under “Register.” **In order to be informed of future updates of the *One-Stop Demographic Data Analysis Tool*, please register by filling out the information on the registration tab after installing the program.** You will receive an e-mail confirming your registration.

The following section provides an overview of each page and a tutorial for accessing the information included in the *One-Stop Demographic Data Analysis Tool*.

Accessing Information from the Program

The “Texas Counties” page shown in Figure 3 includes: (1) a box which lists the 254 counties in Texas in alphabetical order; (2) a box that indicates counties selected by the user for reporting; (3) a reference map which shows county and district boundaries; and (4) a listing of data available for reporting. The second page is similar in format as the “Texas Counties” page, except this page is used to access information about TxDOT Districts. Here a colored map highlights the different TxDOT Districts on the “TxDOT Districts” page.

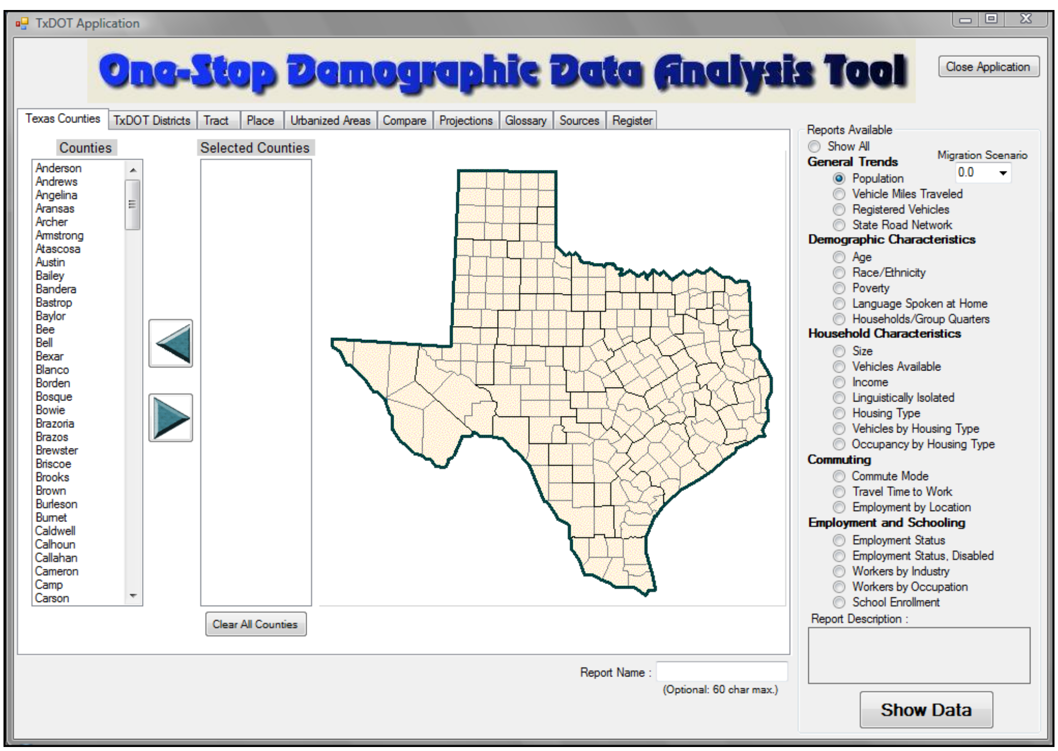


Figure 3: “Texas Counties” Page

Accessing data for counties and districts.

In the following example, we show how a report is created from the *One-Stop Demographic Data Analysis Tool*. These same procedures are used to create a report for one or more districts when working with the "TxDOT Districts" page.

Selecting Areas

In this example, we create a population summary report for Borden and Scurry Counties. In order to select these counties, choose from the "Counties" box on the left hand side of the "Texas Counties" page. All counties are listed in alphabetical order. Select "Scurry" from the list and click on the right arrow to add the county to the "Selected Counties" list box. You can also choose a county by clicking on the reference map. The county name appears when you place the mouse within the middle of a county outline. We click on the county outline of Borden (see Figure 4). Our two counties are now selected. (Note: the program does not allow for a county to be selected more than once per report, thus keeping the user from accidently double counting a particular geography). If you need to remove a county from selection, click on the name of that county in the "Selected Counties" list box, and click on the left arrow. This removes the county from the "Selected Counties" list. In order to de-select all selected counties (or districts), you may click on the "Clear All Counties" button which is below the "Selected Counties" box.

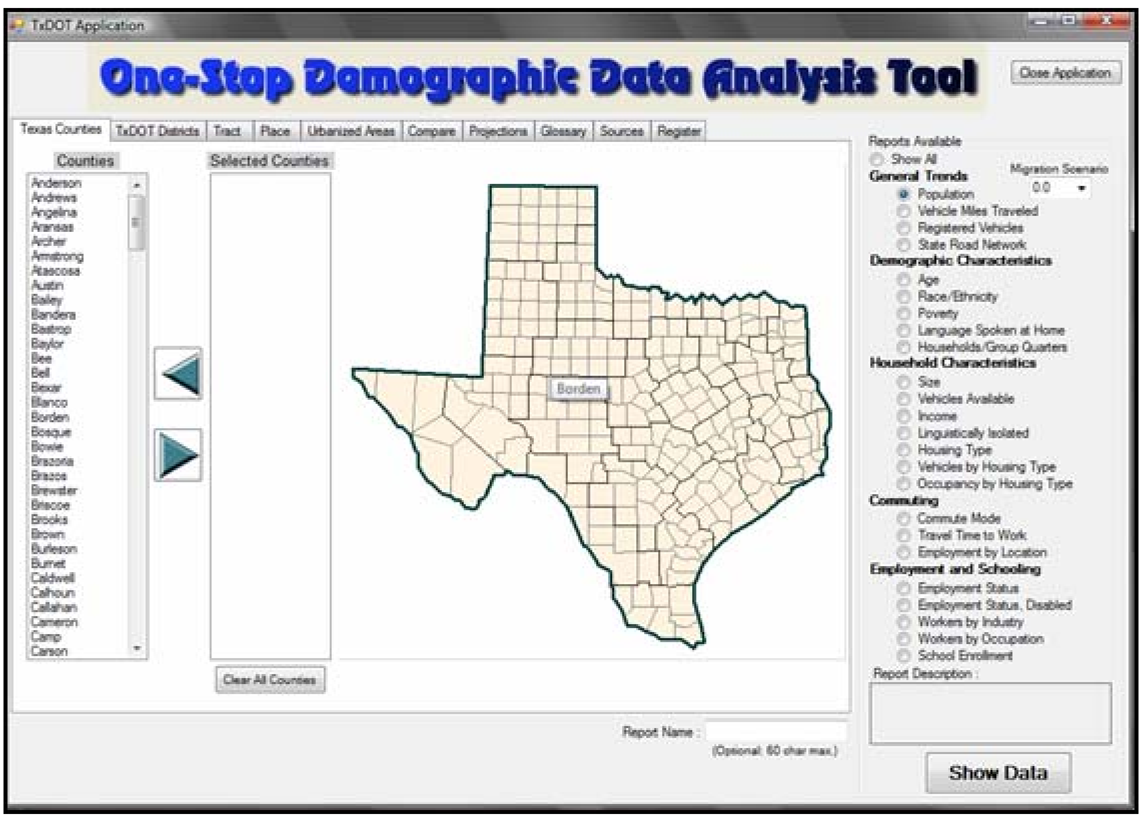


Figure 4: Selecting "Borden County" From Map

Creating a Report

Once one or more counties (or districts) have been selected, choose a report from the "Reports Available" list on the right side of the page. Place your mouse over the name of each item in order to obtain a brief description of the data in that particular report. The descriptions are provided in the "Report Description" box below the "Reports Available" listing. If you wish to see all reports for a particular area, select "Show All."

In this example, we create a report of the population trends for these two counties combined. First, select population on the "Reports Available" list and a "Migration Scenario" drop down box appear. These migration scenarios refer to different net migration scenarios used by the Texas State Data Center to create different population projections. More detailed information about the methods and assumptions utilized for these population projections can be found in **Section II** of this report or online at: http://txsdc.utsa.edu. In this case, we choose migration scenario 1.0 by clicking on the drop-down box and selecting 1.0. This scenario assumes the same net migration rates by age, sex, and race/ethnicity for future years as those that occurred between 1990 and 2000.

Naming the Report

We name this report, "Hwy 180 Corridor Population" by typing this name in the box below the map of Texas (report names are not required). We then click the "Show Data" button below the "Reports Available" list, and the report is generated (see Figure 5). We find our report title at the top of the report, followed by the statistical tables of information, and a graphic of the data included in the report.[1] The source(s) for each item is stated below the data table, and the geographies selected are shown at the very bottom of the page. Each report includes a description of the sources used in compiling the data. Additional detailed information about these sources is provided on the "Sources" tab page. Where available, the listings are hyperlinked to the original source websites from the "Sources" tab page. Variable definitions are provided in the "Glossary" tab page.

[1] Some report items do not include graphical display of the data.

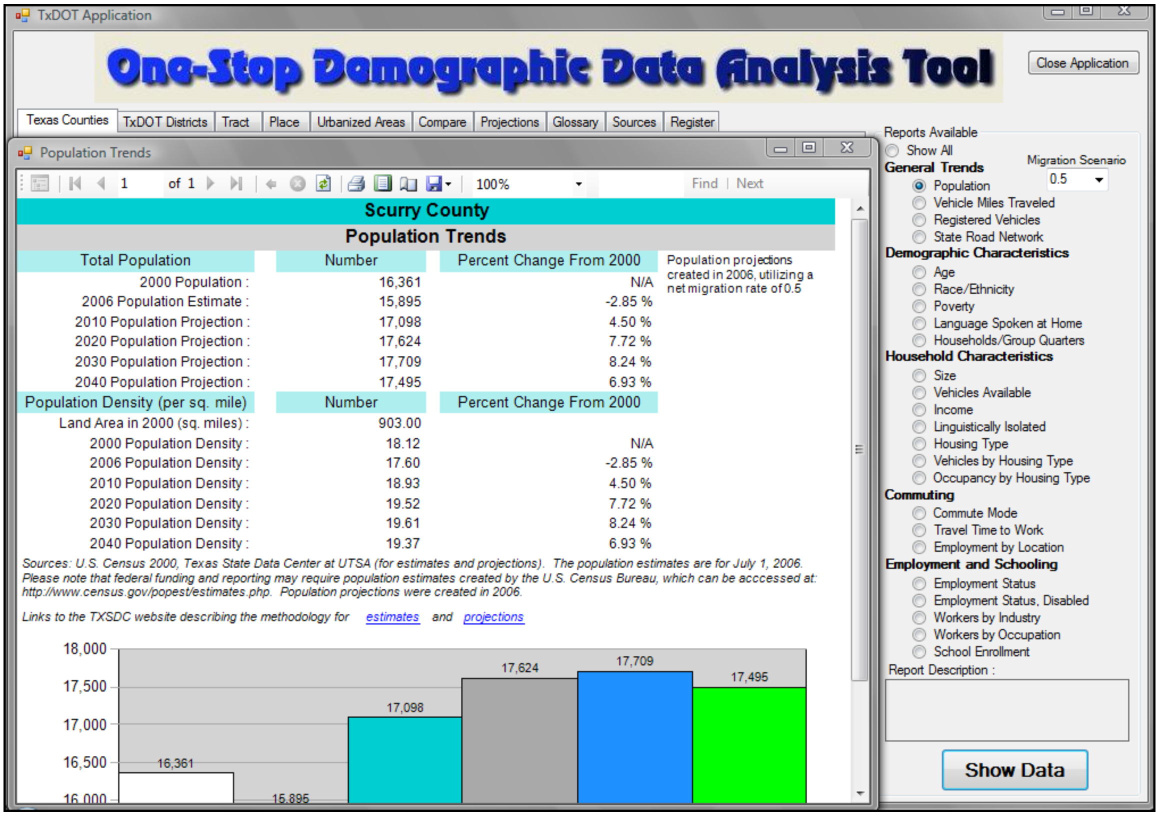


Figure 5: Example of a Report on Population Trends

Printing a Report or Exporting to Adobe® Acrobat or Microsoft® Excel

The report can be printed from the application or exported to an Adobe® Acrobat file (.pdf) or Microsoft® Excel (.xls) file. In order to print the report, click on the printer icon at the top of the page. The printer dialogue box will then appear and the report(s) can be printed as with other applications. Two additional icons are available to preview and to make changes to the page layout.

In order to export to an Adobe® Acrobat (.pdf) file, select the blue diskette icon and choose Acrobat (.pdf) file from the drop down list. Once selected, a dialogue box will appear asking for a name for the select file. In this case, we name the file "Hwy180CorridorPop.pdf." Click on the save button and the report is created. The report can now be opened using Adobe® Acrobat Reader. These same procedures are used to export to Excel, except "Excel" file is chosen from the drop down list. Once the file is created, the report can be accessed via Microsoft® Excel. Additional reports from the *One-Stop Demographic Data Analysis Tool* can be exported similarly and combined to create user defined reports. (Note: Graphics from the report application are not editable within Excel. Instead, graphics are exported to Excel as bitmaps.)

Accessing data for the State of Texas

In order to select data for the State of Texas, hold down the shift key and select Anderson then Zavala Counties (first and last listed counties) on the "Texas Counties" page, or alternatively Abilene District and Yoakum District on the TxDOT Districts page. Click on the right arrow button to select all counties (or districts). Then follow the same procedures as above to create a report.

Accessing data for Places, and Urbanized Areas, and Census Tracts

With a few exceptions, the same summary tables can be printed for Places, Urbanized Areas, and Census Tracts by selecting the respective geography tab. These areas are selected by referencing the geographic area name in the selection box and choosing the desired areas in the same ways as before. For Census Tracts, the county name must be selected first, followed by the tract reference number. The Census Tract tab includes two hyperlinks to Internet sites which can be used to locate a Census Tract for an area or a given address. Once the area is selected, the user can select and print the desired demographic data report.

Comparing Counties or Districts

The reports that are generated for the individual area selection tabs (Counties, TxDOT Districts, Tracts, Places, and Urbanized Areas) sum data for all selected geographies (i.e. if two counties are selected, then the report will provide the summary for the two counties combined). Comparison reports can be generated for up to five areas within the "Compare" tab. In this way, two counties (or two areas consisting of multiple counties) can be compared. You first select the area to compare (TxDOT Districts, Counties, places, Urbanized Areas, or Census Tracts), select the specific areas of interest, and then select and generate the a report for those areas.

Creating a Report to Include Information from a TxDOT District and One or More Additional Counties

You cannot combine selections from different geographic levels (such as counties and Census Tracts). All selections must be accessed from the same tab page. However, districts are outlined in black on the county selection page. You can select all of the referenced counties within a district by clicking on the map. Then add additional counties that are not included within that specific district.

Accessing the Glossary of Terms and Source List

The *One-Stop Demographic Data Analysis Tool* provides definitions for the data items included in the various reports within the "Glossary" tab and additional information and Internet links to data sources under the "Sources" tab (see Figures 6 and 7). In addition to the original data sources used for the Data Tool, other transportation planning related Internet links are included.

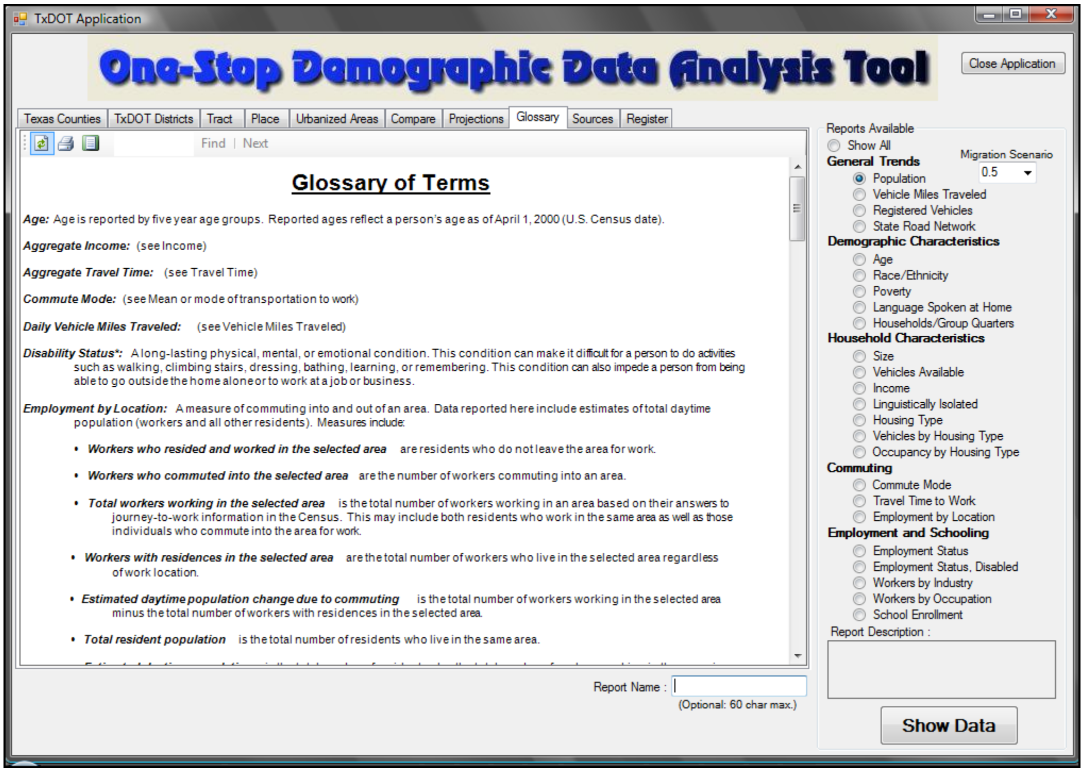


Figure 6: "Glossary of Terms" Page

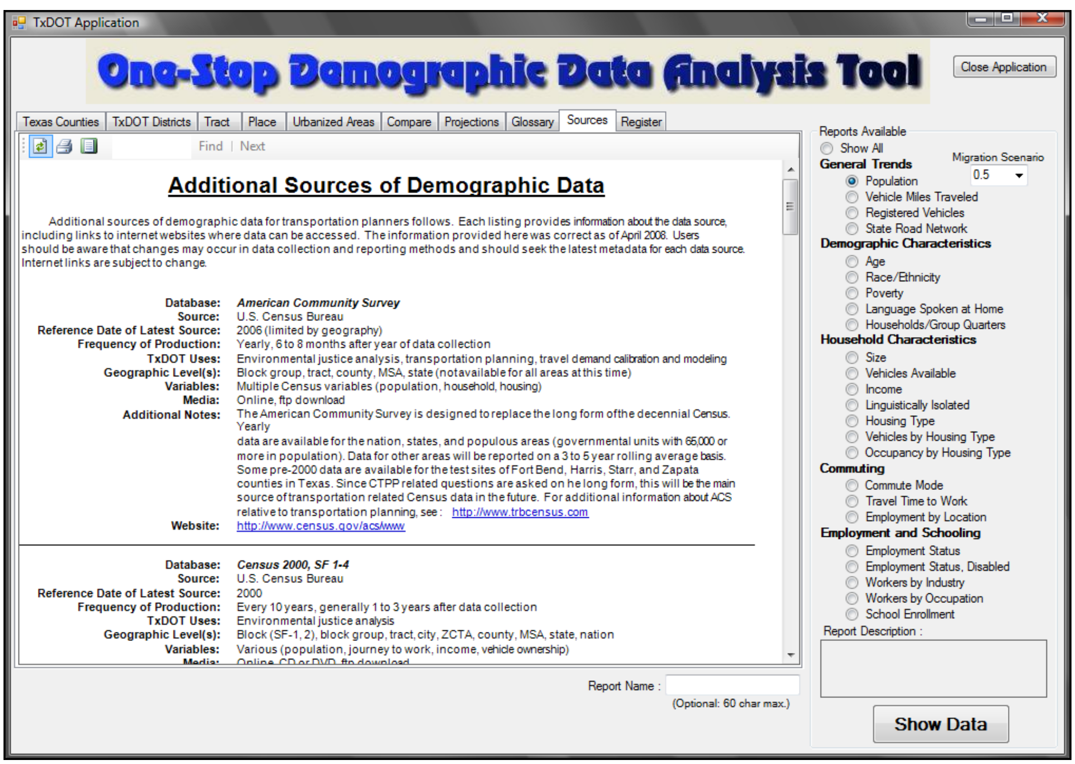


Figure 7: Source Listing

Terms and sources can be searched within each tab page. Click on the white box at the top of the page and type a term to search. For instance, type “vehicles” and click “Find” to search for any case where the term “vehicles” is used. Then click “Next,” and the program will search for the next listing of “vehicles.” Selecting “Next” subsequently will find each additional use of the term “vehicles” until the program reaches the last listed occurrence.

The entire glossary and source list can be printed from each respective tab page by clicking on the printer icon.

The sources are inclusive of the items included on the *One-Stop Demographic Data Analysis Tool* and other items of interest to transportation planners. These listings include direct internet links to the original sources where available. If you have suggestions for additional items, please send an e-mail by clicking on the “Register” page and selecting “Contact Us.” We will consider these suggestions for updated versions of the *One-Stop Demographic Data Analysis Tool*.

Descriptions of Data Included

The *One-Stop Demographic Data Analysis Tool* is designed for transportation professionals who need an easy way to access and report socioeconomic and demographic data for one or more counties, TxDOT Districts, or other geographies. The data included can be found elsewhere, but the program provides a “one-stop” source of demographic and socioeconomic data.

The data included within the *One-Stop Demographic Data Analysis Tool* were derived from the following listed sources. General references are listed below and specific tables are referenced on each report page generated from the program. Users should refer to these sources for more information about the methods, assumptions, and limitations of these data. A brief overview of the methods and assumptions used to derive the population estimates and projections included in the *One-Stop Demographic Analysis Tool* follow this listing of the sources referenced.

General Trends:

Population: U.S. Census 2000 SF-1, Texas State Data Center Estimates and Projections Program (2007 estimates and 2000-2040 Population Projections, 2006 vintage)

Vehicle Miles Traveled: Texas Department of Transportation

Registered Vehicles: Texas Department of Transportation

State Road Network: Texas Department of Transportation

<u>Demographic Characteristics:</u>

Age: U.S. Census 2000 SF-1

Race/Ethnicity: U.S. Census 2000 SF-1

Poverty: U.S. Census 2000 SF-3

Language Spoken at Home: U.S. Census 2000 SF-3

Household/Group Quarters: U.S. Census 2000 SF-1

<u>Household Characteristics:</u>

Household Size: U.S. Census 2000 SF-1

Vehicles Available: U.S. Census 2000 SF-3

Income: U.S. Census 2000 SF-3

Linguistically Isolated: U.S. Census SF-3

Housing Type: U.S. Census 2000 SF-3

Vehicles by Housing Type: U.S. Census 2000 SF-3

Occupancy by Housing Type: U.S. Census 2000 SF-3

<u>Commuting:</u>

Commute Mode: U.S. Census 2000 CTPP

Travel Time to Work: U.S. Census 2000 CTPP

Employment by Location: U.S. Census 2000 Journey to Work and Migration Statistics Branch

<u>Employment and Schooling:</u>

Employment Status: U.S. Census 2000 SF-3

Employment Status, Disabled: U.S. Census 2000 SF-3

Workers by Industry: U.S. Census 2000 SF-3

Workers by Occupation: U.S. Census 2000 SF-3

School Enrollment: U.S. Census 2000 SF-3

Methodology for Estimates of the Total Population of Counties in Texas

The *One-Stop Demographic Data Analysis Tool* includes estimates of the total population for July 1, 2007 for counties, TxDOT Districts, and places. These were completed by personnel from the Texas State Data Center offices in the Institute for Demographic and Socioeconomic Research at the University of Texas at San Antonio and published in September, 2007. In this brief report, the methodology used to prepare the estimates is described. Because of space limitations, only a summary of the methodology is presented. Those wishing to obtain a more complete description of the estimation procedures and of the historical and sensitivity analyses used to select the methods employed in these estimates should contact program personnel in the Texas State Data Center at the University of Texas at San Antonio.

Estimation Methodology

Methodology for County Estimates

The estimates reported for counties are the averages of estimates made using ratio-correlation, component-method II, and housing-unit methods. Ratio-correlation procedures utilize multiple regression techniques with the ratio of variable values for adjacent time periods rather than simply the variable values themselves being used as independent and dependent variables. After an extensive evaluation of the relative accuracy of alternative procedures (including difference-rate, ratio-correlation and rate-correlation methods) and an analysis of alternative variables, a simple ratio-correlation model was employed to complete the final estimates. This model used the variables of births, deaths, elementary school enrollment, vehicle registration, and voter registration.

The component-method II procedure employed utilizes data on births, deaths and elementary school enrollment to estimate population. In this method, migration of the school-age population is assumed to be indicative of migration in the total population (with adjustments being made for the historical differences between the school-age migration rate and the total population's rate of migration). Data on public school enrollment from the Texas Education Agency and data from the Texas State Data Center's survey of private schools in Texas are used to estimate change in the school-age population. Data on institutional populations were obtained from applicable institutions, while data on other special populations, such as the elderly population were obtained from the U.S. Bureau of the Census.

The housing-unit method used is of the standard form with change in the number of housing units in the housing stock of an area, from the base date (in this case, the 2000 Census) to the estimate date (in this case, July 1, 2007), being used to estimate population change. New housing additions and demolitions are taken from the U.S. Bureau of the Census survey of building permits and demolitions and the Texas State Data Center survey of counties and cities issuing permits for residential buildings and demolitions. Both the U.S. Census Bureau's building permit survey and the Texas State Data Center's survey can only collect data from permit issuing county and city jurisdictions (methods for dealing with non-permit issuing places are discussed later). Assumptions about vacancy rates and average household size are then used in conjunction with data on the number of housing units in an estimate area (including those in the area at the base date and the net number of units added to, or subtracted from, the base housing stock for the time period between the base date and the estimate date). Separate estimates are completed by type of structure with the types used being single-family structures, 2-to-4 unit structures, structures with 5 or more units, and mobile homes. For purposes of the 2007 estimates, 2000 vacancy rates and average household sizes for each of the housing structure types were assumed to prevail as of the estimate date of July 1, 2007. For 2007, the estimates of the number of new mobile homes added to an area's housing stock were obtained from the Texas State Data Center's survey of building permits and demolitions. The sum of mobile homes from the survey was subtracted from the U.S. Bureau of the Census' estimate of the total number of mobile homes shipped to Texas. The difference was allocated to jurisdictions on the basis of the change in units in jurisdictions for other housing types from 2000 to the estimate date of July 1, 2007.

The average of the component-method II, ratio-correlation and housing- unit population estimates is used as the population estimate for July 1, 2007 with the total for all counties being controlled to the July 1, 2007 estimate for the State obtained from the U.S. Bureau of the Census. Prior to the release of these estimates, county estimates were evaluated for consistency and reasonableness by comparing them to those from other State and local agencies.

The January 1, 2008 estimates are obtained by adding births to, and subtracting deaths from July 1, 2007 through December 31, 2007, to the July 1, 2007 estimates and assuming that July 1, 2006 to July 1, 2007 rates of migration continue from July 1, 2007 to January 1, 2008. The State and county estimates are obtained using the same method with the sum of the county estimates controlled to the State estimate.

Methodology for Place Estimates

For places, population estimates were made using the same three methods as used for county estimates. To complete the component-method II estimates for places for 2007, standard component procedures were applied to 2000 Census population counts for places. County-level birth and death data for 2000-06 from the Texas Department of State Health Services and 2000-06 data from the Texas Education Agency on public school enrollment and from the Texas State Data Center survey of private schools on enrollment in private schools were used in this procedure. In addition, data on Medicare enrollment and on the net movement of persons from the military to the civilian population were obtained for counties from the U.S. Bureau of the Census. Values for each of these items were allocated from counties to places prior to the completion of the place estimates. Such allocation procedures were necessary because data items that were available for places (such as birth and death data) showed year-to-year fluctuations and reporting errors that made the direct use of place-level data problematic. The general allocation procedures used for these items involved population subgroups closely associated with the item being allocated (i.e., women of child-bearing age for fertility, school-age population for school enrollment, the total population for deaths, persons 65+ years of age for Medicare enrollment, and the population 14-17 years of age for net movement). The number in the appropriate subgroups for each place and the remainder of the county in each county in 2000 were survived (using state-level survival rates for 1999-2001) to July 1, 2007, and the sum of the survived groups in each place and the remainder of the county were controlled to the county total for the item as reported from the appropriate agency to obtain the value for each place. Place estimates were completed for July 1, 2007 and adjusted to account for population changes due to annexations or other boundary changes as obtained from the annual Texas State Data Center Boundary and Annexation Survey.

The housing unit estimates for places were completed using the same general procedures delineated above (for counties) except that it was necessary to use procedures to allocate new housing units and demolitions to places that were not reporting jurisdictions. This was done by taking the difference between the county totals for new building permits and demolitions and the sum of values for places for which data were reported for a county and proportionally allocating the difference to the non-reporting places. For the 2007 estimates, the allocation was done on the basis of the non-reporting places' proportions of county housing stocks as reported in the 2000 Census.

The third method used is the ratio-correlation method. Ratio correlation estimates were made to allocate county populations to places (and non-place areas) using births, deaths and housing units for places as estimation items.

The estimates for place populations from the three methods were averaged to provide a July 1, 2007 estimate of the total population for each place. The sum of the estimated populations for places in each county (and for that part of each county's population not living in places) were controlled to county totals to ensure consistency with the county estimates.

The January 1, 2008 place estimates are prepared using the same extrapolative procedures as described above for the State and county. Place estimates for each county for January 1, 2008 are controlled to the county estimate for January 1, 2008.

Comparisons to U.S. Census Bureau Estimates

The estimates presented here differ from those from sources such as those periodically produced by the U.S. Census Bureau for several reasons. These estimates have been made using techniques that are different than those used by the Bureau. The Census Bureau uses only the distributive housing unit method to estimate place populations and the administrative records method to estimate county populations. Because the administrative records method uses income tax data that are not available to analysts outside the Census Bureau, this technique cannot be used by other agencies. In addition, the estimates reported in the following pages utilize more recent data than those used by the U.S. Bureau of the Census. The Census Bureau's county estimates utilize 2006 birth and death data, whereas 2007 values were employed in the Texas State Data Center estimates reported here. Also, the Census Bureau utilizes birth and death data only in their county level estimates while the Texas State Data Center includes current births and deaths in both county and place level estimates. Finally, the Census Bureau estimates do not include information on annexation and boundary changes for places later than 2003 whereas information through 2007 was included in the estimates completed by the Texas program. Because of these differences, the population estimates presented here and those from the U.S. Bureau of the Census are not directly comparable.

Methodology for Projections of the Total Population of Counties in Texas

Introduction

The *One-Stop Demographic Data Analysis Tool* includes projections of the total population of Texas counties (districts) for ten year intervals between 2010 and 2040. These were prepared by personnel from the Office of the State Demographer and the Texas State Data Center in the Institute for Demographic and Socioeconomic Research at the University of Texas at San Antonio and published in October 2006. These projections, like all projections, involve the use of certain assumptions about future events that may or may not occur. Users of these projections should be aware that although the projections have been prepared with the use of detailed state-of-the-art methodologies and with extensive attempts being made to account for existing demographic patterns, they may not accurately project the future population of the State or of particular counties in the State. These projections should be used only with full awareness of the inherent limitations of population projections in general and with particular and detailed knowledge of the procedures and assumptions delineated below which characterize the projections presented in this report.

These projections are of the total population of the State and of all counties in the State for each decade between 2010 and 2040. They are thus similar in form to those released by the program in previous years (see Texas Population Estimates and Projections Program 2000-2040 released in 2004) but have been revised using post-2000 census and other enhanced data bases. The fully detailed projections of the population in each age, sex and racial/ethnic group for each county and the State for each year from 2000 through 2040 are available in electronic forms for the State and all counties in the State and can be requested from the Texas State Data Center at the Institute for Demographic and Socioeconomic Research at the University of Texas at San Antonio.

This summary provides a relatively detailed description of the projection methodology and then discusses the bases for, and the assumptions used in, creating the alternative projection scenarios. It concludes with a description of the products available from the projection process.

Projection Methodology

The projections were completed using a cohort-component projection technique. As the name implies, the basic characteristics of this technique are the use of separate cohorts--persons with one or more common characteristic--and the separate projection of each of the major components of population change--fertility, mortality and migration--for each of the cohorts. These projections of components for each cohort are then combined in the familiar demographic bookkeeping equation as follows:

$P_{t2} = P_{t1} + B_{t1 - t2} - D_{t1 - t2} + M_{t1 - t2}$

Where:

P_{t2} = the population projected at some future date $t_1 - t_2$ years hence
P_{t1} = the population at the base year t_1
$B_{t1 - t2}$ = the number of births that occur during the interval $t_1 - t_2$
$D_{t1 - t2}$ = the number of deaths that occur during the interval $t_1 - t_2$
$M_{t1 - t2}$ = the amount of net migration that takes place during the interval $t_1 - t_2$

When several cohorts are used, P_{t2} may be seen as:

$$P_{t2} = \sum_{i=1}^{n} P_{ci\,,\,t2}$$

Where:

P_{t2} is as in the equation above
$P_{ci,t2}$ = population of a given cohort at time t_2 and
$P_{ci\,,\,t2} = P_{ci\,,\,t1} + B_{ci\,,\,t1 - t2} - D_{ci,\,t1 - t2} + M_{ci\,,\,t1 - t2}$

Where:

all terms are as noted above but are specific to given cohorts c_i

In this, as in any other use of the cohort-component technique at least four major steps must be completed:

1. The selection of a baseline set of cohorts for the projection area or areas of interest for the baseline time period (usually the last census and for other dates for which detailed base data are available);
2. The determination of appropriate baseline migration, mortality, and fertility measures for each cohort for the baseline time period;
3. The determination of a method for projecting trends in fertility, mortality and migration rates over the projection period;
4. The selection of a computational procedure for applying the rates to the baseline cohorts to project the population for the projection period.

Each of these steps as performed for the Texas State Population Estimates and Projections Program's projections are briefly discussed in the pages which follow.

Selection of Baseline Cohorts

The baseline cohorts used in the projections are single-year-of-age cohorts for males and females of Anglo, Black, Hispanic and Other racial/ethnic groups extracted from the PL94-171 and Summary File data bases from the 2000 Census of Population and Housing. Population data for 2000 were used as the starting base because they provide the last complete count information available.

The development of 2000 Census-based baseline populations is essential if baseline rates of fertility, mortality, and especially migration are to be computed and the projections are to provide meaningful comparisons with population values for past time periods and projections. As described below, ensuring relative comparability of such baseline populations was more difficult than in the past.

The baseline populations for these projections consist of four groups. These are an Anglo, Black, Hispanic, and an Other population group. In general these consist of Non-Hispanic Whites who are referred to as Anglos, Non-Hispanic Blacks or African Americans, Hispanics of all races, and persons in all other non-Hispanic racial groups referred to as the Other population group. However, because the 2000 Census allowed respondents to indicate more than one racial identity decisions had to be made about the classification of persons in 126 race categories (63 racial combinations each for Hispanic and Non-Hispanic ethnic groups). This required an extensive evaluation of several classification alternatives which are described in general terms below. A more complete description of this evaluation is provided at:
http://txsdc.utsa.edu/tpepp/2006projections/.

In general, the results of the 2000 Census showed a relatively small percent of persons in Texas (about 2.5 percent) indicated they were members of 2 or more racial heritages suggesting that most persons (97.5 percent) identified with a single racial group. Similarly, an examination of Hispanic populations indicated that they showed racial identification patterns similar to those in 1990 (i.e. nearly all identified themselves as either White or in the Other racial group).

Given these patterns, Hispanics from all racial groups were placed in the single group of Hispanics of all races. Thus persons in 63 of the 126 categories were classified as Hispanic. Within the 63 non-Hispanic categories, more than 97.5 percent identified themselves as in one of the single racial/ethnic group of: Non-Hispanic White; Non-Hispanic Black; Non-Hispanic Asian; Non-Hispanic American Indian or Alaskan Native; Non-Hispanic Native Hawaiian or other Pacific Islander, or Non-Hispanic Other. Persons in these groups were classified as in previous projections with Non-Hispanic Whites being placed in the Anglo category, Non-Hispanic Blacks in the Black group, and all other persons placed in the Other population group. This allowed for classification of 6 of the 63 Non-Hispanic groups. Forty-two non-Hispanic categories consisted of persons indicating identification with 3 or more racial groups. Given that persons in these 42 groups accounted for less than one-tenth of one percent of the Texas population and that there is no agreed upon procedure for allocating these persons to single racial groups, they were allocated to the Other population category. The above procedures provided for the classification of persons in the 63 racial groupings in the Hispanic category and for persons in 48 of the 63 non-Hispanic racial groupings.

The remaining 15 non-Hispanic categories involved two-race combinations. Persons in the six two-group categories of the combination of base groups with the Other race category were allocated to the Other population category (i.e. that is persons in the American Indian or Alaskan Native and Asian; American Indian or Alaskan Native and Native Hawaiian or Pacific Islander; American Indian or Alaskan Native and Other; Asian and Native Hawaiian or Pacific Islander; Asian and Other; and Native Hawaiian or Pacific Islander and Other groups were allocated to the Other population category). Based on examinations of several alternatives as described at *http://txsdc.utsa.edu/tpepp/2006projections/* and an assessment of other literature on racial/ethnic identification, all two race combinations involving Blacks (including persons who identified themselves as Black and White) were placed in the Black category and the remaining four two-race combinations involving Whites were placed in the White category.

The use of these classifications allowed for the creation of 4 mutually exclusive groups (i.e., Anglo, Black, Hispanic, and Other) that are quite comparable to those used in 1990. However it must be recognized that complete comparability between pre-2000 Census and 2000 Census data is not possible (again see *http://txsdc.utsa.edu/tpepp/2006projections/*).

The potential projection of two other subgroups was examined but a decision made not to include separate projections for these groups in this set of projections. These were an Asian and a multi-race group. They were not included because of the small number of persons in these groups in many counties and, in the case of multiple race groups, a lack of historical data for rate computations. The creation of projections for these groups for the State and selected counties will be considered for future projections.

It was also necessary to adjust the base population for "special populations". Special populations are populations who reside in an area, usually in institutional settings, who do not generally experience the same demographic processes over time as the indigenous population in the area. Rather, they tend to come into and leave an area at fixed intervals. Examples of such populations are college populations, prison populations, military base populations, and other persons in institutional settings. Because their movement into and out of an area is a function of events (e.g., enrollment, graduation, incarceration) which are not determined by local socioeconomic conditions, special populations must be removed from the base populations of projection areas before birth, death and migration rates are applied to the base population. If special populations of substantial size are not removed, they will create distortions in age and other characteristics of the population that will remain in the population through the cohort aging process and create inaccuracies in the projections. Special populations are, therefore, generally removed from the cohort base, the base cohorts projected forward and a separate projection of the special population for the projection date is added to the projected base cohorts to obtain the projection of the total population.

In Texas, several continuing special population groups are especially large and must be removed from base populations. These are college and university populations, state prison populations, military populations, and populations in other State institutions. In the projections presented here, each of these groups was removed from the base population of the counties in which they are located by subtracting these special populations from the 2000 population reported in the Census for these counties. Since these special populations must be subtracted from base populations that are age, sex and race/ethnicity specific, it was necessary to obtain age, sex and racial/ethnic detail for the special populations. This was done for the college populations by obtaining information on college enrollment for each public college and university in the State for 2005 by age, sex and race/ethnicity from the Texas Higher Education Coordinating Board. For prisons, information on the age, sex and race/ethnicity of prisoners in each institution in 2005 was obtained from the Texas Department of Criminal Justice. For both college enrollments and prisons, the most recent projected values from the appropriate agencies (Texas Higher Education Coordinating Board and the Texas Department of Criminal Justice) for the periods after 2000 were incorporated in the projections. For other institutions, information on age, sex and race/ethnicity were obtained from the group quarters data from the 2000 Census and updated with post-2000 Census data.

Given the distributions of the special populations by age, sex and race/ethnicity, it was then possible to subtract the special populations from the baseline 2000 Census cohorts to obtain a baseline set of cohorts free from the influence of special populations. These procedures for baseline cohorts were completed for all counties in the State. However, following standard practice, special populations were removed from the base population only when they made up five percent or more of the population of the area. For counties with special populations of sufficient size, the baseline cohorts without special populations are projected forward and projections of special populations for the projection years are added to the projections for the baseline cohorts to obtain projections of the total population.

Determination of Baseline Fertility, Mortality and Migration Rates

Baseline rates for fertility and mortality are identical to those used in the 2004 projections as are the migration rates for the 0.0, 0.5, and 1.0 scenarios. However, projection values under the 0.0, 0.5, and 1.0 scenarios will differ slightly from those in the 2004 projections because of projected changes in special populations. Therefore, the rates are as described below.

Fertility Rates

Age, sex and race/ethnicity specific fertility rates were computed using births by age, sex and race/ethnicity and place of residence of the mother. The numerators for such rates are the average number of births for 1999, 2000 and 2001 for mothers in each age, sex and race/ethnicity group and the denominators are the population counts by age, sex and race/ethnicity in 2000. Birth data to compute the rates were obtained from the Texas Department of Health and data on women by age (10-49 years) and race/ethnicity were obtained from the 2000 Census of Population. These data showed total fertility rates for Anglos, Blacks, Hispanics and the Other racial/ethnic group in 2000 that were 1.92, 2.05, 2.85 and 1.89 respectively.

Mortality Rates

To obtain baseline mortality measures, survival rates by single years of age, for both sexes and for each of the racial/ethnic groups were needed. Survival rates for Anglos, Blacks, Hispanics, and the Other racial/ethnic category were computed using death data from the Texas Department of Health for 1999, 2000 and 2001.

Migration Rates

Migration is the most difficult component process to project and for which to obtain baseline rates. For the Texas State Population Estimates and Projections Program's projections, rates were derived using a standard residual migration formula. Thus, births and deaths by age, sex and race/ethnicity cohort were added or subtracted (as appropriate) to the 1990 population to produce an expected 2000 and for post-2000 projections expected populations for later periods. This expected population was compared to the actual Census count to estimate net migration for 1990-2000 and subsequently for later post-2000 time periods.

Projection of Trends in Fertility, Mortality and Migration

An examination of post-2000 patterns in 2004 revealed that the projections of future survival rates for persons 75 years of age or older were underestimated and fertility rates for Anglos and Hispanics were assumed to decline too rapidly. These new (2006) projections show the same fertility and mortality (survival) rates for future periods as used in the 2004 projections. Long-term target levels remained as in the 2001 projections but fertility and survival levels found to prevail for 2000-2004 were assumed to continue to 2005 and trended linearly after that to targeted levels for 2030 and thereafter.

Projections of Fertility

To project future rates of fertility, county and State-level projections were assumed to follow historical patterns and trends. Trends in fertility were based on 1990 to 2001 trends in fertility. Evaluation of these age and race/ethnicity-specific fertility rates in Texas showed patterns of slightly increased fertility among Anglos from 1990-2000. Rates for Blacks showed a decrease of nearly 14 percent from 1990 to 2000. Hispanics showed a decline of more than 6 percent in fertility from 1990 to 2000. Anglo total fertility rates were 1.80 in 1990 and increased to 1.92 by 2000. The rates of the Other racial/ethnic group decreased from a total fertility rate of 2.04 in 1990 to 1.89 in 2000. The Black total fertility rate decreased from 2.38 in 1990 to 2.05 by 2000. The total fertility rate of Hispanics showed a decline from 3.05 in 1990 to 2.85 in 2000.

Given these patterns and the well established long-term pattern of decline in fertility in other developed nations (Frejka and Kingkade, 2001) and the decline in fertility among Black, Hispanics and Others from 1990 to 2000, rates were trended downward for the projection period with a lower limit set to be equal to the average fertility for low-fertility European counties in 2000, rates many believe are at levels unlikely to be reduced further (Frejka and Kingkade, 2001). For all groups 2000 rates were trended to 2000-2004 levels and were assumed to reach target levels indicated below. For Anglos, the 2000 total fertility rate of 1.92 was assumed to reach the total fertility levels of 1.60 by 2030, and remain at that level for the remainder of the projection period. For the Other population group, fertility is assumed to be reduced to 1.6 by 2030, and remain at that level. Black rates are assumed to show declines from a total fertility rate of 2.05 in 2000 to 1.60 in 2030 and later. Hispanic fertility is assumed to decline from 2.85 in 2000 to 2.35 in 2030, and 2.20 in 2040. Total fertility levels were interpolated for intermediate years between the target years and age and race/ethnicity specific rates for women 10-49 years of age developed for each TFR for each year assuming the age structure of fertility for 2000. This produced State-level age and race/ethnicity specific birth rates for each year from 2000 through 2040.

For the projections reported here, single-years of age, sex and race/ethnicity specific fertility rates and total fertility rates for 2000 were computed for counties using the data and procedures described above. The counties' trends in fertility for the projection period from 2000 to 2040 were then projected by assuming that the county's future fertility would follow the State trend.

Specifically, this involved computing a ratio between the age and race/ethnicity specific birth rate for each age and racial/ethnic group for each county and the comparable State age and race/ethnicity specific birth rate for 1999-2001. This ratio for each age and race/ethnicity specific birth rate for each county was then multiplied by the projected State rate for each of the projection years with the State rates used in the multiplication being those with the trends noted above.

Projections of Mortality

The projections of mortality for the projection period were made with county and state rates being assumed to follow national trends for the projection period and 1999-2001 county and state age, sex and race/ethnicity survival rates being ratioed to national age, sex, and race/ethnicity specific survival rates. The national rates were obtained from the Population Projections Branch of the U.S. Bureau of the Census and reflect recent long-term projections of mortality (Hollmann et al., 2000; U.S. Bureau of the Census, 1996; 2000).

Survival rates were ratioed to the projected survival rates for the Nation. The national projections used show a life expectancy for Anglo males of 73 in 1990, and 81 by 2050. For Anglo females the values were 80 and 86. The values for Black males were 66 and 71 and for females were 74 and 79. The life expectancies for Hispanics were 75 and 81 for Hispanic males and 83 and 87 for Hispanic females. For Others the values were 78 years for males for 1990 and 85 for 2050, and 85 and 91 for females. Life table survival rates for the State and counties for 2000 were ratioed to national rates for 2000 and these rates applied to projected national rates for each year from 2000 through 2040.

Projections of Migration

The migration component is the most difficult to project. For the Texas State Population Projection Program's projections, the age, sex and race/ethnicity specific net migration rates (calculated in the manner described above) were used to arrive at four alternative scenarios (described in the following pages) by systematically altering the assumptions related to the entire set of age, sex, and race/ethnicity specific net migration rates. No attempt was made to develop separate scenarios for specific age groups or to formulate scenarios using different assumptions for each of the racial/ethnic groups.

Special Considerations in the Projection of Component Rates

The computation and projection of fertility and migration rates at the county level is sometimes problematic for counties with small population bases. Given the use of 4 racial/ethnic groups, 2 sexes and 85 age groups, a total of 680 cells of data were employed for each county. In counties with small populations in which either the baseline population used as the denominator to compute rates and/or the number of events used in the numerator (i.e., births or net migrants) was too small to produce reliable and reasonable rates, it was necessary to develop a means of obtaining reasonable rates.

In order to obtain reasonable rates for counties for which problems were identified, rates for larger groupings of areas with characteristics similar to the counties for which alternative rates were necessary were used to develop homogenous groupings of areas. Council of Government Regions and county types within regions were used. All counties within Council of Government (COG) regions were thus divided into four groups--metropolitan central city counties, metropolitan suburban counties, nonmetropolitan counties that are adjacent to metropolitan counties, and nonmetropolitan counties that are not adjacent to metropolitan counties. The rates for these groupings were used because analyses across time have indicated that the rates for these 4 types show substantial homogeneity across areas within each grouping but substantial differences among the groupings. Rates were completed for each of these four county types within each region and for the four types for the State as a whole (by using the aggregate populations of counties within each type within each region and/or the total State population by type).

For counties with problematic rates, rates for the county type of which the county was a member for the COG region where the county was located were substituted only for the problematic rates for those age, sex, and race/ethnicity groups for which the rates computed with the county's own population data were deemed to be problematic. For a few regions for a few racial/ethnic groups, even the COG rates were problematic. In such cases, the State rate for the county type was substituted for the county rate. Finally, in a very few cases even the state-level status was not acceptable and the overall state rate for the racial/ethnic group was used. It is important to stress that this procedure does not result in the rates for all age and sex groups for a given racial/ethnic group being replaced by regional or State averages. Rather, replacements are made for only those rates for age, sex, and racial/ethnic cohorts within counties which had problematic values. Thus, county-level differentials in demographic patterns are maintained in the population projections.

Counties were deemed to have unreasonable age-specific fertility rates if they exceeded the mean rates for an age race/ethnicity group for the county type of which they were a part by more than two standard deviations or were greater than 25 percent for any single year for any age, sex and race/ethnicity group. State-level age specific fertility rates for the county types were used for substitutions for fertility because of instability even in COG level rates. In addition, data on the fertility levels of women in the Other group indicated that only a few counties had age-specific rates that were sufficiently stable to be used in the projections. For all other counties, the age and race/ethnicity specific rates used for the Other racial/ethnic group were the State-level age, sex and race/ethnicity specific rates for the Other race/ethnicity group.

Migration rates are more variable across areas such that the use of means was not possible and would have improperly altered rates for rapidly and slow growing areas. Limits were used instead of statistical means. These limits were based on the upper and lower limits seen as feasible for migration. Unreasonable migration rates were designated as those in which per-person-per-year rates were 0.10 or greater (a rate that allows up to 10% migration per single-year age group per year). Since migration rates can have either positive or negative values, this allowed migration rates to vary between -0.10 and 0.10 per-person-per-year for each age, sex and race/ethnicity cohort. The counties identified as having problematic fertility and/or migration rates were largely nonmetropolitan, most with relatively small populations.

Although the procedure described above was generally adequate for rate adjustments, for some counties the migration rates were problematic in yet another manner. The use of historical rates often resulted in substantially higher rates of net migration for one sex than the other. Such an imbalance cannot be expected to continue over the entire projection period. The ratio of male rates relative to female rates for each age was examined by computing means for each ratio and analyzing standard deviations for such means. From this analysis, it was decided that a ratio greater than 2 should result in a replacement of the migration rate. Given this, rates were adjusted to be no larger than twice the ratio of male to female rates or visa versa at the COG and State levels within county types for the same age, sex, and race/ethnicity group (i.e., metropolitan central city, metropolitan suburban, nonmetropolitan adjacent, and nonmetropolitan nonadjacent). If the ratio of male to female migration rates for a county of a given type for any age exceeded this limit for the COG type, its rate for that age, sex, and race/ethnicity was replaced with that for the county type for the COG. If the COG's rate for the county type was still problematic, the rate for that county type for the State as a whole was substituted for the county rate. Again, as for fertility and mortality rates, for a very few rates for a few areas even state-level county-type specific rates were unacceptable and state-level rates by age, sex, and race/ethnicity were used. The use of this procedure resulted in substantially more balanced sex ratios in the final projections.

The Computation and Selection of Future Projection Scenarios

In this section, both the assumptions underlying the projection scenarios and the final computational procedures are described. For both, the emphasis is placed on the logic underlying the scenarios and procedures rather than on the detailed computational processes. Those interested in greater detail may consult several readily available references on the subject (Murdock et al., l987; Pittenger, 1976; Murdock and Ellis, 1991; Smith, Tayman and Swanson, 2001) or may contact the personnel involved in the Projection Program in the State Demographer's Office in the Institute for Demographic and Socioeconomic Research at the University of Texas at San Antonio.

The Projection Scenarios

Four projection scenarios which produce four alternative sets of population values for the State and each county are presented in these projections. These scenarios assume the same set of mortality and fertility assumptions in each scenario but differ in their assumptions relative to net migration. The net migration assumptions made for three scenarios are derived from 1990-2000 patterns which have been altered relative to expected future population trends. This is done by systematically and uniformly altering the adjusted (as noted above) 1990-2000 net migration rates by age, sex and race/ethnicity. The scenarios so produced are referred to as the zero migration (0.0) scenario, the one-half 1990-2000 (0.5) scenario, and the 1990-2000 (1.0) scenario. The fourth scenario uses 2000 to 2004 estimates of net migration with the 2004 population values being taken from the Texas State Data Center age, sex and race/ethnicity estimates.

The Zero Migration (0.0) Scenario

The zero scenario is a scenario which assumes that inmigration and outmigration are equal (i.e., net migration is zero) resulting in growth only through natural increase (the excess or deficit of births relative to deaths). This scenario is commonly used as a base in population projections and is useful in indicating what an area's indigenous growth (growth due only to natural increase) will be over time. In general, this scenario produces the lowest population projection for counties with historical patterns of population growth through net inmigration and the highest population projection for counties with historical patterns of population decline through net outmigration.

The One-Half 1990-2000 Migration (0.5) Scenario

This scenario has been prepared as an approximate average of the zero (0.0) and 1990-2000 (1.0) scenarios. It assumes rates of net migration one-half of those of the 1990s. The reason for including this scenario is that many counties in the State are unlikely to continue to experience the overall levels of relative extensive growth of the 1990s. A scenario which projects rates of population growth that are approximately an average of the zero and the 1990-2000 scenarios is one that suggests slower than 1990-2000 but steady growth.

The 1990-2000 Migration (1.0) Scenario

The 1990-2000 scenario assumes that the trends in the age, sex and race/ethnicity net migration rates of the 1990s will characterize those occurring in the future of Texas. The 1990s was a period characterized by rapid growth. It is seen here as the high growth alternative because its overall total decade pattern is one of substantial growth (i.e., 22.8% for the 1990-2000 decade for the State). Because growth was so extensive during the 1990s it is likely to be unsustainable over time and thus this scenario is presented here as a high growth alternative. For counties that experienced net outmigration during the 1990s, this scenario produces continued decline.

The 2000-2004 Migration Scenario

The 2000-2004 projection scenario provides a scenario that takes into account post-2000 population trends. In the State overall and in some counties the post-2000 period has resulted in reduced levels of net migration. In other counties post-2000 net migration rates have been greater than those of the 1990s. Under this scenario the 2000-2004 age, sex and race/ethnicity specific migration rates are assumed to prevail from 2000 through 2040. This scenario allows those users who believe that the 2000-2004 period has produced fundamental long-term changes in population patterns to ascertain the likely future size and characteristics of the population.

Computation of Future Populations

Given the projected rates and scenarios noted above, the computation of the projected population was completed using standard cohort-component techniques as described above with all computations being completed on an individual year and age basis for each sex and racial/ethnic group. Base population values for 2000 were used as the starting values and populations were projected for each year from 2001-2040. Because of the need to ensure that the sum of county projections produces reasonable future populations for the State as a whole, the State's future population by age, sex and race/ethnicity was first independently projected under each of the scenarios described above. County base cohorts were projected to the projection date and projected special populations added to the projected base populations for the appropriate counties. Projected populations of colleges and universities for future years were taken from projections by the Texas Higher Education Coordinating Board(2005), values for existing prison populations and correspondence concerning plans for future prison facilities were acquired as of July 2005 from the Texas Department of Criminal Justice. All other institutions were maintained at 2000 levels as indicated in the 2000 Census. The State-level projections were then used as control totals for the sum of county projections for each age, sex and racial/ethnic group. The projections so produced and controlled for each scenario are those provided here as projections of the population of the State and of each county in the State.

Recommended Scenario

Many users want to know which projection scenario to use for various forms of analysis and thus we generally recommend a specific scenario for use in most counties. At the same time, it is important to note that other scenarios may be more appropriate for a given county for a given period of time.

From our analyses of these projection scenarios, we believe that the 0.5 scenario is the most appropriate scenario for most counties for use in long-term planning. This recommendation is suggested for several reasons.

First, the 1990-2000 period was a period of expansive growth in the Texas economy. There has been a general slowdown in the U.S. and Texas economies since 2000 that is likely to slow population growth. Although a recovery is occurring, it is uncertain at this time when it will be complete. At the same time, we believe that the substantial changes shown for 2000-2004 for many areas are unlikely to prevail over the long run in most areas, thus its use for long term projections such as those produced here seems ill advised. The 0.5 scenario produces a statewide annual rate of growth of approximately 1.5, percent slower than 1990-2000 but still substantial growth, given the 2000 population base. It thus represents a rate of growth more moderate than the rapid growth of the 1990s but one that produces substantial population growth in the State.

Second, the 2000 Census count showed a substantially larger U.S. and Texas population than was anticipated. Although the Census Bureau has not fully determined the reasons for this, it is likely that the 2000 count included persons who were missed in 1990. Since residual migration measures classify such persons as 1990-2000 migrants and three of the scenarios are based on 1990-2000 migration patterns, it is possible that the migration rates for some groups, for some periods, for some counties are too high suggesting the use of a more moderate rate of growth scenario.

Third, although the scenarios use trends in births and deaths, they assume constant levels of migration. Such an assumption is used because of the lack of historical data of sufficient specificity to trend these rates over time. Our analyses of such rates suggest that it is unlikely that such trends (especially in some key groups) will continue at the level of the 1990s. At the same time, the overall direction of trends and differences among racial/ethnic groups seem likely to continue suggesting the need for the use of a scenario that is based on 1990-2000 trends in migration but shows slower growth?-the 0.5 scenario.

Finally, higher than expected birth rates and elderly survival rates from 2000 to 2004 resulted in an alteration of projected fertility and mortality rates so that larger populations are projected under the 0.0, 0.5 and 1.0 scenarios. Because all four projection scenarios use the same fertility and mortality projections, the projected values for the three scenarios used in the previous (2004) projections are higher in this (2006) set of projections than in the previous projections. As a result, the rates of growth shown for the 1.0 scenario have become even higher and even more difficult to sustain over the projection period. This serves as an additional factor further recommending the use of the 0.5 scenario for long-term planning purposes.

As noted above, we recommend the 0.5 scenario for the long-term planning purposes for which these projections are produced. However, for those who intend to use the projections for relatively short-term (i.e., 3-10 year) planning purposes or who believe the 2000-2004 period is indicative of long-term trends, the 2000-2004 scenario may be preferable.

Selected Items included in the One-Stop Demographic Data Analysis Tool

The *One-Stop Demographic Data Analysis Tool* includes the latest population projections prepared by the Texas State Data Center and the Institute for Demographic and Socioeconomic Research at the University of Texas at San Antonio. In addition, the program includes a series of projections of household and socioeconomic characteristics which use the various population projection scenarios as a basis to which future trends are extrapolated. These projections of household and socioeconomic characteristics are intended as a means of understanding the potential impacts of population and demographic change on the State of Texas and its counties and regions. With the exception of the data relative to disabilities, these household and socioeconomic characteristic projections utilize prevalence rates from the 2000 Census which are applied to the various population projection scenarios. These methods are often used in projecting long-term trends in socioeconomic characteristics to understand the implications of demographic changes on population based service demand (1) (2) (3) (4). These projections are intended for long-term planning and are not intended to supplant or substitute for those made by agencies that clearly use more detailed procedures for short-term projections or local demographic analyses with specific data for a particular area. The accuracy of these projections will be affected by any changes in characteristic rates that may have occurred since 2000. These data were projected for counties and controlled to a separate State projection. These items are available for reporting at county, TxDOT District, Council of Governments, and Metropolitan Statistical Area geographies. End-users can report data separately for each selected area or as a sum total for all areas selected. End users can choose specific dates between 2000 and 2040 (5 year increments). The following section provides information on the items included and the ways in which they were derived.

Population by Age Group:

Descriptions of the methods used to produce population projections have been presented in the previous section. In addition to the total population and population density reported in the Population Report of the *One-Stop Demographic Data Analysis Tool*, population projections by 5-year increments (2000 – 2040) can be reported for the total population and combinations of age, race/ethnicity, and sex. Data are reported for ages 0-4, 5-14, 15-19, 20-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, and 85+.

Specialized Age Group:

In addition to the age group report, population data are reported for broader ranges of ages and by race/ethnicity and sex. These age groups include ages 0-4, 5-15, 16-18, 19-64, and 65+. These represent special age groups (school age, working ages, and elderly).

Households and Household Characteristics:

Total Households and Households by Owner/Renter Occupancy: The householder (headship) rates by race/ethnicity and age for 2000 were applied to the different population projection migration scenarios to derive household projections. These resulting household projections were further divided by applying owner/renter occupancy rates by age, sex, and race/ethnicity of the householder for 2000 to the projected households.

Household Population and Average Household Size: In order to account for group quarter population, household populations were estimated by assuming the same ratios of household population to total population as were present in 2000. Average household sizes were obtained by dividing the total household population for a given year by the total projected households for that same year.

Family Households in Poverty: Family households were derived by applying household-type-specific rates for 2000 by age and race/ethnicity. Family households were further characterized by poverty status, by applying 2000 family poverty rates by age and race/ethnicity of the householder to the projected family households.

Households without Vehicles: The number of households without vehicles was derived by applying vehicle ownership rates by age, sex, and race/ethnicity of the householder for 2000 to the household projections.

Households by Income: Projections of the number of households by 12 categories of household income in 1999 dollars are reported within the One-Stop Demographic Data Analysis Tool. The number of households by household income was derived by calculating the ratio of households by 16 categories of household income to total households by age, sex, and race/ethnicity of householder for 2000. These ratios were then applied to the projections of households according to the age, sex, and race/ethnicity of householder. Median household income is calculated from the resulting grouped data and is reported for counties, TxDOT Districts, MSAs, and COGs.

Civilian Labor Force:

Total Labor Force, Labor Force by Sex and Race/Ethnicity: Projections of the Civilian Labor Force were obtained by applying rates of labor force participation by age, sex, and race/ethnicity in 2000 to each population projection scenario. These refer to the population living in a county that are employed regardless of the location of employment, and thus will differ from other workforce projections based upon employment location.

Projections of Persons with at Least 1 Disability (Total Disabilities) and Persons with Mobility Impairments (Out-of-Home Disabled):

Projections of the total disabled population age 5 and older and the disabled population age 16 and older who had a "difficulty going outside the home alone to shop or visit a doctor" were prepared for the *One-Stop Demographic Data Analysis Tool*. The projections incorporate the U.S. Census Bureau measures of disability which define a disability as a long-lasting physical, mental, or emotional condition that limits a person's ability to walk, climb stairs, dress, bathe, learn, or remember [18, 19]. The total disabled population is sometimes used as a measure of public transportation demand and is incorporated within some public transportation funding formulas. At the same time, the numbers for the total "out-of-home" disabled have been recommended for public transportation demand planning [20, 21].

Similar to projections of other population and socioeconomic characteristics incorporated within the *One-Stop Demographic Data Analysis Tool*, the projections of the disabled population were prepared by applying prevalence rates to the population resulting from the different projection scenarios. However, the projections of the disabled population differed in two significant ways: 1) prevalence rates were obtained from the 2006 American Community Survey instead of the 2000 U.S. Census; and 2) the projections were based upon age and sex (but not race/ethnicity) specific disability rates. Prevalence rates were obtained from the American Community Survey because U.S. Census Bureau reviews of disability measures, and in particular those related to out-of-home and employment disabilities, indicated that disabilities were likely over-reported in the 2000 Census stemming from possible misinterpretation of written instructions in the mail survey [22, 23]. Although the question contents remained the same, the order of the disability questions and additional instructions were provided beginning with the American Community Survey of 2003 resulting in more reliable reporting of disabilities. In addition, the American Community Survey of 2006 was the first to include both household and group quarter's population which allowed for calculation of prevalence rates for the entire population.

The proportion of the population with a disability is influenced greatly by the presence of older populations since disabilities increase with age [22, 24-27]. Disability rates were calculated by dividing the number of males and females in each age group by the total number of males and females for that same group. These rates were calculated for the State of Texas as a whole and for 63 different regions within the State. The 63 areas were created by modifying the U.S. Census Bureau's Public Use Microdata Areas (PUMAs). PUMAs represent the areas from which the Public Use Microdata Sample (PUMS) data are derived – areas which represent no less than 100,000 people as of the 2000 Census. Since PUMAs can represent areas of more than one county or many Census Tracts within a larger county, PUMAs (and the associated PUMS data) were combined so that the rates were associated with a single county or a combination of counties (see Figure 8). Once area specific rates of total and out-of-home disabilities were obtained, these rates were applied to the four population projection scenarios produced by the Texas State Data Center. Disability rates for each combined PUMA area were applied to the 2000 base population of the covered counties and for 5-year projections to 2040 for each gender and age group combination. Similarly, disability rates by age group and sex were applied to the population projections for the State as a whole. County projections were controlled to the State projects.

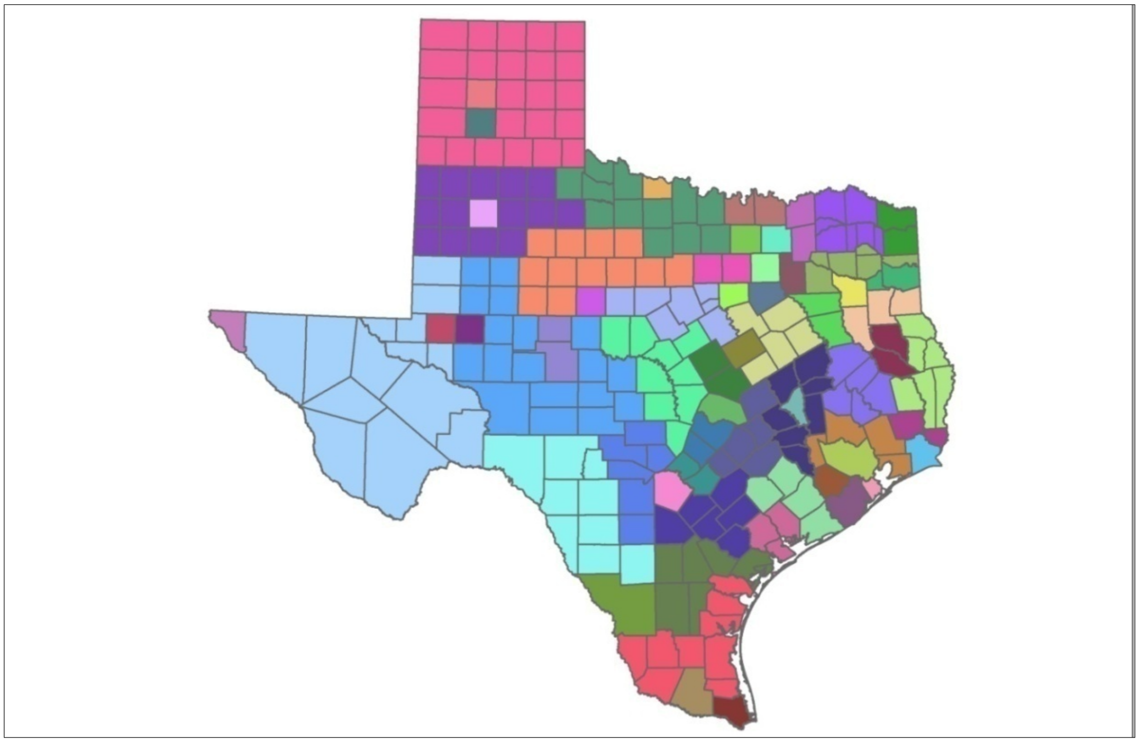


Figure 8: Consolidated PUMAs (in Color) and County Boundaries

Like all estimates and projections of populations and sub-populations, there is a degree of uncertainty assumed based on the difficulty of the task of predicting future demographic characteristics. In addition to these inherent limitations, additional cautions should be noted when using these data for planning purposes. These projections include projected populations of the total and out-of-home disabled. These projections were prepared using rates relevant to the entire population and were applied to the total population within a county, regardless of household or Group Quarters residence. Thus, for some counties with large institutionalized populations, the projected populations reflect the total number of people with these types of disabilities irrespective of their ability to access transportation services should they choose to do so (for instance, prison populations). The two largest of these populations include those living in correctional facilities (typically younger and male) and those living in nursing homes (typically very old and female).

Glossary of Data Terms

Age: Age is reported by five year age groups. Reported ages reflect a person's age as of April 1, 2000 (U.S. Census date).

Aggregate Income (see Income)

Aggregate Travel Time (see Travel Time)

Daily Vehicle Miles Traveled (see Vehicle Miles Traveled)

Disability Status*: A long-lasting physical, mental, or emotional condition. This condition can make it difficult for a person to do activities such as walking, climbing stairs, dressing, bathing, learning, or remembering. This condition can also impede a person from being able to go outside the home alone or to work at a job or business.

Employment Density: A measure of commuting into and out of an area. Data reported here include estimates of total daytime population (workers and all other residents). Measures include:

> ***Total resident population*** is the same as the total population for an area.
>
> ***Total workers working in an area*** is the total number of workers working in an area based on their answers to journey-to-work information in the Census. This may include both residents who work in the same area as well as those individuals who commute into the area for work.
>
> ***Total workers living in an area*** is the total number of residents who live and work in the same area.
>
> ***Estimated daytime population*** is the total number of residents plus the total number of workers working in the area minus the number of residents who work elsewhere.
>
> ***Daytime population change (net change)*** is the total number of residents working elsewhere minus the total number of workers from elsewhere.
>
> ***Workers who live and work*** in the same area are residents who do not leave the area for work.
>
> ***Total incommuters*** is the number of workers commuting into an area.
>
> ***Employment / Resident Ratio*** is another measure of commuting. A ratio of 1 indicates that there is a balance between jobs and labor supply. A ratio greater than one indicates that there are more jobs than local residents; which indicate more in-commuting than out-commuting.

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[*] Derived from the Population Reference Bureau's "Economic and Demographic Terms Glossary." 1998. In *Population Handbook*, 4th International Edition; and the U.S. Bureau of the Census.

Employment Status (or labor force status)**: Classified in a hierarchical mode by the Census, population ages 16 and older are first classified as "in labor force" or "not in labor force." Those persons who are in the labor force are then classified as "in armed forces" or "civilian." Finally, those in the civilian labor force are classified as "employed" or "unemployed."

Family*: Two or more persons living together and related by birth, marriage, or adoption. Families may consist of siblings or other relatives as well as married couples and any children they have.

Group Quarters**: Persons who do not live in housing units are classified by the Census Bureau as living in group quarters. Two types of group quarters are recognized, including institutional and non-institutional.

> ***Institutionalized group quarters populations*** included persons under supervised care or custody in institutions during the Census. Classified as "patients" or "inmates," these persons are restricted to the institution grounds.
>
> ***Non-institutionalized group quarters populations*** are persons living in group quarters other than institutionalized facilities, such as college dormitories, military barracks, or homeless shelters.

Group Quarters Population: Persons living in group quarters on the Census date.

Household*: An occupied housing unit and all persons who occupy that housing unit. A household may be comprised of one or more families, one or more unrelated individuals, or a combination of families and unrelated individuals.

Households by Vehicle Availability (see Vehicle Availability)

Household Income (see Income)

Household Size: The number of people living within an household.

Household Type**: Households are classified by type according to the sex of the householder and by the presence of relatives in the household.

> A ***family household*** or family is a householder living with one or more persons who are related to him or her by birth, marriage or adoption.
>
> A ***non-family household*** is a householder living alone or with non-relatives.
>
> All families are households but not all households are families.

Household Population: Persons living within a household on the Census date.

Householder (formerly head of household)**: One person in each household is designated as the householder (Person 1 – when completing the Census form), this is usually the person whose name the home is owned, being bought, or is rented. If there is no such person, any household member who is over 15 years of age can be designated as the householder by the person responding to the Census.

Housing Units (see also Tenure)**: Separate living quarters in which the occupants live separately from any other individuals in the building. A housing unit may be a house, an

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[**] Derived from "Glossary of Major Demographic Terms and Measures," 2006. In *Demographics: A Guide to Methods and Data Sources for Media, Business, and Government*, Steve Murdock, et. al.

apartment, a mobile home, a group of rooms, or a single room that can be occupied as separate living quarters. Data includes classification of vacant units including units used for seasonal/recreational use; units for rent or for sale at the time of the Census; units rented or sold but not occupied at the time of the Census; units available for migrant workers; and all other units vacant at the time of the Census.

Income**: Income refers to money received from any source. For the purposes of Census data collections, persons are asked to report their income for the calendar year prior to the date of the Census; therefore, all 2000 Census data related to income and poverty reference 1999 incomes.

> ***Aggregate Household Income*** refers to the total income of all households in an area.
>
> ***Household Income*** sums the income of the householder and any other individuals 15 years of age or older in the housing unit whether they are related to the householder or not.
>
> ***Per Capita Income*** is the average or mean income per person in an area.
>
> ***Mean Household Income*** is the total household income for the area divided by the number of households.

Industry**: The industry or type of business an employed person participates in. Like occupations, industry classifications are organized hierarchically in a coded system and are revised when necessary. Census codes for industry groups are utilized in the 2000 Census based upon the 1997 North American Industry Classification System (NAICS). Data reported here include major classification headings. Significant changes from the previous Standard Industrial Classification (SIC) System make it difficult to compare 2000 data to previous Censuses.

Labor Force*: All persons 16 years old and older who are either employed or unemployed, but are actively looking for work and available to accept employment, plus the members of the Armed Forces.

Language Spoken at Home: The language spoken at home for people age 5 and older. The Census Bureau asks individuals if they speak a language other than English at home. Respondents are asked to provide the language spoken. In addition, those individuals that indicate that they speak a language other than English at home were asked how well they spoke English (ranked from "not at all" to "very well").

Linguistically Isolated Households: Those households which contain no one aged 14 or older who can speak English at least "very well." All persons within a linguistically isolated household are considered linguistically isolated persons (this may include individuals younger than 14 who can speak English "very well" or exclusively).

Mean Household Income (see Income)

Median Household Income (see Income)

Mean (or Mode) of Transportation to Work: The Census reports data on the ways in which workers 16 years and older traveled to work during the week prior to answering the Census questionnaire. Data reported here are derived from the Census Transportation Planning Package which uses different rounding algorithm than that reported on Summary Files 3 and 4.

Metropolitan Statistical Area (MSA): An MSA is an integrated economic and social unit with a large population nucleus. Each MSA consists of one or more counties or statistically equivalent area meeting published standards of population and metropolitan character; in the six New England states (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont), cities and towns (rather than counties) are used as the component geographic units. MSA definitions change over time, so check definitions for comparability. For instance, the San Antonio MSA was 4 counties and is now 8.

Non-institutionalized Population (see Group Quarters)

Occupation**: A measure of the employed labor force by the type of job held (what a person does). Occupations are grouped hierarchically in a coded system that has been revised over time but is currently based on the 2000 Standard Occupational Classification System (SOC). While the Census Bureau utilizes its own occupation codes, they are based on the SOC system.

Per Capita Income (see Income)

Percent Change**: A common measure of population change between two time periods, stated as a percentage of the base population. Percent population change is computed by subtracting the number of people at an earlier period of time from the population at a later period of time, then dividing the difference by the population at the earlier period and multiplying the result by 100.

Persons in Poverty (see Poverty)

Persons per Household: Equivalent to average household size. It is the number of persons living in households in an area divided by the total number of households for that area.

Population**: A population consists of the persons living in a specific geographical area at a specific point in time. It refers to the aggregate, the group of people as a whole, in an area.

Population Density: The number of people per square mile.

Population Estimate**: Approximation of the size and potentially other characteristics of a population for periods of time between the last Census and the present time. The source of the 2007 estimates reported here are from the State Data Center at UTSA.

Population for Whom Poverty Status is Determined: Poverty status is determined for all people except the institutionalized, persons in military group quarters, people in college dormitories, and unrelated individuals under age 15.

Population in Group Quarters (see Group Quarters Population)

Population in Households (see Household Population)

Population Projection**: Approximation of the size and potentially other characteristics of a population for future periods of time. Projections utilize assumptions about future populations or future patterns for demographic processes. Projections of the population reported here were created by the Texas State Data Center at UTSA in 2006. The data are based on cohort-component techniques and use the 2000-2004 migration rate scenario. Data for other migration scenarios as well as detailed information about methodologies can be found at *http://txsdc.utsa.edu/tpepp/2006projections/.*

Population Projection Scenarios: The Texas State Data Center produces four different series of population projections. The assumptions about future trends in fertility and mortality are the same for all of the alternative population projections. The differences between these series arise from the fact that each of the four population projection scenarios incorporates different assumptions about cohort specific net migration rates (the difference between the number of people entering or leaving an area). These differences are as follows:

- ***Migration Scenario 0.0 –*** Assumes that in-migration and out-migration are equal resulting in population change due to natural increase alone (the net change due to births and deaths alone).
- ***Migration Scenario 0.5 –*** Assumes that net migration rates by age, sex, and race/ethnicity will be ½ the rates experienced during the 1990s for counties and the State of Texas.
- ***Migration Scenario 1.0 –*** Assumes that net migration rates by age, sex, and race/ethnicity will be the same as the rates experienced during the 1990s for counties and the State of Texas.
- ***Migration Scenario 2000-2004 –*** Assumes that net migration rates by age, sex, and race/ethnicity will be the same as those rates experienced between 2000 and 2004 for counties and the State of Texas.

Poverty**: The absence of wealth. Measure of poverty are derived from income data for families and unrelated individuals. A two-dimensional matrix presents income thresholds for unrelated individuals and two-person families (also differentiated by over 65 years of age or under 65 years of age) and categorized for families based on family size and number of children present. Persons or families with incomes falling below the income threshold for their specified size of family unit are considered in poverty. Data on poverty shown here reflect the number of persons (or families) below the 100 percent poverty level.

Race and Ethnicity**: "Race" and "ethnicity" are frequently utilized together to refer to differences among populations related to their cultural, historical, or national-origin characteristics. Although the concept of race was once assumed by some segments of some societies to describe a base of biological differences, race has come to indicate differences that are largely socioeconomic and cultural. Ethnicity generally refers to the national, cultural, or ancestral origins of people. As used in the U.S. Census of Population and Housing, all designations of race and ethnicity are self-identified by respondents to the Census. They are not verified by the Census taker. Race is determined by a question that asks the respondent to indicate whether he or she and every other member of the household is White, Black or African American, Asian, American Indian or Alaska Native, Native Hawaiian or Pacific Islander, or a member of some Other racial group. Ethnicity is determined from a separate question that asks the respondents to indicate for themselves and all other members of the household whether they are of Hispanic origin or not of Hispanic origin. If the respondents are of Hispanic origin they are further asked to indicate the specific Hispanic group (e.g. Cuban, Puerto Rican, Mexican-American, or Other Hispanic) of which they and each other member of the household are a member. Hispanic is not a race category nor does White, Black, etc., refer to an ethnic category. Race and ethnicity are different dimensions derived from responses to different questions.

Registered Vehicles: The number of vehicles registered in a particular county. The data do not distinguish between commercial and non-commercial vehicles.

School Enrollment: Information on the number of people age 3 years and older who are enrolled in school. The data include pre-school, primary, secondary, and college enrollments.

The information reported here do not distinguish between public and private school; however data on private and public school enrollments can be found in the original Census data.

Sex and Gender**: Sex is self identified on the Census and most other surveys by marking either "male" or "female." While "sex" refers to a descriptive biological term, the characteristics of men and women referred to as "gender related" (such as differences in occupational distributions and income levels) appear to be the result of social, cultural, and economic differences experienced by males and females.

Square Mile: An unit of measure equal to the area of a square which is one mile in length on each side.

State Road Network: Two measures of highway infrastructure include centerline miles and lane miles.

> ***Centerline miles*** are the length of the roadway measured in miles.
>
> ***Lane miles*** is the number of lanes times the length of the roadway.

Summary File 1 and 2: contains 100% data from the 2000 Census, meaning that the information is compiled from questions asked of all people and about every housing unit.

Summary File 3 and 4: contains data from the 2000 Census long form, meaning that the information was collected on a sample basis

Tenure**: This housing characteristic is asked on the Census questionnaire for all occupied housing units in order to classify the unit as "owner occupied" or "renter occupied." Tenure data have been collected by the Census Bureau since 1890, though with different details regarding ownership (with or without a mortgage) and rent (with or without cash payment).

> ***Owner occupied housing units*** are those in which the person completing the questionnaire or someone else who lives in the household owns the housing unit, even if it is mortgaged or in the process of being purchased.
>
> ***Renter occupied housing units*** are not occupied by the owner and are classified as "renter occupied" if someone other than the owner occupies the unit whether the unit is rented or occupied without cash rent.

Travel Time to Work: The amount of time it usually takes workers 16 and over to reach their employment location. Longer travel times can be a result of workers choosing to travel further from home and work, a result of increased congestion on existing roadways, or a combination of the two. Aggregate travel time is the sum of the travel time for all workers in an area, while mean travel time is aggregate travel time divided by the total number of workers in an area.

Unemployed Persons**: Persons who are not employed but are actively looking for work through the state employment office.

Unemployment Rate*: The percentage of the labor force that is unemployed.

Usual Means of Transportation to Work (see Means of Transportation to Work)

Vehicle Availability*: The number of passenger cars, vans and pickup or panel trucks of 1-ton capacity or less that are kept at home and available for the use of household members. Dismantled or immobile vehicles are excluded. Vehicles kept at home and used exclusively for business purposes are excluded. Vehicles that are rented or leased for 1 month or more, company vehicles, and police and government vehicles are included if kept at home and used for non-business purposes.

Aggregate vehicles available. The total number of vehicles available to households within a particular area. To calculate aggregate vehicles available, a value of "7" is assigned to vehicles available for occupied units falling within the terminal category, "6 or more." (For more information on aggregates, see "Derived Measures.")

Vehicles per household (Mean vehicles available). Vehicles per household are computed by dividing aggregate vehicles available by the number of occupied housing units. Vehicles per household are rounded to the nearest tenth.

Vehicle Miles Traveled: The number of miles vehicles are driven over a specified time period. Data reported here include average daily vehicle miles driven and total vehicle miles driven for a specified year.

Worked at Home Population: Those workers 16 years and older who usually worked from home during the week prior to the Census.

Workers: Individuals 16 years and older who were employed.

Workforce**: The sum of the employed and unemployed in an area. Persons who are not able to be employed or are not actively seeking employment are not considered part of the workforce.

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