

ON LABOR DYNAMICS I



POPULATION IN TENNESSEE

What are the prospects for the state's labor force as the baby boomers approach retirement and the population ages?

by Murat Arik



Shifts in population dynamics have important implications for the economy. As the debate over socioeconomic policy issues regarding the aging population continues, a growing body of literature explores the effects of aging population and declining fertility issues in industrialized countries on labor force shortages and policies to address them. The most common concerns associated with the shifts in population dynamics could be summarized into three categories: Social Security and sources to finance it; changes in economic structure associated with this shift; and labor force shortages as the working-age population shrinks, fertility rate declines, and retirement age population grows.

The scope of this essay is not to address far-reaching implications of the shifts in population dynamics but to analyze shifts in Tennessee's population as they are related to labor force dynamics. Especially with the baby boomers (born between 1946 and 1964) approaching retirement age, workforce shortages and policies to alleviate the problem have been the subject of numerous discussions and debates. The reason for increased attention to this issue is the huge number of baby boomers: about 77 million, representing 37 percent of the total population 16 and older.¹

How do baby boomers affect labor force dynamics? A large number of an age cohort increases labor force for a given period. For example, the increase in the U.S. population between 1940 and 1960 was around 36 percent. In subsequent decades, population did not grow at the same rate, leading to a problem of sustainability of labor force equilibrium. The population of Tennessee exhibits a slightly different pattern, with decennial population growth rates not showing ups and downs nearly as sharp as those for the U.S. In fact, Tennessee's population trend indicates a mini-population boom between 1970 and 1980 with 17 percent population growth.²

Given the historical population trend and projected population growth in Tennessee, this essay addresses demographic shifts in Tennessee and their likely impact on labor force dynamics:³

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Table 1: Population Dependency Ratios in Tennessee (2000)

	Old Age	Young Age	All Ages
Total Population	19.55	35.43	54.98
Male	15.85	37.15	53.00
Female	22.67	33.80	56.50

Source: Census and BERC

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[Tennessee’s population] is less racially diverse than the U.S. population, its employment-population ratio is smaller than the U.S. average (62.4 versus 62.7 in 2002), and it is relatively less educated.

(1) What are the characteristics of the population by age cohort, (2) what are the historical and projected changes in the population by age cohort, and (3) what are the likely sectoral and occupational implications of shifting population dynamics for labor force policies?

Tennessee Population’s Characteristics

General population dynamics. Tennessee was 16th largest of the 50 states in terms of population in 2000 (5.7 million). By 2015 it is projected to reach 6.4 million, maintaining its rank. To briefly summarize Tennessee’s population’s basic characteristics, it is less racially diverse than the U.S. population, its employment-population ratio is smaller than the U.S. average (62.4 versus 62.7 in 2002), and it is relatively less educated (high school graduates and above total 80.4 percent in the U.S. versus 75.9 percent in Tennessee). By age cohort, Tennessee’s population is similar to the U.S. in the percent of population over 65 (12.4 percent in 2000).⁴

In 2002, the labor force participation rate in Tennessee was 65.3 percent, relatively lower than the U.S. average of 66.7 percent.⁵ Labor force participation rate is closely related to changes in population dynamics by gender, race, age, deaths, births, and immigration. Labor force participation rate is the highest for

the 30–34 and 40–44 age cohorts (84.5 percent), 30–34 male age cohort (94 percent), and 30–34 white male age cohort (94.3).

An indicator that gauges backward and forward linkages between working-age population and dependent population is the dependency ratio.⁶ Table 1 presents several aspects of the dependency ratio by gender and age cohort. Overall, every working-age person supports more than one dependent person (old or young). The old-age dependency ratio is significantly lower than the young-age ratio but is projected to increase over the years. One noticeable indicator is that the female old-age dependency ratio is significantly higher than the male old-age dependency ratio because the share of female old-age population is higher than the male old-age population.

Employment, educational attainment, and mobility status. Table 2 further breaks down Tennessee’s population by several categories. The primary emphasis is employment dynamics, educational attainment level, and mobility status, each by age cohort.

Observations can be made regarding employment status of population by age cohort:

- Within the working age population (17–64),
 - the 25–44 age cohort has the highest employment rate,
 - the 45–64 age cohort has the highest percentage not in the labor force, and
 - the 17–24 age cohort has the largest unemployment rate.
- Within the 65 and older age group,
 - 17 percent of the 65–80 age cohort are employed, and
 - 4.5 percent of the 81 plus age cohort are employed.⁷

Table 2. Population Characteristics of Tennessee by Age Cohort (2003)

Indicators/Age Cohort	17-24	25-44	45-64	65-80	81+
Employment Status					
Employed	60.61	76.64	67.20	17.19	4.55
Unemployed	10.18	4.57	2.96	0.70	0.00
Not in Labor Force	29.06	18.45	29.79	82.11	95.45
Mobility Status (Lived Here a Year Ago)					
Yes (Same House)	73.18	83.14	92.86	94.82	92.85
No (Overseas)	0.97	0.37	0.13	0.04	0.16
No (Other States)	25.85	16.48	7.01	5.14	6.99
Educational Attainment					
Less than High School	30.38	12.04	16.42	33.46	45.85
High School	32.16	32.18	34.66	33.66	29.76
Some College, No Degree	5.55	6.91	7.49	5.26	3.41
Associate, Technical Vocational Degree	23.61	22.83	18.02	12.67	9.59
Bachelor’s Degree	7.89	18.52	13.33	8.89	7.15
Master’s Degree and Over	0.41	7.52	10.09	6.07	4.23

Source: All indicators are tabulated by BERC from 5 percent Public Use Microdata from the American Community Survey, available at www.census.gov.

Age cohort by mobility status presents important implications for labor-force dynamics in Tennessee. No age cohort presents a strong international dimension: it is less than one percent across the age cohorts. A relatively high percentage in the 17–24 age cohort might be due to foreign students attracted by higher education institutions in Tennessee. This has important implications for possible labor force shortages due to the aging population since some advocate that immigrants are likely to alleviate possible labor shortages in the U.S.⁸

A high percentage of migration from other states in the 17–24 and 25–44 age cohorts is a plus for Tennessee because these cohorts are important at a time when the workforce is aging. The mobility status of people 65 and over indicates that Tennessee is a preferred retirement destination for many people. A longitudinal analysis is necessary to draw further conclusions regarding this observation.

In terms of educational attainment of Tennessee’s population 25 and over, data show an interesting trend: as we move from the 25–44 age cohort to the 81-plus age cohort, the percentage of people without a high school diploma increases. The age cohorts of 25–44 and 45–64 have a better schooling mix than the older age cohorts. Even though the age cohort of 17–24 includes a large number of 12th graders, the large percentage with less than high school educational attainment is worth pointing out because policy intervention at this age cohort might be possible.

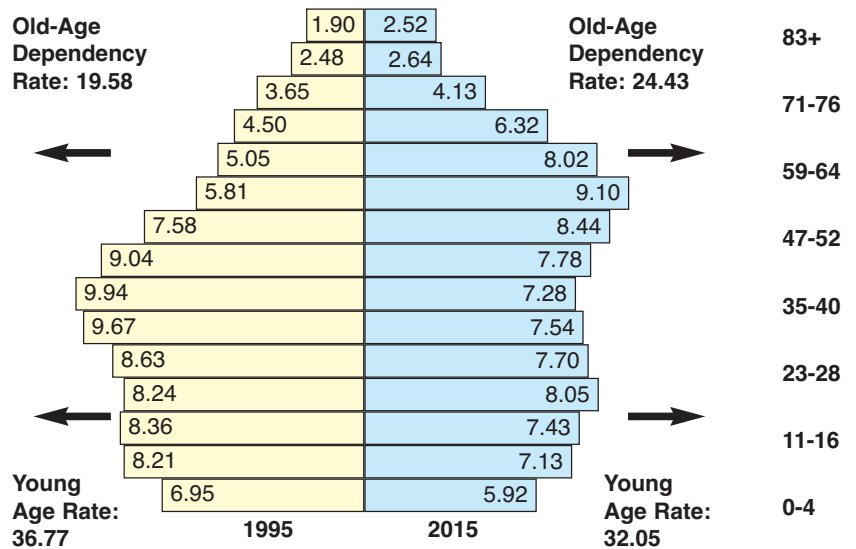
Historical and Projected Change in Tennessee’s Population

Population by age cohort in the U.S. is expected to shift significantly in line with the aging of the baby boomers in the next two decades. Toossi (2002) identifies four critical changes in population trends that affect labor force dynamics in the U.S.

- Growth of the labor force is slowing; annual average growth was 1.6 percent between 1950 and 2000 but is expected to grow 0.6 percent between 2000 and 2050.
- Women’s share in the labor force rapidly increased between 1950 and 2000 (2.6 percent) and is expected to grow 0.7 percent from 2000 through 2050.
- The labor force is aging; the 55 and older cohort grew 1.1 percent (1950–2000) and is expected to grow 1.4 percent between 2000 and 2050.
- There will be changes in labor force diversity by race.⁹

A review of literature regarding U.S. population projections and labor force dynamics suggests that population and labor force will be

Figure 1: Population of Tennessee by Age Cohort (1995 and 2015) (%)



older in 2012 compared with previous years. For example, the 16–24 age cohort will decline from 17 percent of the population in 1992 to 15.7 percent in 2012 and the 25–54 cohort from 56.7 percent to 52 percent, but the percent of the population aged 55 and older will increase from 26.3 percent in 1992 to 32.4 percent in 2012.¹⁰

This change pertains not only to the U.S. but is also more or less valid for many states, including Tennessee. However, structural change in the U.S. population was higher than in Tennessee’s population: about 14 percent between 1970 and 1980, 8.9 percent between 1980 and 1990, and 24.7 percent between 1990 and 2000. Similarly, it is projected to be higher in the next two decades: 18 percent between 2000 and 2010 and 11 percent between 2010 and 2020.¹¹

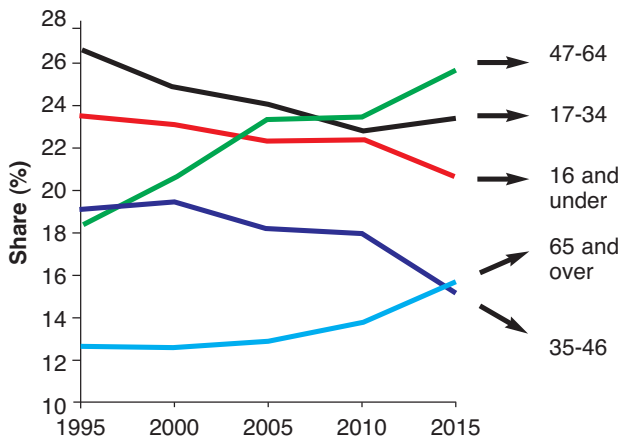
Overall Population Shift by Age Cohort.

The population of Tennessee is expected to shift substantially between 1995 and 2015. Figure 1 clearly presents the extent of change by age cohort as the share of old age cohorts increases and young age cohorts decreases. The share of the population 65 and over is expected to increase from 12.52 percent in 1995 to 15.61 percent in 2015, whereas the share of population 16 and under is expected to decrease from 23.52 percent in 1995 to 20.48 percent in 2015. Overall structural change for the given age cohorts for the entire period is expected to be 10 percent. While old age cohorts (53–58, 59–64, and 65–70) increase their percentage share between 1.8 and 3.2 percentage points, young age cohorts (0–4 and 5–10) will decline between 1.03 and 1.08 percentage points. Per-

As we move from the 25–44 age cohort to the 81-plus age cohort, the percentage of people without a high school diploma increases.

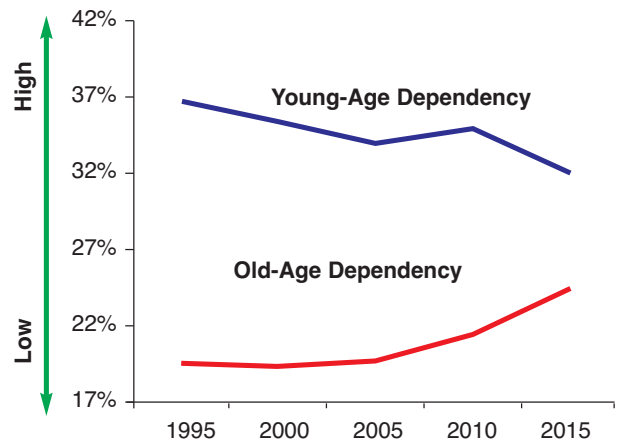
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Figure 2. Population Trend by Age Cohort: Tennessee (%)



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Figure 3. Young and Old Age Dependency Rates by Five-Year Periods in Tennessee



The projected decline in the share of the 35–46 age cohort is likely to justify the concerns over possible labor force shortages in Tennessee’s economy.

haps more revealing are the expected 2.14 and 2.66 percentage point declines in the 29–34 and 35–40 working-age cohorts, respectively.

Figure 2 presents the trend in population by aggregated age cohort. This graph clearly demonstrates the extent of the population’s aging since the shares of the 47–64 and 65 and over age cohorts are on the rise. A downward trend in the shares of the 16 and under and 17–34 age cohorts is expected to continue. Furthermore, the projected decline in the share of the 35–46 age cohort is likely to justify the concerns over possible labor force shortages in Tennessee’s economy.

Dependent population ratios. Overall, the dependent population ratio is expected to increase only slightly between 1995 and 2015. However, old-age dependency ratios are expected to increase as the population ages, whereas young-age dependency ratios are expected to decline considerably. Figure 3 depicts the changing dynamics of dependent population ratios. Even though the trend clearly indicates an aging population over the years, we do not expect major population-related policy issues within this study period (1995–2015) in Tennessee. The trend in dependency ratios (Figure 3) and shifts in age cohorts (Figures 1 and 2), however, suggest that a serious policy concern regarding old age population would be likely to emerge in Tennessee by 2030.

Shifting Population Dynamics and Labor Force Implications

Our analysis so far indicates Tennessee’s labor force and population are aging. As the baby boomers approach retirement age, a large number of workers are expected to leave the labor force, creating possible labor shortages across

industries. However, this might not be the case considering the significant productivity increase across the industries in the past two decades. Assuming the productivity growth trend continues, industries would be able to produce more output with the same number of people.

However, if productivity growth does not change substantially over the years, we can identify which industries are most likely to experience possible labor shortages in the long run.¹² While analyzing the data, we must caution the reader that labor force demand and supply depend on many things: change in participation rates by gender, productivity growth, racial diversity and participation rate, and successful policies to retain workers beyond retirement age and to attract and train retired workers to reenter the labor market.

Industry workforce. In Tennessee, the effect of aging on industries will vary substantially. Industry employment by age cohorts indicates that public administration, transportation, education, utilities, and manufacturing are the sectors where the aging population effect is expected to be significant (Table 3). In these sectors, the share of the 45–64 age cohort in the current workforce is substantially higher, ranging from 43.75 percent in manufacturing to 48.36 percent in utilities. Ranked by young to old age ratio, public administration, transportation, education, and utilities are more likely to be at risk of facing labor shortages due to the aging population.¹³

Industries that will be less affected by the aging process in the short to medium run are entertainment, social services, retail, construction, and professional services. A critical issue shown in Table 3 is that a substantial percent of workers across industries are 65–80. This ranges from 11.85 percent in services and 10.68 percent in public administration to 2.45 percent

in the information sector. We expect an increase in these ratios in the next two decades with the population shift from young to old.

Occupational employment. Similar to industry analysis, the effect of the aging population on employment by occupations varies substantially. Six occupations that have a high ratio of older members will be likely to experience shortages in the next two decades. In other words, Tennessee would need more legal workers, managers, production workers, educators, cleaners, transportation workers, and engineers (Table 4). However, when interpreting these results we need to take into account employment by occupation projections since some of the occupations would be increasing at the sub-replacement level. On the other hand, an occupation that has a high ratio of aging members and high projected growth rate would be more likely to experience shortages in the next two decades.

The occupations least likely to be affected by the aging population are eating and drinking, computer, protective services, and scientists. However, high demand for these occupations would generate pressure on the labor market.

Conclusion

Tennessee's population is aging, and this aging process is likely to shift priorities in population policies. However, based on our analysis, we do not expect to see any significant policy shift by 2030. The labor market, on the other hand, may experience pressure in certain occupational categories and industries. For example, according to Tennessee Department of Labor

and Workforce Development projections, teachers, motor vehicle operators, and personal care workers are expected to have high growth potential between 2002 and 2012. In 2003, these occupations had the lowest young to old age ratio, indicating that in the next decade a substantial share of people in these occupations will reach retirement age.¹⁴

The occupations with a high share of aging members that are projected to decline or grow slowly are legal workers, production workers, office workers, and rail transportation workers.

When predicting the impact of aging population on occupational dynamics, we should also factor in demands for a given occupation beyond replacement. For example, the aging population will increase demand for health services, community services, and personal care services. The high demand for these services in turn will increase employment in these occupations. Therefore, we expect a large increase in demand in health occupations over the next two decades.

Tennessee's population growth source is projected to be healthy, predominantly from births and interstate migration. The shifts in age structure are not likely to create sharp policy shifts in Tennessee. Tennessee does not look like a frontrunner in aging population issues. Tennessee will have ample opportunity to learn from other states where aging population is likely to be a major concern in the next two decades. ■

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Table 3. Sectoral Employment by Age (%), Ranked by Young to Old Age Ratio, 2003

Age Group	Young			Medium and Old			Young/Old Ratio
	0-16	17-24	25-44	45-64	65-80	81 & Over	
Agriculture	0.00	9.46	29.05	33.11	22.97	5.41	0.63
Public administration	0.18	4.79	36.46	47.70	10.68	0.18	0.71
Transportation	0.16	7.24	38.90	44.09	9.45	0.16	0.86
Education	0.28	6.72	39.59	45.10	7.84	0.47	0.87
Utilities	0.00	4.92	43.44	48.36	3.28	0.00	0.94
Manufacturing	0.13	7.88	42.77	43.75	5.14	0.34	1.03
Services	1.11	12.64	37.12	36.02	11.85	1.26	1.04
Wholesale	0.00	6.56	44.67	41.19	7.17	0.41	1.05
Finance	0.00	7.99	43.45	41.45	6.49	0.62	1.06
Medical	0.08	9.01	45.38	40.14	4.78	0.62	1.20
Information	0.00	7.69	47.20	42.66	2.45	0.00	1.22
Professional	0.65	10.48	43.78	38.22	6.40	0.46	1.22
Construction and mining	0.36	9.59	47.46	36.33	5.92	0.36	1.35
Retail	1.36	22.22	36.61	32.46	6.99	0.36	1.51
Social services	1.12	17.23	42.70	29.59	9.36	0.00	1.57
Entertainment	5.31	35.29	35.75	18.53	4.93	0.19	3.23
Total	0.82	12.45	41.15	38.32	6.81	0.47	1.19

Source: BERC's calculations from 5 percent PUM data (www.census.gov).

Table 4. Occupational Employment by Age (%), Ranked by Young to Old Age Ratio, 2003

Age Group	Young			Medium and Old			Young/Old Ratio
	0-16	17-24	25-44	45-64	65-80	81 & Over	
Legal	0.00	6.49	33.77	51.95	7.79	0.00	0.67
Managerial	0.00	3.17	39.74	47.22	8.99	0.88	0.75
Production	0.23	12.29	32.78	48.48	5.84	0.38	0.83
Education	0.13	5.91	42.82	44.83	5.91	0.40	0.96
Cleaning	2.00	12.83	34.47	38.48	11.62	0.60	0.97
Engineering	0.00	3.11	48.25	42.80	5.06	0.78	1.06
Transportation	0.79	14.40	36.78	41.06	6.41	0.56	1.08
Community Services	0.00	8.56	43.85	38.50	8.56	0.53	1.10
Office Workers	0.48	11.68	40.50	40.21	6.78	0.34	1.11
Business	0.00	2.80	50.00	43.46	2.80	0.93	1.12
Repair	0.23	8.84	44.44	40.14	5.67	0.68	1.15
Financial	0.00	3.65	50.00	40.51	5.11	0.73	1.16
Sales	1.31	19.02	36.59	35.67	6.95	0.46	1.32
Health Services	0.00	17.77	39.26	32.23	9.92	0.83	1.33
Farm, Fishing, and Forest	0.00	15.71	41.43	27.14	11.43	4.29	1.33
Medical	0.14	6.27	51.00	37.89	4.56	0.14	1.35
Entertainment	0.46	9.13	47.95	33.33	9.13	0.00	1.35
Construction	0.44	11.73	46.63	34.46	6.45	0.29	1.43
Personal Services	3.96	20.05	35.09	30.34	9.23	1.32	1.45
Scientists	0.00	7.00	55.00	29.00	9.00	0.00	1.63
Protective Services	1.74	13.91	50.00	33.91	0.43	0.00	1.91
Computer	0.00	9.43	58.49	29.56	2.52	0.00	2.12
Eating and Drinking	4.94	41.77	30.54	17.22	5.09	0.45	3.39

Source: BERC's calculations from 5 percent PUM data (available at www.census.gov).

Tennessee will have ample opportunity to learn from other states where aging population is likely to be a major concern in the next two decades.

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Notes

1. For a detailed treatment of this issue, see Stacy Poulos and Demetra S. Nightingale, *Aging Baby Boomers in a New Workforce Development System*, at www.doleta.gov/seniors/other_docs/AgingBoomers.pdf, accessed January 21, 2005.

2. For historical census figures and other population data, see the Tennessee State Data Center at the University of Tennessee at <http://cber.bus.utk.edu/tnsdc/sdcmmain.htm>.

3. For a comparative perspective on Tennessee's labor force characteristics, see Murat Arik, "Regional Labor Force Quality Comparison: How Tennessee Ranks," *Tennessee's Business* 13:2, 2004.

4. Data regarding employment-population ratio were obtained from the Bureau of Labor Statistics at www.bls.gov or <ftp://ftp.bls.gov/pub/news.release/srgune.txt>. Population and employment data are from the Census Bureau and Department of Labor Statistics (www.census.gov and www.bls.gov), respectively.

5. Labor force refers to people over 16 and either working or actively looking for a job. Labor force participation rate is the ratio of civilian labor force to population 16 and over not including members of armed forces or institutionalized workers. For issues regarding labor force dynamics in the U.S., see *Occupational Outlook Quarterly*, Winter 2003-04, at www.bls.gov.

6. Dependency ratio is a measure of how many dependent people (population under 16 and 65-plus years of age) are supported by each working-age person. Old-age

dependency refers to the ratio of population 65-plus to working-age population (17-64).

7. Indicators for this section are calculated from 5 percent PUM (Public Use Microdata) based on the American Community Survey at www.census.gov, which has detailed information regarding methodology, sample size, and margin of error. The 5 percent PUM allows us to get timely information about various aspects of population not otherwise available.

8. For a discussion of this issue from a small business perspective, see Bruce D. Phillips, "The Future Small Business Workforce: Will Labor Shortages Exist?" *Business Economics*, October 2004.

9. Mitra Toossi, "A Century of Change: The U.S. Labor Force, 1950-2050," *Monthly Labor Review*, May 2002.

10. Mitra Toossi, "Labor Force Projections to 2012: The Graying of the U.S. Workforce," *Monthly Labor Review*, February 2004. See also Paul Campbell, "Population Projections: States, 1995-2025," p. 25-1131, U.S. Bureau of the Census, Population Division, May 1997.

11. Structural change refers to shifts in the share of age cohorts across the years. The following formula is used: $SCI = \frac{1}{2} \sum |x_{it} - x_{i,t-1}|$ where x_i refers to percent share of age cohort (i) in total population at time (t) and ($t-1$).

12. For a comprehensive look at labor force issues at the national level, see the Winter 2003-2004 issue of *Occupational Outlook Quarterly* at www.bls.gov.

13. Young to old age ratio refers to the share of workforce under 44 to that over 45. The results are tabulated at a highly aggregated industry level.

14. Tennessee Department of Labor and Workforce Development, Division of Employment Security, *Occupational Projections (2002-2012)*.