Lincoln MPO 2040 LRTP Technical Report:

Appendix A:

Lancaster County Population Projections: 2010 to 2040

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Summary Report

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Executive Summary

Projections prepared for Lancaster County show that the growth of the population and households will continue between 2010 and 2040 as it has every decade since 1900. Based upon three separate but related models, the total population increases range from 54 to 77 percent from 2000 to 2040, with an increase of 65 percent to more than 410,000 persons as determined by the "trend" model deemed most likely to occur.

The three models depict scenarios regarding varying levels of migration. A "low series" model portrays future growth if net person movement resembles the relatively low levels that occurred in the county in the 1980s, a "high series" model depicts growth based upon the relatively high net migration of the 1990s, while the trend model shows growth if the longer term trend since the 1970s unfolds in the future. The models illustrate population change based on decade migration rates of 2.0, 5.5, and 9.0 percent for the low, trend, and high series respectively.

Utilizing Census 2000 data by single years of age as a starting point, the models "flow through" the population cohorts based upon age-specific migration rates, localized birth rates by age of the mother, and single year of age survival rates. Analyzing by single years of age is critical for Lancaster County given the "jumps" in migration that occur as college students move into and out of the area. Detailed local analyses regarding the college-aged population structure and its corresponding migration are key components and a strength of these projections, which likely differentiate the values from these models from others that are available.

The models show that growth will occur among all major age groups, with the highest percentage gains among the 65 and over population, as persons born in the "baby boom" of the 1950s age into this cohort. The models are quite uniform in depicting how the population will change over time, with the primary difference between them being the level of the overall population given varied migration. Numerous graphs and charts in the report illustrate the specifics of how the overall population and age structure will change, as influenced by vital events such as rising levels of both births and deaths within the county.

The projected population from the trend model is the basis for projecting how the household structure will change. Calculations projecting the distribution of the population between households and group quarters function to determine that the number of households will increase to more than 165,000 by 2040. The percentage of one-person households will continue to increase, representing 36 percent of all households in 2040, a gain of five percentage points compared to 2010. Long standing trends of family households and those with children declining as a relative share of all households are assumed to continue into the future.

These projections aid in the planning and decision-making process regarding how to adapt to the coming changes in the population's structure. While no projection can be exactly accurate and future local or world events can change population dynamics quickly, projections can be used as a guide for understanding the changes that are likely to occur. Area leaders can utilize this information to prepare for Lancaster County's continued growth which will continue unabated for the foreseeable future, as positive population fundamentals such as births steadily exceeding deaths and anticipated net inmigration occurs.

Discussion

The populations of Lancaster County and the city of Lincoln have been growing. This growth has not just occurred recently, but in every decade since 1900, even managing a small gain in the depression years of the 1930s. In more recent times, population growth has achieved a high decade rate above 17 percent in the 1990s, a low decade rate slightly above 10 percent in the 1980s, with the 1970s and post 2000 period falling in the middle of this range, with growth rates of about 14 percent.

Will the local population grow each decade in the near future? What rate of growth is most likely? Will increases occur primarily in certain age groups? How will the number of households and average household size change? These are the types of questions that population projections can provide insight on. No one knows exactly how population changes will occur, and unforeseen future local and world events such as recessions or wars can change population dynamics dramatically. In general, however, mathematical modeling based on the past and utilizing assumptions for the future provides a sense of where the population of a place such as Lancaster County is headed.

Population projections are especially important as preparations continue for the needs of the sizable baby-boom population. With the first "boomers" turning age 65 in 2010, their changing needs given housing preferences, greater possibilities of losing a spouse, and eventual possible need for long-term care or nursing home facilities come into focus as one looks into the future to 2040. Current and future development of housing and infrastructure will need to adapt and prepare for the coming demographic changes. Population and housing projections can be a useful tool in the planning process.

Lancaster County has additional complexities regarding its population since several universities, a penitentiary, and Nebraska's state government are located there. As such, Lancaster County experiences a relatively high rate of migration, attracting college-aged students and some in their early working years but also often has those with a newly completed degree move out of the area. Migration not only has a direct influence on individuals but also upon their immediate current family and more importantly their potential future family (eventual spouses and children). Thus, understanding and modeling migration accurately is a key component in portraying the future population structure of Lancaster County.

With migration in mind, these projections provide three separate models to illustrate various scenarios regarding the effect on population from differing levels of migration. With birth and survival rates remaining relatively steady over time, changes in migration are a more variable factor for how the population will change. This has been witnessed locally when lower levels of migration lead to lower growth rates in the 1980s, while the 1990s had relatively high levels of migration and growth. Therefore, the varying series illustrate a conservative approach to growth based on low migration rates from the 1980s, an aggressive growth scenario using high migration rates from the 1990s and a trend model which can be viewed not only as an average between the high and low levels but also indicative of the longer term trend since 1970 and extending into the post 2000 period.

The trend level of migration and growth is the scenario we assume is most likely to occur, as it smoothes the actual future changes that will likely sometimes be above and sometimes below the trend level. The trend level of growth is believed to be the most reasonable for evaluating longer periods of time, as Lancaster County has not experienced consecutive decades of either high or low growth in recent times. Therefore, the low and high series are based upon such migration rates for the 2005 to 2020 period and then gradually return to the trend level of migration by 2040.

Migration rates during the 1980s, 1990s, and 2000s period as illustrated by the Census Bureau's intercensal estimates program were meticulously analyzed. Through this examination migration rates for five-year age groups were prepared and developed into rates for individual ages. Having rates by single years of age was crucial to correctly pattern the migration "jumps" that occur as college students both come into and often later leave Lancaster County.

A comprehensive analysis of how the population is structured for college ages was conducted and improved the overall precision of these projections by age. The detailed patterning of college ages and the age-specific migration rates are considered a strength of these projections when compared to others. Since these projections were tailored to Lancaster County specifically and updated and prepared using the most current data available, they provide a locally grounded approach to detailing the complex nature of Lancaster County's population.

Based upon the trend level of growth, the projections also provide information on the future housing structure in Lancaster County. These projections detail not only the total number of persons, but those living in housing units and group settings. With this information, the total number of households and average household size were determined, along with projections by age of the householder. Additionally, the number of one-person households and the number of nonfamily and family households, including those that have children under age 18, illustrate further details on the future housing structure. Such projections further aid planning and development regarding the demand for 1-person households (apartments and smaller homes) as well as housing and other amenities for families with children (parks, playgrounds, etc.).

While users of data from projections should exercise some discretion in the conclusions they draw from the information, the following points are viewed as some of the key pieces of information gleaned from the projection models. They are not necessarily listed in any particular order. Figures from the trend model will be cited the most frequently, since it portrays the scenario most likely to occur.

1. Based on the current 2009 population estimates from the U.S. Census Bureau, another year of growth typical for the 2000s period would give Lancaster County about 285,000 people in 2010. However, growth has probably been a bit stronger than normal lately, as Nebraska and Lancaster County have benefitted from increased migration from other parts of the United States harder hit by the housing and economic downturns (e.g. Florida, Arizona, Michigan, Ohio). So 286,000 to 288,000 persons is quite plausible, under the assumption that the estimates program has been fairly accurate in tracking the area's population since 2000. The trend model puts the 2010 population at 286,955, which seems reasonable (Tables 2 and 4).

2. The trend model pegs the 2040 population at nearly 413,000, a growth of more than 162,000 persons from 2000 or about 65 percent (Table 5). Both the low and high series differ from the trend model by 7 percent. Thus, the low series differs from the high series by about 58,000 people or 15 percent in 2040. Growth rates between 2000 and 2040 range from about 54 percent in the low model to 77 percent in the high model (Table 5).
3. While natural change will be a larger contributor to population growth in each five-year period than net migration, the relative difference between these two factors will shrink over time (Figure 1). Natural change has a relative uptrend until 2020, at which time it steadily decreases as the number of deaths increases relatively faster than the number of births beyond 2020 (Table 2). While the level of natural change declines slightly from its peak, it is a stable factor that contributes positively to population growth in all time periods.
4. The trend model's number of births increases more rapidly in the early and last portions of the projection period. Projected and actual births showed large increases between 2000 and 2005 (Figures 2 and 28). Births then increase more steadily until 2025, followed by another sharper uptick (Figure 2). Thus, it appears that there may be an increased need for schools based on the growth in births between 2000 and 2010 (Figure 28), followed by a potential lull in new school needs before an increasing demand for school capacity begins in the late 2020s. Natural change rates, driven largely be increased births in the 2000s, are the highest in Lancaster County in the 2000s decade since the "baby boom" ended in the 1960s (Figure 24) and the annual number of births is approaching the levels at the height of the baby boom (Figure 28).
5. The level of net migration in the trend model increases in all but one five-year period during the projection period (Table 2, Figure 1). Net migration, when broken into domestic and international components, shows that international migration, based largely on national projections customized to represent Lancaster County, increases steadily in a linear fashion (Figure 3). Domestic and total migration stem more directly from the relative sizes of the age cohorts that move through the age stages that have relatively high migration rates.
6. The models show similar differentials between the low, trend, and high series for the under 18, 18 to 64, and total populations. Stated another way, the models show similar patterns of change over time, just at differing levels (Figures 4-6).
7. A narrow differential exists regarding the number of persons age 65 and over in the low and trend models (Figure 7). One reason for this is that older age groups are generally less likely to move. Additionally, past data showed those in their 60s leaving Lancaster County but net inmigration occurred among 70 year-olds so the net migration among the 65 and over age group was not all that different from zero. The high model shows a 65 and over population that increases more rapidly after 2020. This stems from increased migration throughout the projection period for persons in their 40s (originally in 2000 and subsequently in later time periods) – the high model has net inmigration for those aged 40-49 while the other models generally do not. Thus, although this population group grows rapidly in each model (between 168 and 223 percent—Table 5), the ultimate level will be determined not only by survival rates and the actual migration of those 65 and over, but migration of those approaching their retirement years as well.

8. Given Lancaster County's migration structure where a large inmigration occurs among college-aged persons followed by a general outmigration of those aged 25-34, increased levels of net migration lead to a sizeable increase in births and the under 18 population. The demographic theory of more positive migration leading not only to more people overall but also a higher level of children is especially apparent in Lancaster County. Retaining more persons in their 20s or 30s would have significant impacts on the population's overall structure.

9. Population pyramids show that the population aged 20-24 will maintain a relatively high portion of the total population for both males and females, as was the case in 1990 and 2000 (Figures 12-17). The color coding of the pyramids indicates the ages of those born during the depression, baby boom, and subsequent baby boom echoes over time and how their respective population percentages will change (e.g. 85 and older representing about 1 percent of the population in 1990 versus more than 4 percent in 2040).

10. Growth in the household population appears linear in nature while the group quarters population increases slowly at first and then more quickly later from 2020 forward, likely due to increased need for nursing homes among the aging population (Figure 18).

11. The total number of households increases steadily in a linear pattern reaching more than 165,000 in 2040 (Figure 19, Table 6). While both family and nonfamily households increase in number, the projection shows the rate of growth will be faster among nonfamily households (Figure 19). Part of this is due to increases in 1-person households (nonfamily by definition), which are projected to increase about 5 percentage points from about 31% of all households in 2010 to 36% in 2040 (Table 6, Figure 22). Some of this change likely stems from married baby boom couples moving into age cohorts where the loss of a spouse occurs more frequently, thus changing from a 2-person to 1-person household.

12. While both family households and those with children will increase in overall number, their relative percentage or share of the total number of households will continue to decrease as it has tended to since 1970 (Table 6). An exception to this overall downtrend is occurring currently, but it is believed the longer term pattern will reemerge as the third wave of increased births stemming from the baby boom begins to subside.

13. The number of households with a householder aged 65-74 will double from 2010 to when it peaks in 2030, those with a 75-84 year-old householder will nearly triple by 2040, and those with a householder aged 85+ will more than triple by 2040 (Table 6, Figure 21). Younger age groups change largely due to the movement of the persons born about 1980 in the baby-boom echo and 3rd wave of higher births during 2000 and 2010 that stems from the original from the baby boom (Figure 20).

Table 1: Summary of Lancaster County Projection to 2040 Utilizing "Low Series" Level of Migration

Category	Census 2000	2005 Proj	2010 Proj	2015 Proj	2020 Proj	2025 Proj	2030 Proj	2035 Proj	2040 Proj
Total Population	250,291	268,604	282,434	297,229	311,915	327,881	344,864	364,809	384,781
Change in Population	n/a	18,313	13,830	14,795	14,686	15,966	16,983	19,945	19,972
Natural Change	n/a	10,924	11,860	11,794	12,128	12,109	11,968	11,964	12,088
Births	n/a	19,257	20,997	21,591	22,504	23,209	24,166	25,747	27,709
Deaths	n/a	8,333	9,137	9,797	10,376	11,100	12,198	13,783	15,621
Net Migration	n/a	7,389	1,970	3,001	2,558	3,857	5,015	7,981	7,884
Domestic	n/a	3,470	-2,310	-1,884	-2,680	-1,747	-976	1,568	1,023
International	n/a	3,919	4,280	4,885	5,238	5,604	5,991	6,413	6,861
Males	125,029	134,252	141,329	148,905	156,286	164,235	172,593	182,410	192,302
Under 5	8,445	9,485	10,356	10,685	11,138	11,481	11,958	12,787	13,763
5 to 9	8,334	8,195	9,059	9,963	10,280	10,701	11,031	11,592	12,396
10 to 14	8,150	8,328	7,914	8,806	9,685	9,978	10,390	10,805	11,352
15 to 19	10,289	10,196	10,486	10,021	11,073	12,158	12,550	13,201	13,732
20 to 24	14,623	15,044	15,380	15,813	15,135	16,843	18,500	19,229	20,180
25 to 29	10,789	12,004	12,434	12,818	13,201	12,618	14,014	15,536	16,155
30 to 34	9,475	10,306	10,545	11,024	11,377	11,675	11,174	12,530	13,884
35 to 39	9,657	8,896	8,855	9,117	9,515	9,801	10,079	9,723	10,900
40 to 44	9,657	9,447	8,684	8,719	8,977	9,355	9,635	10,006	9,651
45 to 49	8,943	9,596	9,435	8,741	8,781	9,027	9,414	9,786	10,164
50 to 54	7,357	9,034	9,520	9,436	8,750	8,779	9,035	9,509	9,893
55 to 59	5,037	7,407	8,744	9,293	9,220	8,547	8,581	8,923	9,400
60 to 64	3,701	4,606	6,750	8,035	8,558	8,491	7,895	7,999	8,333
65 to 69	3,194	3,297	4,176	6,191	7,397	7,895	7,860	7,389	7,505
70 to 74	2,841	2,819	2,947	3,785	5,642	6,756	7,245	7,307	6,889
75 to 79	2,237	2,537	2,409	2,559	3,322	4,981	6,006	6,534	6,624
80 to 84	1,409	1,845	2,003	1,940	2,092	2,753	4,177	5,118	5,608
85+	891	1,210	1,632	1,959	2,143	2,396	3,049	4,436	5,873
Females	125,262	134,352	141,105	148,324	155,629	163,646	172,271	182,399	192,479
Under 5	8,235	9,120	9,959	10,269	10,705	11,037	11,495	12,292	13,232
5 to 9	7,840	7,998	8,713	9,587	9,885	10,283	10,606	11,144	11,916
10 to 14	7,794	7,836	7,723	8,472	9,326	9,600	9,980	10,383	10,916
15 to 19	10,225	9,783	9,829	9,760	10,655	11,716	12,084	12,684	13,200
20 to 24	13,432	14,971	14,757	14,940	14,817	16,252	17,874	18,554	19,429
25 to 29	9,398	11,015	12,434	12,345	12,502	12,381	13,562	15,047	15,624
30 to 34	8,539	9,011	9,756	11,057	10,981	11,090	10,990	12,161	13,474
35 to 39	9,121	8,051	7,774	8,435	9,585	9,502	9,604	9,598	10,614
40 to 44	9,484	8,972	7,900	7,690	8,334	9,458	9,378	9,569	9,563
45 to 49	9,040	9,483	9,011	7,990	7,783	8,420	9,556	9,560	9,760
50 to 54	7,440	9,196	9,475	9,071	8,049	7,830	8,473	9,705	9,709
55 to 59	5,260	7,576	8,996	9,340	8,943	7,934	7,715	8,438	9,664
60 to 64	3,946	4,892	7,025	8,401	8,734	8,351	7,426	7,287	7,982
65 to 69	3,695	3,623	4,566	6,615	7,936	8,252	7,909	7,099	6,980
70 to 74	3,600	3,420	3,386	4,316	6,271	7,529	7,845	7,604	6,839
75 to 79	3,272	3,460	3,135	3,144	4,025	5,869	7,072	7,459	7,249
80 to 84	2,392	3,015	3,041	2,797	2,827	3,641	5,353	6,533	6,920
85+	2,549	2,930	3,625	4,095	4,271	4,501	5,349	7,282	9,408
Totals: Under 5	16,680	18,605	20,315	20,954	21,843	22,518	23,453	25,079	26,995
5 to 9	16,174	16,193	17,772	19,550	20,165	20,984	21,637	22,736	24,312
10 to 14	15,944	16,164	15,637	17,278	19,011	19,578	20,370	21,188	22,268
15 to 19	20,514	19,979	20,315	19,781	21,728	23,874	24,634	25,885	26,932
20 to 24	28,055	30,015	30,137	30,753	29,952	33,095	36,374	37,783	39,609
25 to 29	20,187	23,019	24,868	25,163	25,703	24,999	27,576	30,583	31,779
30 to 34	18,014	19,317	20,301	22,081	22,358	22,765	22,164	24,691	27,358
35 to 39	18,778	16,947	16,629	17,552	19,100	19,303	19,683	19,321	21,514
40 to 44	19,141	18,419	16,584	16,409	17,311	18,813	19,013	19,575	19,214
45 to 49	17,983	19,079	18,446	16,731	16,564	17,447	18,970	19,346	19,924
50 to 54	14,797	18,230	18,995	18,507	16,799	16,609	17,508	19,214	19,602
55 to 59	10,297	14,983	17,740	18,633	18,163	16,481	16,296	17,361	19,064
60 to 64	7,647	9,498	13,775	16,436	17,292	16,842	15,321	15,286	16,315
65 to 69	6,889	6,920	8,742	12,806	15,333	16,147	15,769	14,488	14,485
70 to 74	6,441	6,239	6,333	8,101	11,913	14,285	15,090	14,911	13,728
75 to 79	5,509	5,997	5,544	5,703	7,347	10,850	13,078	13,993	13,873
80 to 84	3,801	4,860	5,044	4,737	4,919	6,394	9,530	11,651	12,528
85+	3,440	4,140	5,257	6,054	6,414	6,897	8,398	11,718	15,281

Table 2: Summary of Lancaster County Projection to 2040 Utilizing "Trend Series" Level of Migration

Category	Census 2000	2005 Proj	2010 Proj	2015 Proj	2020 Proj	2025 Proj	2030 Proj	2035 Proj	2040 Proj
Total Population	250,291	268,604	286,955	306,711	326,864	347,088	368,844	390,838	412,697
Change in Population	n/a	18,313	18,351	19,756	20,153	20,224	21,756	21,994	21,859
Natural Change	n/a	10,924	12,007	11,980	12,168	12,027	11,937	11,869	11,696
Births	n/a	19,257	21,198	22,039	23,028	23,803	24,990	26,762	28,747
Deaths	n/a	8,333	9,191	10,059	10,860	11,776	13,053	14,893	17,051
Net Migration	n/a	7,389	6,344	7,776	7,985	8,197	9,819	10,125	10,163
Domestic	n/a	3,470	2,022	2,766	2,528	2,288	3,438	3,259	2,807
International	n/a	3,919	4,322	5,010	5,457	5,909	6,381	6,866	7,356
Males	125,029	134,252	143,611	153,625	163,724	173,835	184,569	195,333	206,085
Under 5	8,445	9,485	10,442	10,887	11,375	11,736	12,327	13,204	14,186
5 to 9	8,334	8,195	9,204	10,202	10,638	11,056	11,409	11,979	12,832
10 to 14	8,150	8,328	8,190	9,255	10,263	10,634	11,057	11,410	11,981
15 to 19	10,289	10,196	10,442	10,308	11,597	12,758	13,262	13,814	14,255
20 to 24	14,623	15,044	14,840	15,259	15,113	17,002	18,747	19,416	20,178
25 to 29	10,789	12,004	12,323	12,252	12,610	12,415	13,951	15,383	15,944
30 to 34	9,475	10,306	11,459	11,846	11,780	12,060	11,883	13,350	14,726
35 to 39	9,657	8,896	9,681	10,838	11,204	11,081	11,350	11,182	12,566
40 to 44	9,657	9,447	8,701	9,533	10,682	10,982	10,861	11,130	10,969
45 to 49	8,943	9,596	9,398	8,714	9,548	10,651	10,953	10,835	11,107
50 to 54	7,357	9,034	9,704	9,577	8,882	9,684	10,815	11,126	11,012
55 to 59	5,037	7,407	9,098	9,843	9,726	8,982	9,805	10,959	11,286
60 to 64	3,701	4,606	6,792	8,399	9,100	8,955	8,298	9,070	10,144
65 to 69	3,194	3,297	4,116	6,133	7,616	8,235	8,130	7,552	8,273
70 to 74	2,841	2,819	2,927	3,698	5,538	6,872	7,468	7,401	6,897
75 to 79	2,237	2,537	2,536	2,676	3,410	5,120	6,400	7,003	6,975
80 to 84	1,409	1,845	2,112	2,157	2,308	2,971	4,519	5,684	6,261
85+	891	1,210	1,646	2,048	2,334	2,641	3,334	4,835	6,493
Females	125,262	134,352	143,344	153,086	163,140	173,253	184,275	195,505	206,612
Under 5	8,235	9,120	10,042	10,465	10,938	11,284	11,851	12,692	13,633
5 to 9	7,840	7,998	8,856	9,815	10,229	10,632	10,972	11,519	12,337
10 to 14	7,794	7,836	7,995	8,908	9,875	10,228	10,633	10,973	11,521
15 to 19	10,225	9,783	9,798	10,047	11,170	12,283	12,760	13,288	13,714
20 to 24	13,432	14,971	14,242	14,431	14,807	16,413	18,085	18,717	19,447
25 to 29	9,398	11,015	12,328	11,809	11,954	12,193	13,507	14,879	15,408
30 to 34	8,539	9,011	10,567	11,896	11,392	11,466	11,698	12,966	14,275
35 to 39	9,121	8,051	8,502	10,025	11,297	10,756	10,829	11,046	12,243
40 to 44	9,484	8,972	7,915	8,411	9,916	11,120	10,590	10,661	10,877
45 to 49	9,040	9,483	8,975	7,967	8,471	9,926	11,139	10,610	10,681
50 to 54	7,440	9,196	9,661	9,207	8,171	8,641	10,133	11,375	10,839
55 to 59	5,260	7,576	9,358	9,896	9,434	8,339	8,822	10,354	11,625
60 to 64	3,946	4,892	7,071	8,778	9,293	8,806	7,808	8,267	9,715
65 to 69	3,695	3,623	4,506	6,558	8,165	8,615	8,183	7,260	7,697
70 to 74	3,600	3,420	3,363	4,223	6,162	7,651	8,099	7,710	6,850
75 to 79	3,272	3,460	3,308	3,287	4,144	6,038	7,536	8,006	7,646
80 to 84	2,392	3,015	3,211	3,111	3,117	3,940	5,789	7,252	7,730
85+	2,549	2,930	3,646	4,252	4,605	4,922	5,841	7,930	10,374
Totals: Under 5	16,680	18,605	20,484	21,352	22,313	23,020	24,178	25,896	27,819
5 to 9	16,174	16,193	18,060	20,017	20,867	21,688	22,381	23,498	25,169
10 to 14	15,944	16,164	16,185	18,163	20,138	20,862	21,690	22,383	23,502
15 to 19	20,514	19,979	20,240	20,355	22,767	25,041	26,022	27,102	27,969
20 to 24	28,055	30,015	29,082	29,690	29,920	33,415	36,832	38,133	39,625
25 to 29	20,187	23,019	24,651	24,061	24,564	24,608	27,458	30,262	31,352
30 to 34	18,014	19,317	22,026	23,742	23,172	23,526	23,581	26,316	29,001
35 to 39	18,778	16,947	18,183	20,863	22,501	21,837	22,179	22,228	24,809
40 to 44	19,141	18,419	16,616	17,944	20,598	22,102	21,451	21,791	21,846
45 to 49	17,983	19,079	18,373	16,681	18,019	20,577	22,092	21,445	21,788
50 to 54	14,797	18,230	19,365	18,784	17,053	18,325	20,948	22,501	21,851
55 to 59	10,297	14,983	18,456	19,739	19,160	17,321	18,627	21,313	22,911
60 to 64	7,647	9,498	13,863	17,177	18,393	17,761	16,106	17,337	19,859
65 to 69	6,889	6,920	8,622	12,691	15,781	16,850	16,313	14,812	15,970
70 to 74	6,441	6,239	6,290	7,921	11,700	14,523	15,567	15,111	13,747
75 to 79	5,509	5,997	5,844	5,963	7,554	11,158	13,936	15,009	14,621
80 to 84	3,801	4,860	5,323	5,268	5,425	6,911	10,308	12,936	13,991
85+	3,440	4,140	5,292	6,300	6,939	7,563	9,175	12,765	16,867

Table 3: Summary of Lancaster County Projection to 2040 Utilizing "High Series" Level of Migration

Category	Census 2000	2005 Proj	2010 Proj	2015 Proj	2020 Proj	2025 Proj	2030 Proj	2035 Proj	2040 Proj
Total Population	250,291	268,604	291,371	316,218	341,752	366,713	393,900	418,456	442,507
Change in Population	n/a	18,313	22,767	24,847	25,534	24,961	27,187	24,556	24,051
Natural Change	n/a	10,924	12,008	11,987	12,190	12,200	12,196	12,036	11,481
Births	n/a	19,257	21,247	22,243	23,459	24,558	26,066	28,054	30,040
Deaths	n/a	8,333	9,239	10,256	11,269	12,358	13,870	16,018	18,559
Net Migration	n/a	7,389	10,759	12,860	13,344	12,761	14,991	12,520	12,570
Domestic	n/a	3,470	6,396	7,725	7,669	6,543	8,206	5,176	4,687
International	n/a	3,919	4,363	5,135	5,675	6,218	6,785	7,344	7,883
Males	125,029	134,252	145,840	158,388	171,259	183,797	197,226	209,173	220,899
Under 5	8,445	9,485	10,420	10,951	11,551	12,059	12,802	13,732	14,706
5 to 9	8,334	8,195	9,290	10,294	10,818	11,320	11,819	12,428	13,333
10 to 14	8,150	8,328	8,389	9,586	10,629	11,079	11,591	11,988	12,608
15 to 19	10,289	10,196	10,519	10,645	12,136	13,304	13,909	14,448	14,926
20 to 24	14,623	15,044	15,097	15,625	15,910	18,029	19,833	20,476	21,212
25 to 29	10,789	12,004	12,119	12,267	12,717	12,829	14,536	15,835	16,360
30 to 34	9,475	10,306	11,895	12,110	12,259	12,608	12,722	14,290	15,570
35 to 39	9,657	8,896	9,460	11,003	11,211	11,266	11,582	11,589	13,014
40 to 44	9,657	9,447	8,721	9,348	10,897	11,006	11,061	11,274	11,274
45 to 49	8,943	9,596	9,800	9,129	9,789	11,326	11,444	11,398	11,623
50 to 54	7,357	9,034	10,352	10,674	9,954	10,588	12,268	12,283	12,240
55 to 59	5,037	7,407	9,550	11,042	11,399	10,554	11,250	12,914	12,948
60 to 64	3,701	4,606	6,852	8,911	10,313	10,576	9,816	10,391	11,922
65 to 69	3,194	3,297	4,043	6,090	7,950	9,161	9,424	8,686	9,218
70 to 74	2,841	2,819	2,876	3,575	5,412	7,049	8,162	8,353	7,726
75 to 79	2,237	2,537	2,641	2,740	3,430	5,193	6,822	7,885	8,111
80 to 84	1,409	1,845	2,171	2,311	2,434	3,072	4,716	6,176	7,185
85+	891	1,210	1,645	2,087	2,450	2,778	3,469	5,027	6,923
Females	125,262	134,352	145,531	157,830	170,493	182,916	196,674	209,283	221,608
Under 5	8,235	9,120	10,019	10,528	11,104	11,589	12,308	13,200	14,135
5 to 9	7,840	7,998	8,934	9,899	10,408	10,888	11,360	11,953	12,820
10 to 14	7,794	7,836	8,188	9,223	10,219	10,657	11,153	11,519	12,126
15 to 19	10,225	9,783	9,861	10,371	11,680	12,799	13,393	13,905	14,349
20 to 24	13,432	14,971	14,481	14,766	15,575	17,392	19,116	19,760	20,452
25 to 29	9,398	11,015	12,119	11,815	12,041	12,590	14,061	15,305	15,831
30 to 34	8,539	9,011	10,956	12,155	11,845	11,982	12,528	13,860	15,092
35 to 39	9,121	8,051	8,305	10,186	11,293	10,923	11,045	11,444	12,662
40 to 44	9,484	8,972	7,928	8,246	10,108	11,139	10,770	10,789	11,175
45 to 49	9,040	9,483	9,361	8,338	8,675	10,551	11,633	11,147	11,167
50 to 54	7,440	9,196	10,302	10,267	9,145	9,438	11,484	12,557	12,031
55 to 59	5,260	7,576	9,824	11,104	11,057	9,786	10,110	12,202	13,332
60 to 64	3,946	4,892	7,134	9,312	10,533	10,393	9,225	9,460	11,428
65 to 69	3,695	3,623	4,421	6,514	8,522	9,583	9,476	8,341	8,563
70 to 74	3,600	3,420	3,307	4,079	6,020	7,845	8,851	8,698	7,660
75 to 79	3,272	3,460	3,443	3,370	4,171	6,125	8,030	9,014	8,894
80 to 84	2,392	3,015	3,302	3,333	3,293	4,077	6,051	7,873	8,862
85+	2,549	2,930	3,646	4,324	4,804	5,159	6,080	8,256	11,029
Totals: Under 5	16,680	18,605	20,439	21,479	22,655	23,648	25,110	26,932	28,841
5 to 9	16,174	16,193	18,224	20,193	21,226	22,208	23,179	24,381	26,153
10 to 14	15,944	16,164	16,577	18,809	20,848	21,736	22,744	23,507	24,734
15 to 19	20,514	19,979	20,380	21,016	23,816	26,103	27,302	28,353	29,275
20 to 24	28,055	30,015	29,578	30,391	31,485	35,421	38,949	40,236	41,664
25 to 29	20,187	23,019	24,238	24,082	24,758	25,419	28,597	31,140	32,191
30 to 34	18,014	19,317	22,851	24,265	24,104	24,590	25,250	28,150	30,662
35 to 39	18,778	16,947	17,765	21,189	22,504	22,189	22,627	23,033	25,676
40 to 44	19,141	18,419	16,649	17,594	21,005	22,145	21,831	22,063	22,449
45 to 49	17,983	19,079	19,161	17,467	18,464	21,877	23,077	22,545	22,790
50 to 54	14,797	18,230	20,654	20,941	19,099	20,026	23,752	24,840	24,271
55 to 59	10,297	14,983	19,374	22,146	22,456	20,340	21,360	25,116	26,280
60 to 64	7,647	9,498	13,986	18,223	20,846	20,969	19,041	19,851	23,350
65 to 69	6,889	6,920	8,464	12,604	16,472	18,744	18,900	17,027	17,781
70 to 74	6,441	6,239	6,183	7,654	11,432	14,894	17,013	17,051	15,386
75 to 79	5,509	5,997	6,084	6,110	7,601	11,318	14,852	16,899	17,005
80 to 84	3,801	4,860	5,473	5,644	5,727	7,149	10,767	14,049	16,047
85+	3,440	4,140	5,291	6,411	7,254	7,937	9,549	13,283	17,952

Table 4: Total Population Change and Components of Change for Lancaster County: 1950 to 2000 with 2010 Estimate and Population Projections with Varying Rates of Migration: 2010 to 2040

Prepared by Center for Public Affairs Research, University of Nebraska Omaha: May 2010
Sources: 1950-2000 Decennial Censuses, Estimates Program (2009 vintage), U.S. Census Bureau;
Vital Statistics Reports, Nebraska Department of Health & Human Services

	Lancaster County, Nebraska						
Item	1950	1960	1970	1980	1990	2000	2010 Est.
Total Population	**119,742**	**155,272**	**167,972**	**192,884**	**213,641**	**250,291**	**285,000**
Population change from last decade		35,530	12,700	24,912	20,757	36,650	34,709
Natural change (births - deaths)		23,303	22,379	13,901	16,950	16,753	22,987
Net migration		12,227	-9,679	11,011	3,807	19,897	11,722
Percent Change or Rate (as a % of population at start of period)		1950s	1960s	1970s	1980s	1990s	2000s
Percent Change of Total Population		29.7	8.2	14.8	10.8	17.2	13.9
Rate of Natural Change		19.5	14.4	8.3	8.8	7.8	9.2
Rate of Net Migration		10.2	-6.2	6.6	2.0	9.3	4.7

Note: The 2010 estimated population above is based upon a typical year of growth for the 2000 to 2009 time period added to the estimated population for 2009.

Projected Values from 2010 to 2040 with Decade Rates

	Low Series			
	2010 Prj	2020 Prj	2030 Prj	2040 Prj
Total Population	**282,434**	**311,915**	**344,864**	**384,781**
Population change from last decade	32,143	29,481	32,949	39,917
Natural change (births - deaths)	22,784	23,922	24,077	24,052
Net migration	9,359	5,559	8,872	15,865
Rate (as a % of population at start of period)				
Percent Change of Total Population	12.8	10.4	10.6	11.6
Rate of Natural Change	9.1	8.5	7.7	7.0
Rate of Net Migration	3.7	2.0	2.8	4.6

	Trend Series			
	2010 Prj	2020 Prj	2030 Prj	2040 Prj
Total Population	**286,955**	**326,864**	**368,844**	**412,697**
Population change from last decade	36,664	39,909	41,980	43,853
Natural change (births - deaths)	22,931	24,148	23,964	23,565
Net migration	13,733	15,761	18,016	20,288
Rate (as a % of population at start of period)				
Percent Change of Total Population	14.6	13.9	12.8	11.9
Rate of Natural Change	9.2	8.4	7.3	6.4
Rate of Net Migration	5.5	5.5	5.5	5.5

	High Series			
	2010 Prj	2020 Prj	2030 Prj	2040 Prj
Total Population	**291,371**	**341,752**	**393,900**	**442,507**
Population change from last decade	41,080	50,381	52,148	48,607
Natural change (births - deaths)	22,932	24,177	24,396	23,517
Net migration	18,148	26,204	27,752	25,090
Rate (as a % of population at start of period)				
Percent Change of Total Population	16.4	17.3	15.3	12.3
Rate of Natural Change	9.2	8.3	7.1	6.0
Rate of Net Migration	7.3	9.0	8.1	6.4

Figure 1: Projected Total Population Change with Natural Change and Net Migration Components in Lancaster County Trend Model: 2000 to 2040

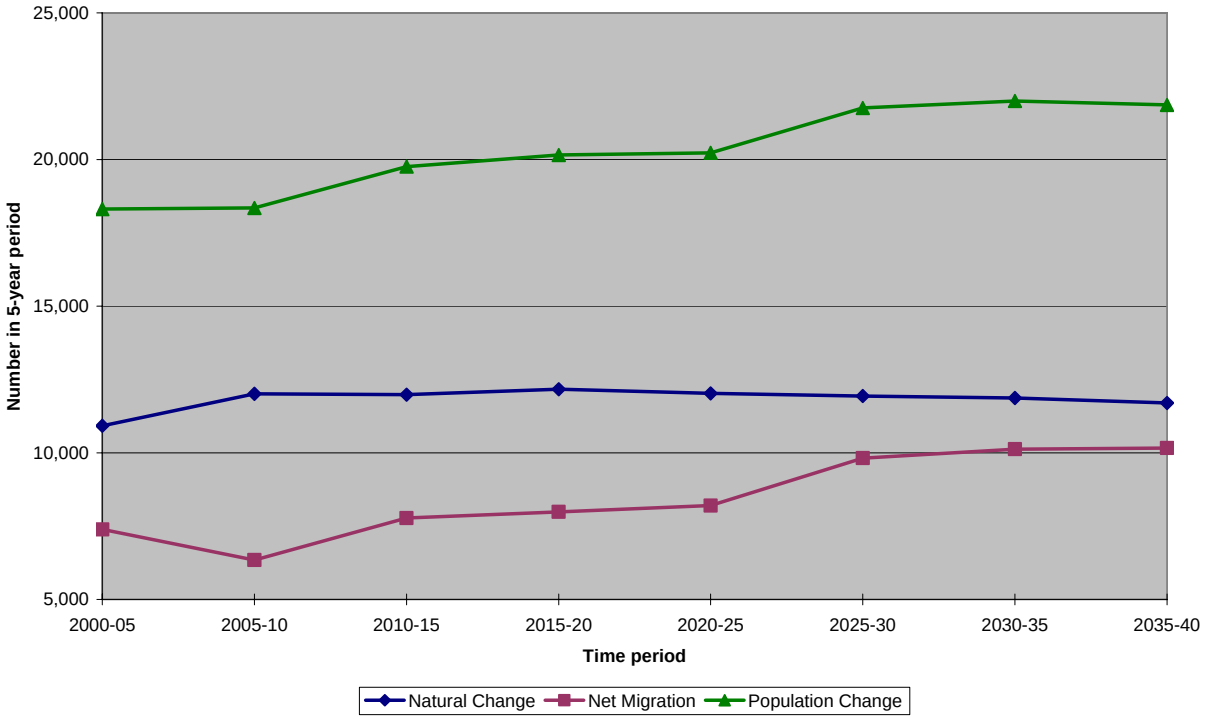


Figure 2: Projected Births, Deaths, and Natural Change in Lancaster County Trend Model: 2000 to 2040

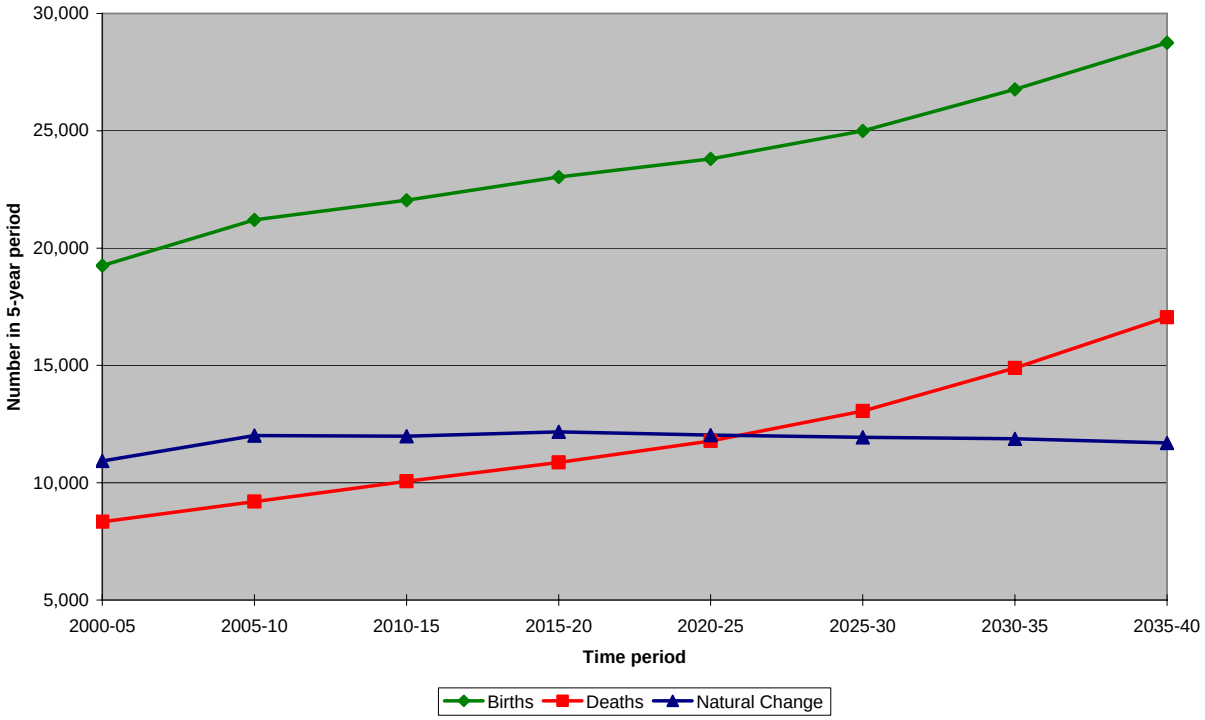


Figure 3: Projected International, Net Domestic, and Total Net Migration in Lancaster County Trend Model: 2000 to 2040

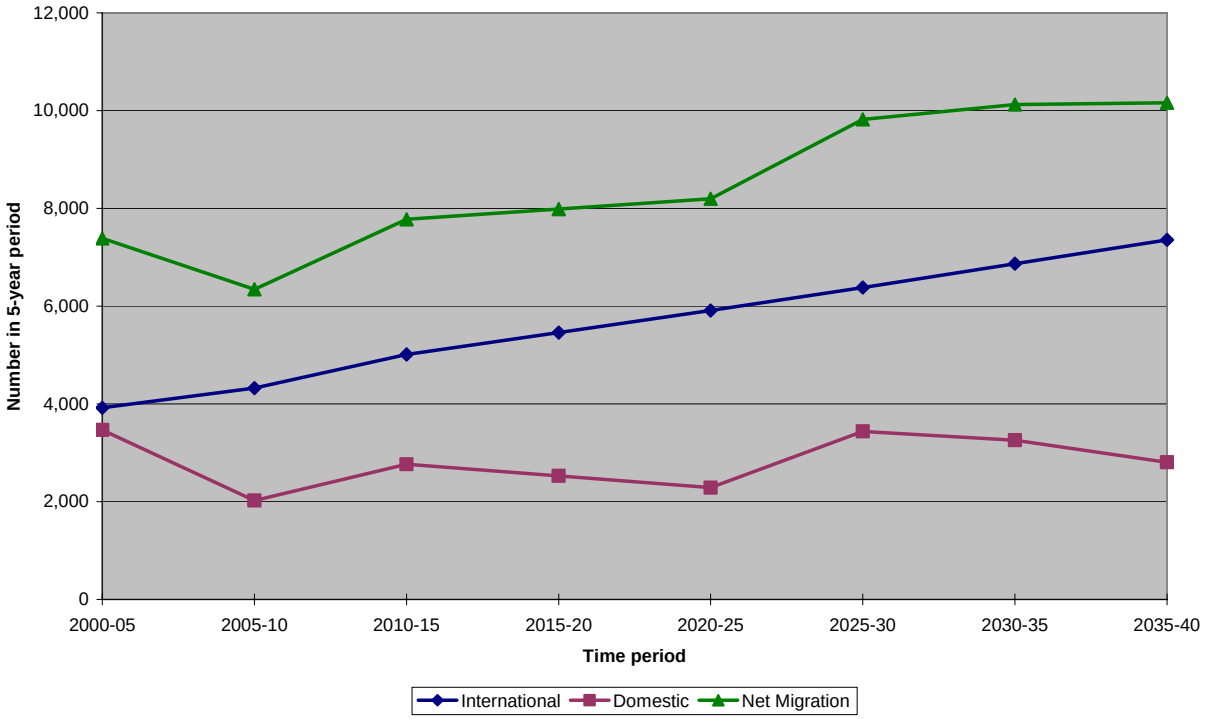


Figure 4: Comparison of Total Population in Lancaster County Projection Models Utilizing Varying Levels of Migration: 2000 to 2040

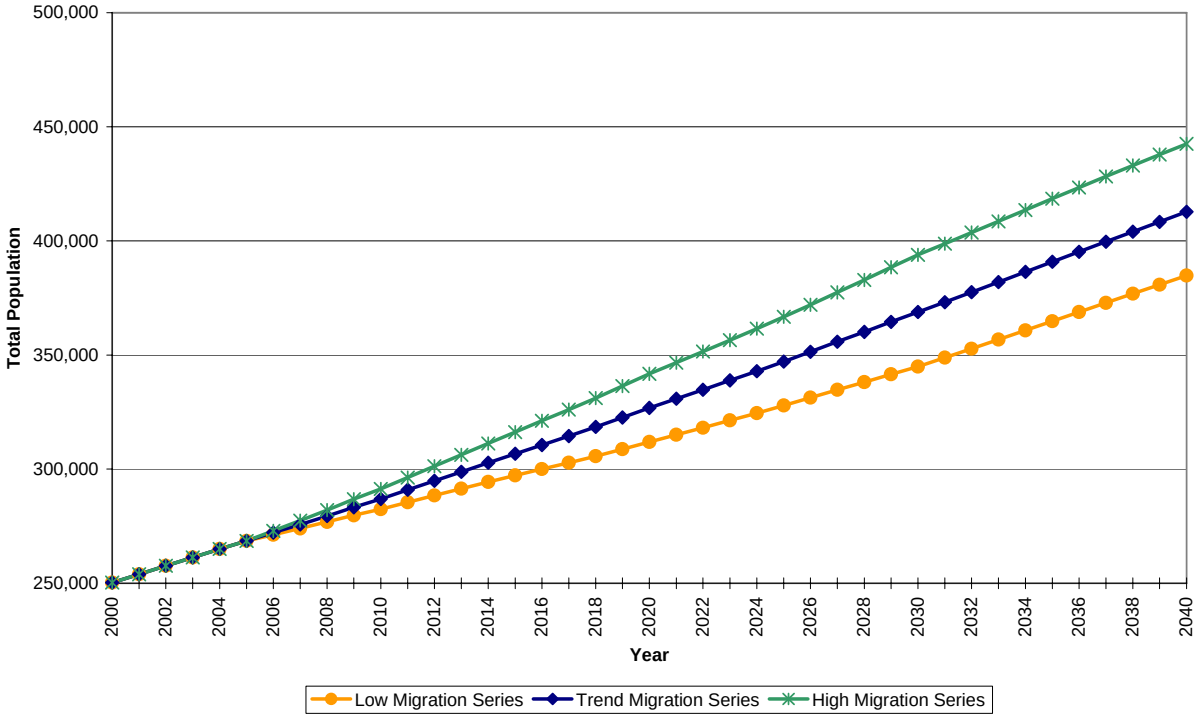


Figure 5: Comparison of Under Age 18 Population in Lancaster County Projection Models Utilizing Varying Levels of Migration: 2000 to 2040

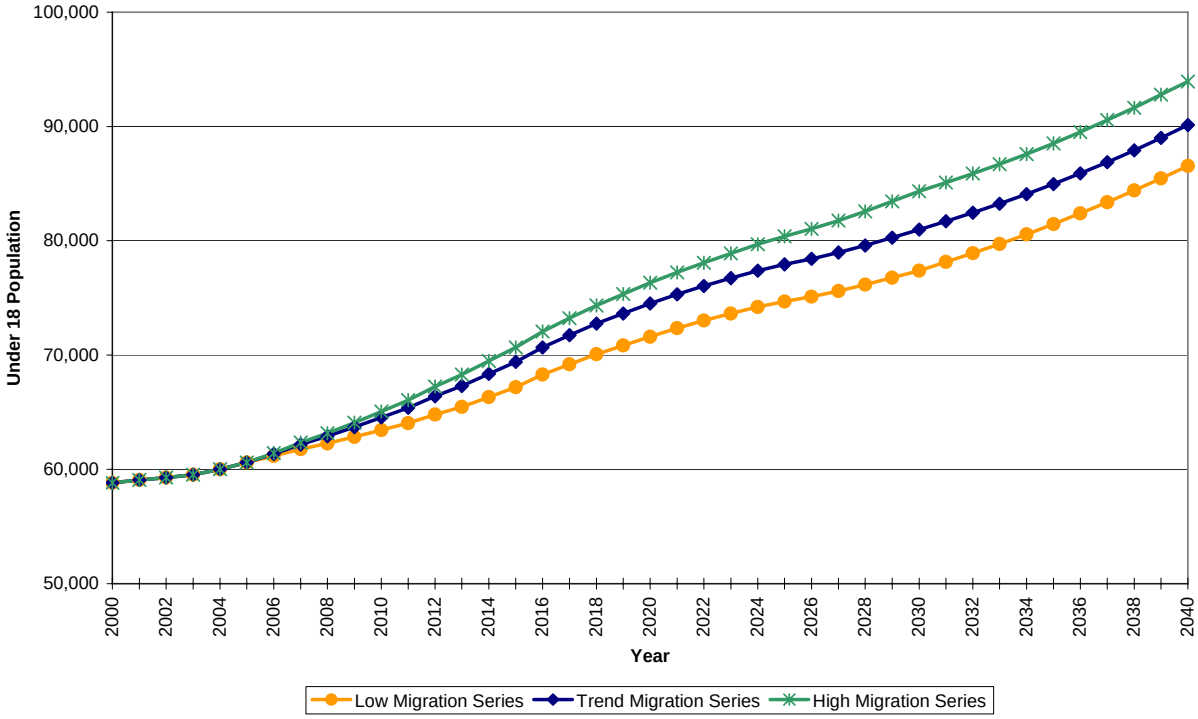


Figure 6: Comparison of Age 18 to 64 Population in Lancaster County Projection Models Utilizing Varying Levels of Migration: 2000 to 2040

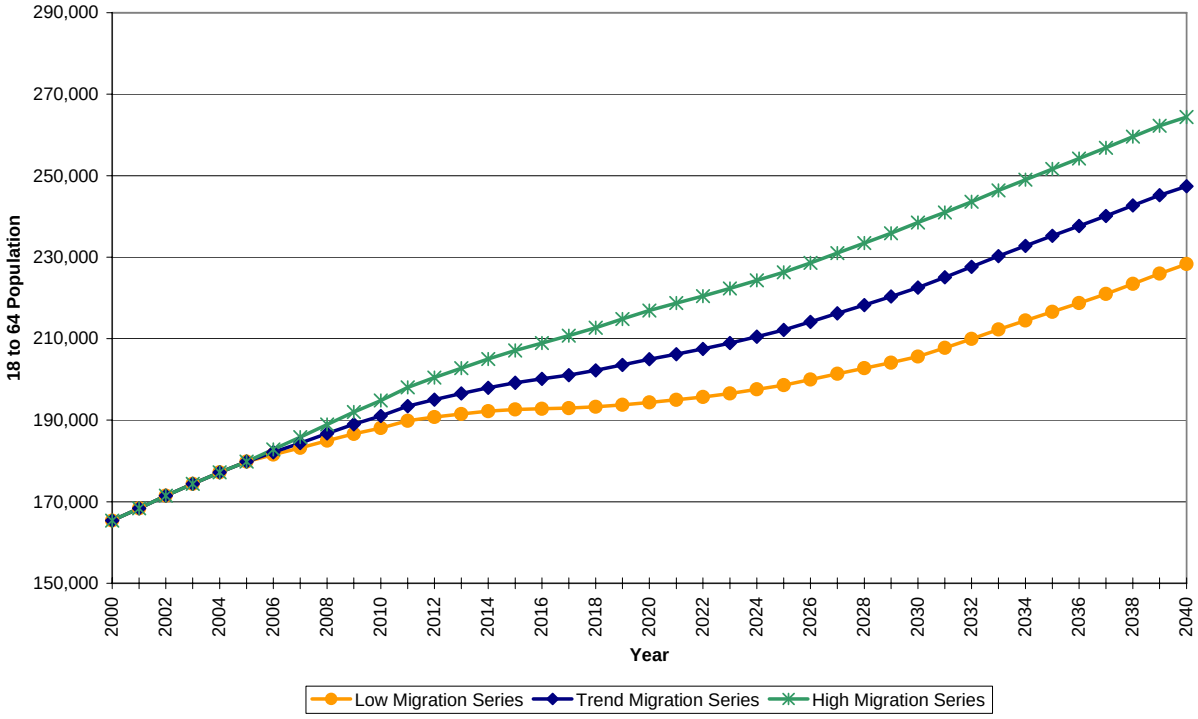


Figure 7: Comparison of Age 65 and Over Population in Lancaster County Projection Models Utilizing Varying Levels of Migration: 2000 to 2040

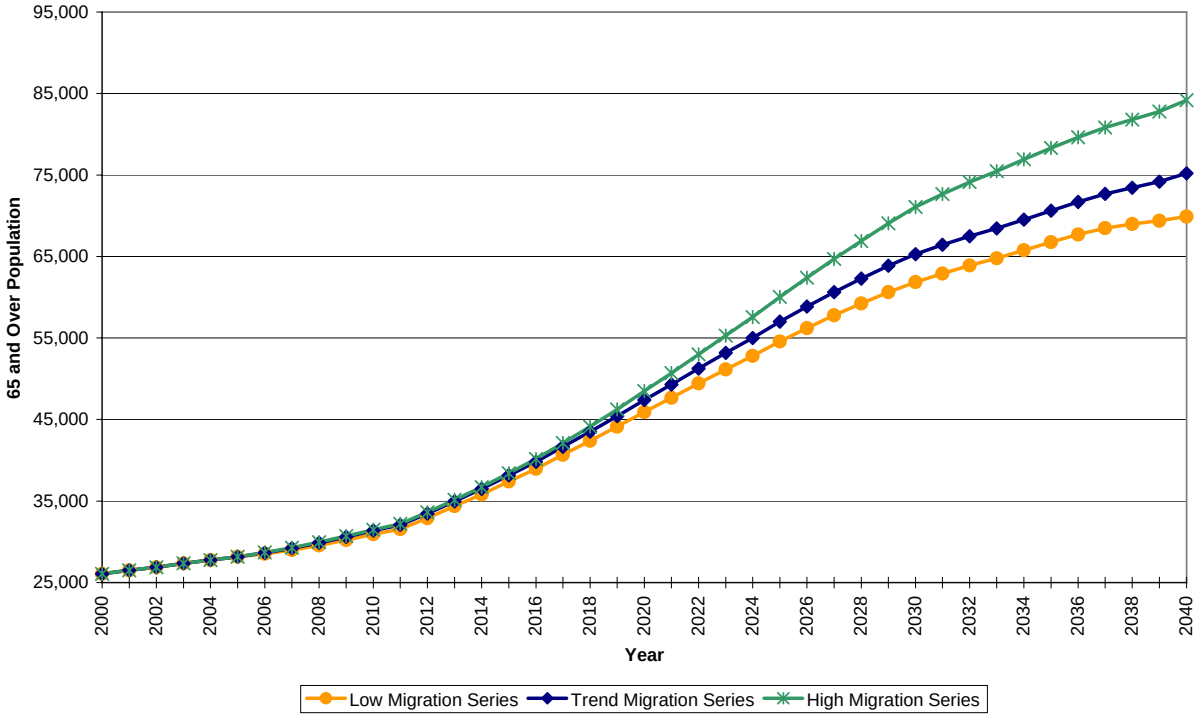
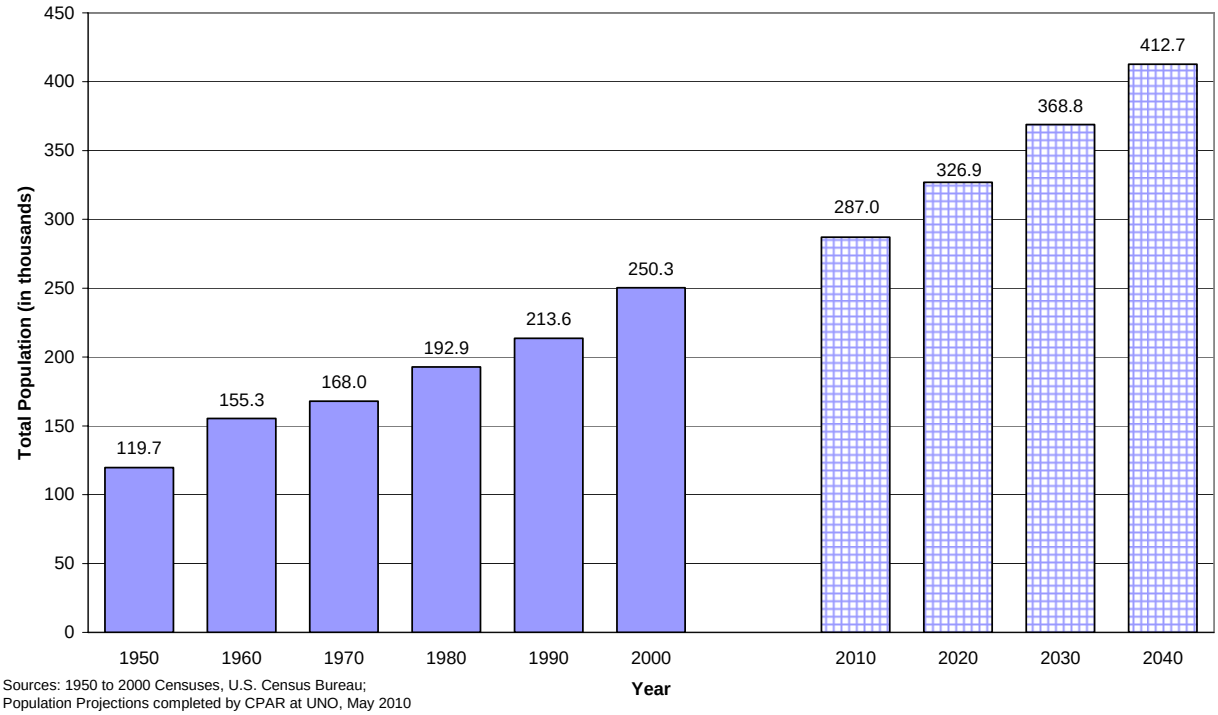
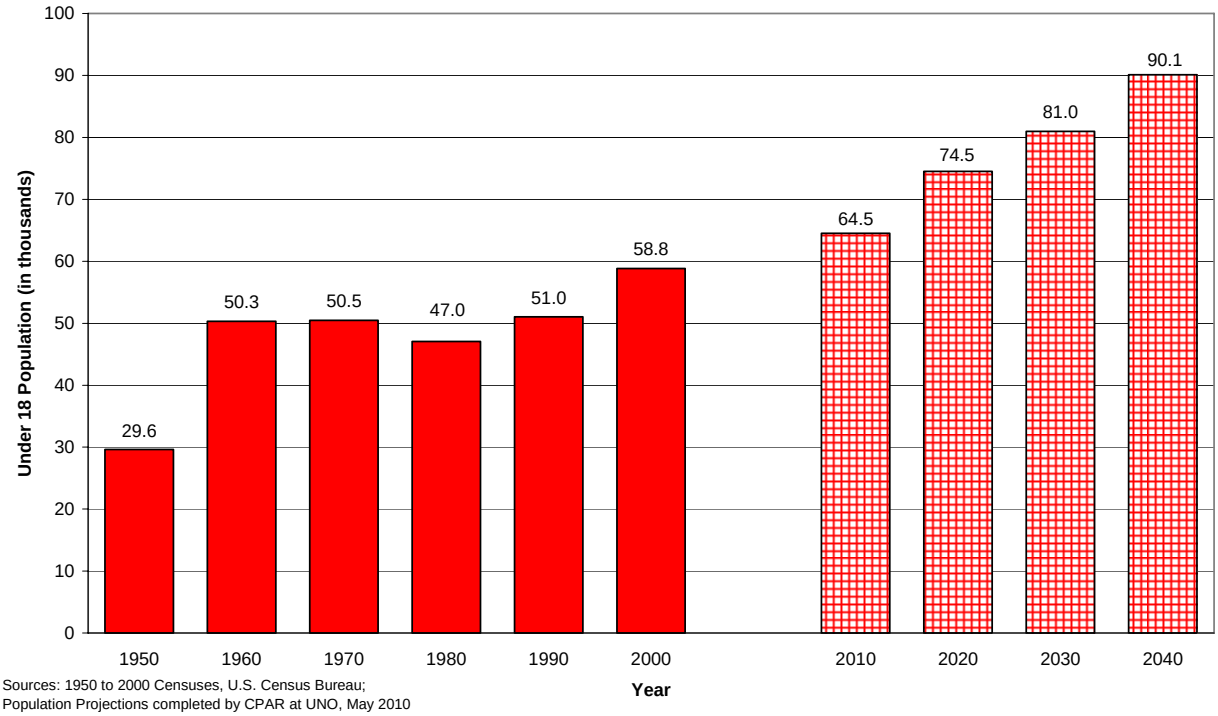


Figure 8: Total Population for Lancaster County: 1950 to 2000 Censuses and 2010 to 2040 Projections based on Trend Model



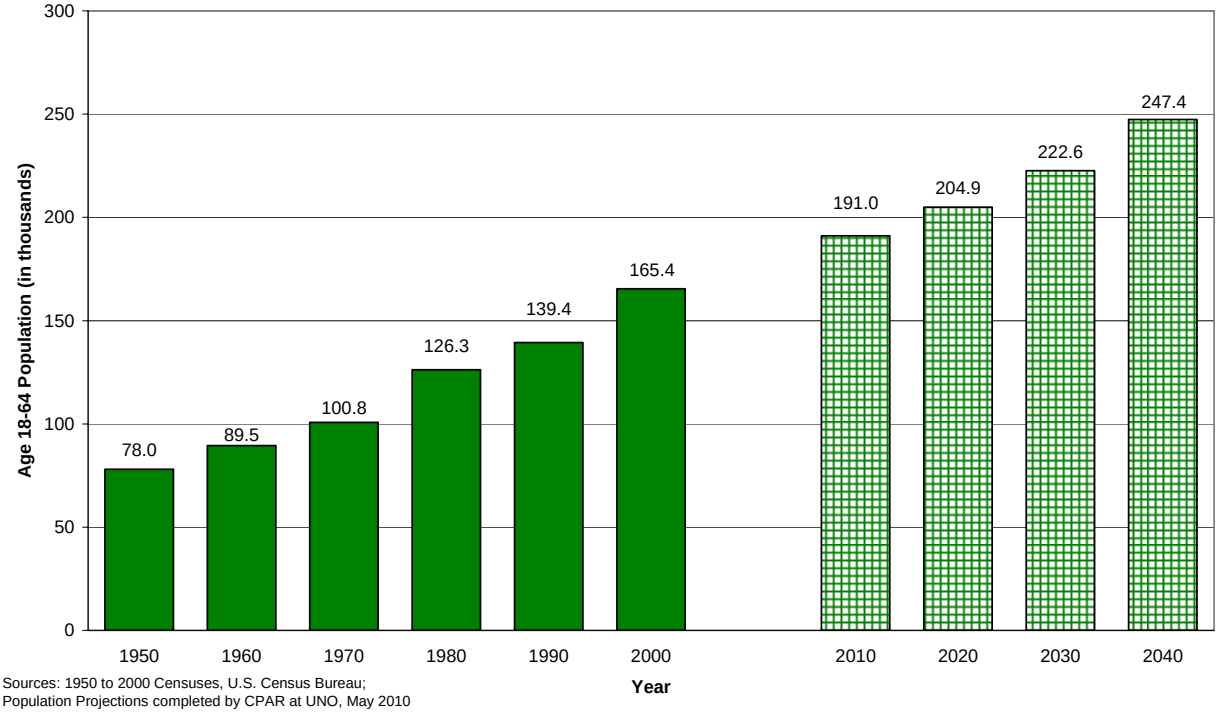
Sources: 1950 to 2000 Censuses, U.S. Census Bureau;
Population Projections completed by CPAR at UNO, May 2010

Figure 9: Under Age 18 Population for Lancaster County: 1950 to 2000 Censuses and 2010 to 2040 Projections based on Trend Model



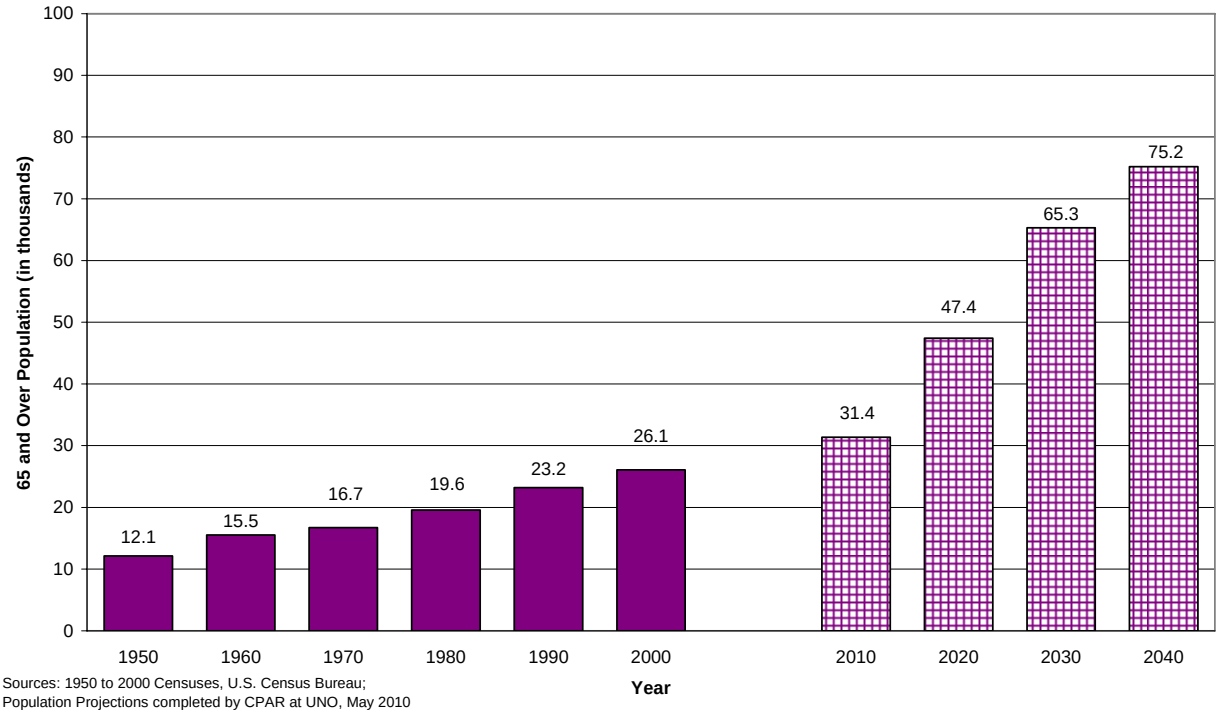
Sources: 1950 to 2000 Censuses, U.S. Census Bureau;
Population Projections completed by CPAR at UNO, May 2010

Figure 10: Age 18 to 64 Population for Lancaster County: 1950 to 2000 Censuses and 2010 to 2040 Projections based on Trend Model



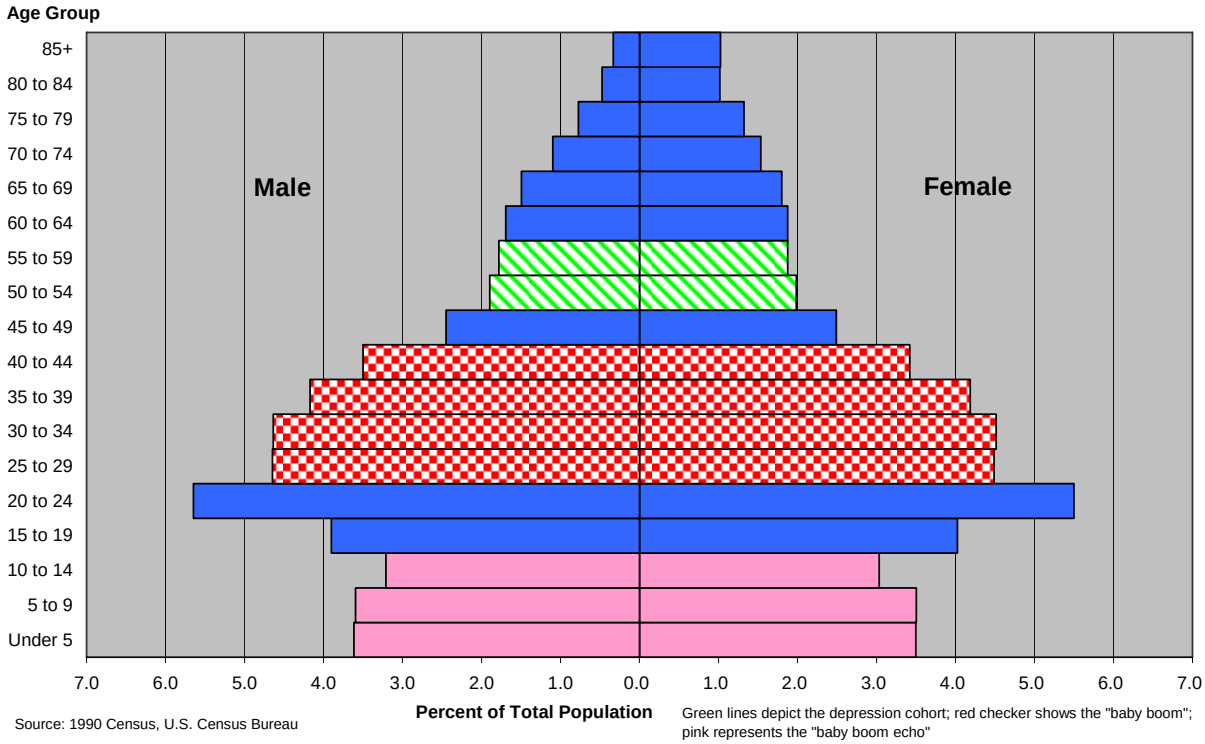
Sources: 1950 to 2000 Censuses, U.S. Census Bureau;
Population Projections completed by CPAR at UNO, May 2010

Figure 11: Age 65 and Over Population for Lancaster County: 1950 to 2000 Censuses and 2010 to 2040 Projections based on Trend Model



Sources: 1950 to 2000 Censuses, U.S. Census Bureau;
Population Projections completed by CPAR at UNO, May 2010

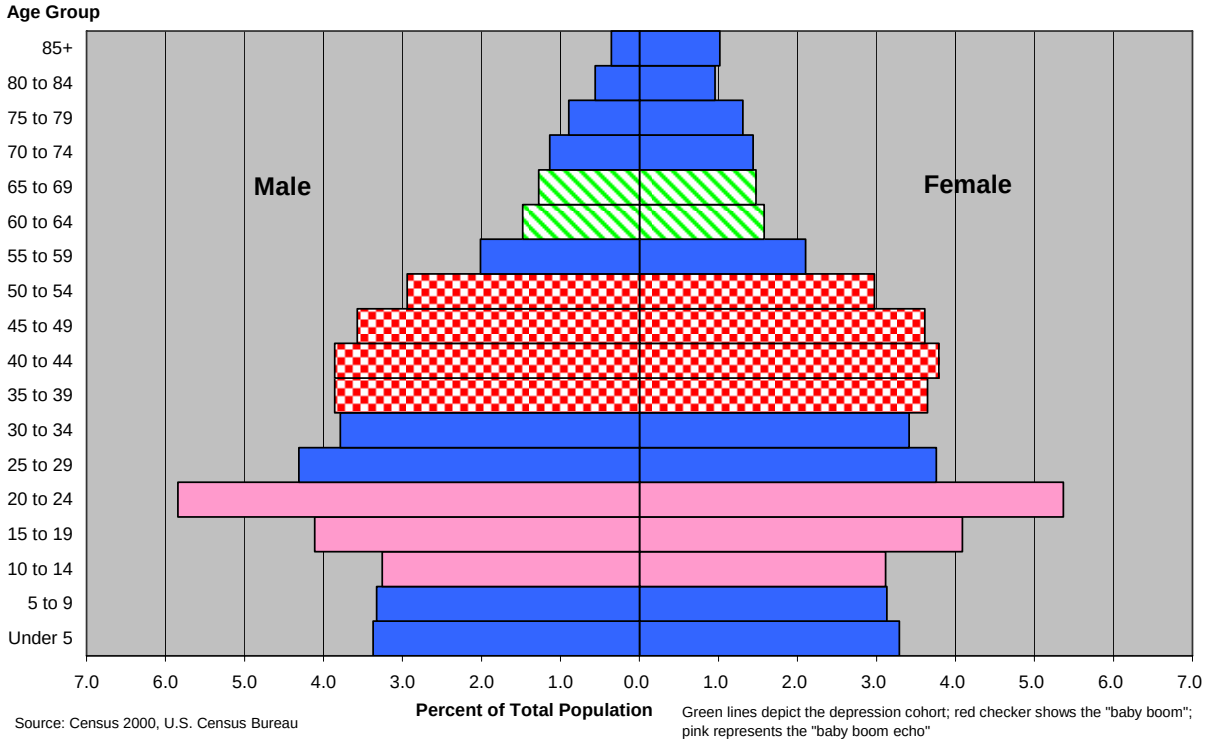
Figure 12: Lancaster County Population by Sex and Five-Year Age Group: 1990 Census



Source: 1990 Census, U.S. Census Bureau

Green lines depict the depression cohort; red checker shows the "baby boom"; pink represents the "baby boom echo"

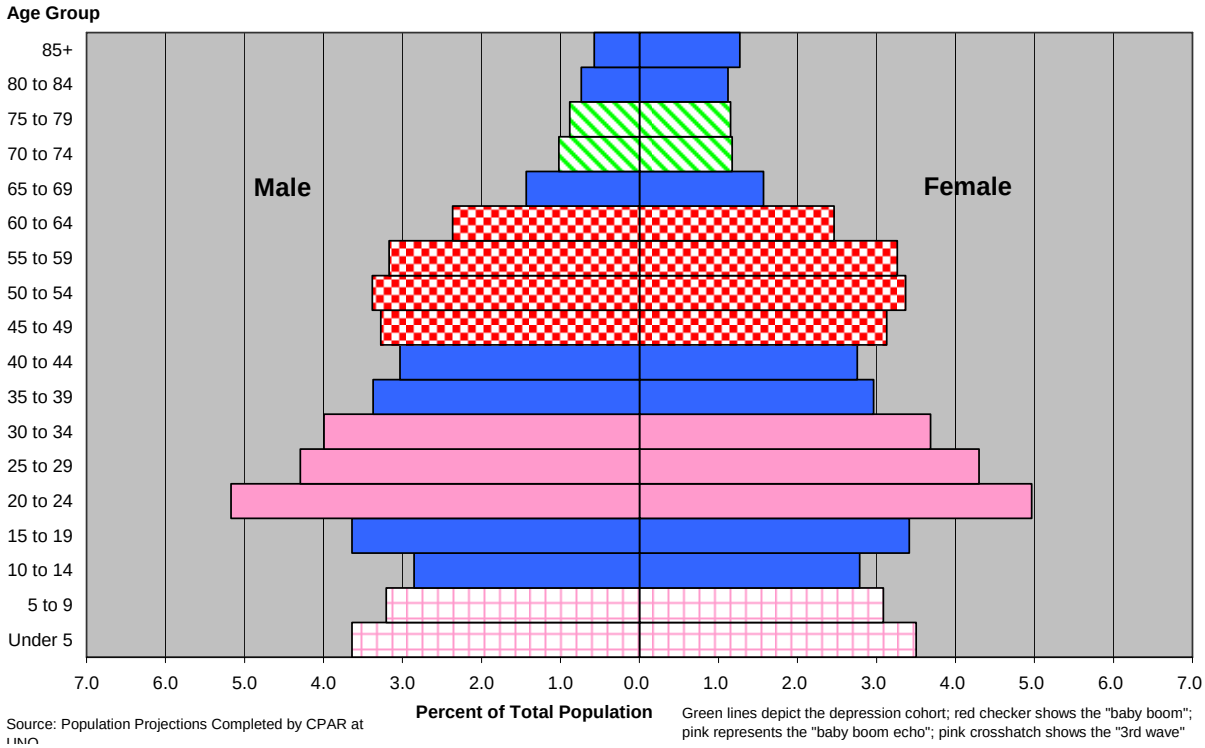
Figure 13: Lancaster County Population by Sex and Five-Year Age Group: 2000 Census



Source: Census 2000, U.S. Census Bureau

Green lines depict the depression cohort; red checker shows the "baby boom"; pink represents the "baby boom echo"

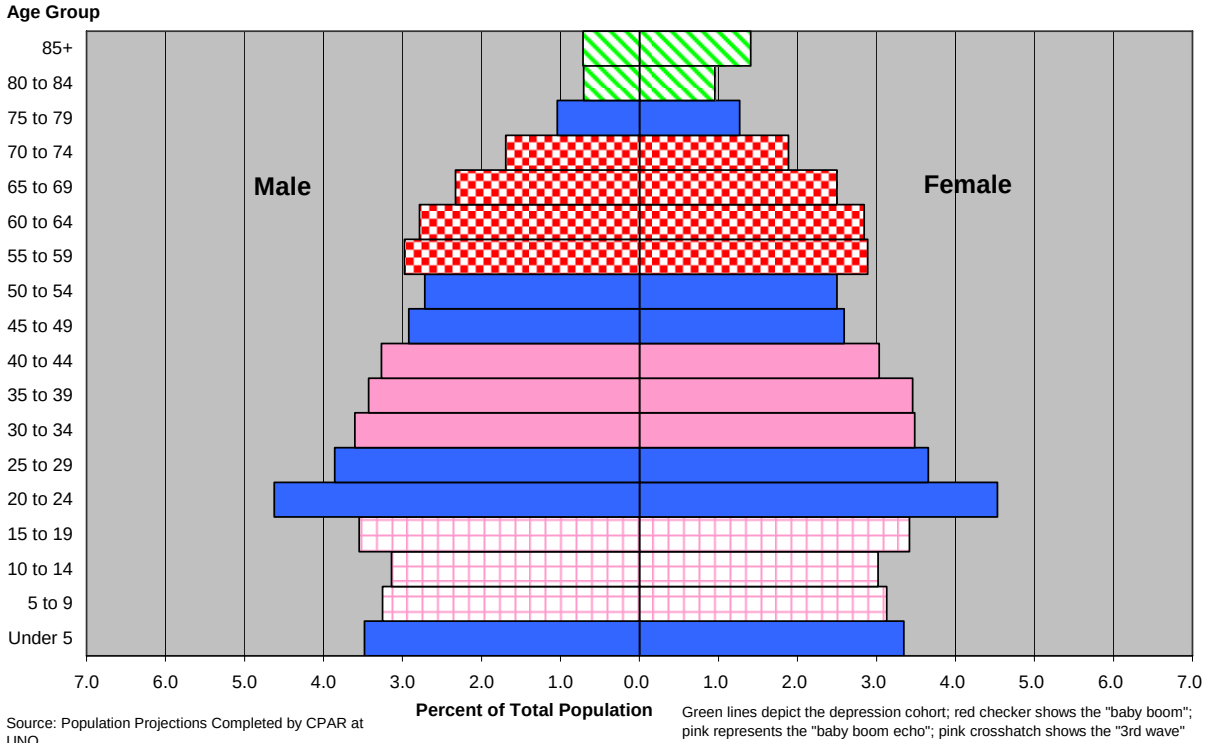
Figure 14: Lancaster County Population by Sex and Five-Year Age Group: 2010 Projection based on Trend Model



Source: Population Projections Completed by CPAR at UNO

Green lines depict the depression cohort; red checker shows the "baby boom"; pink represents the "baby boom echo"; pink crosshatch shows the "3rd wave"

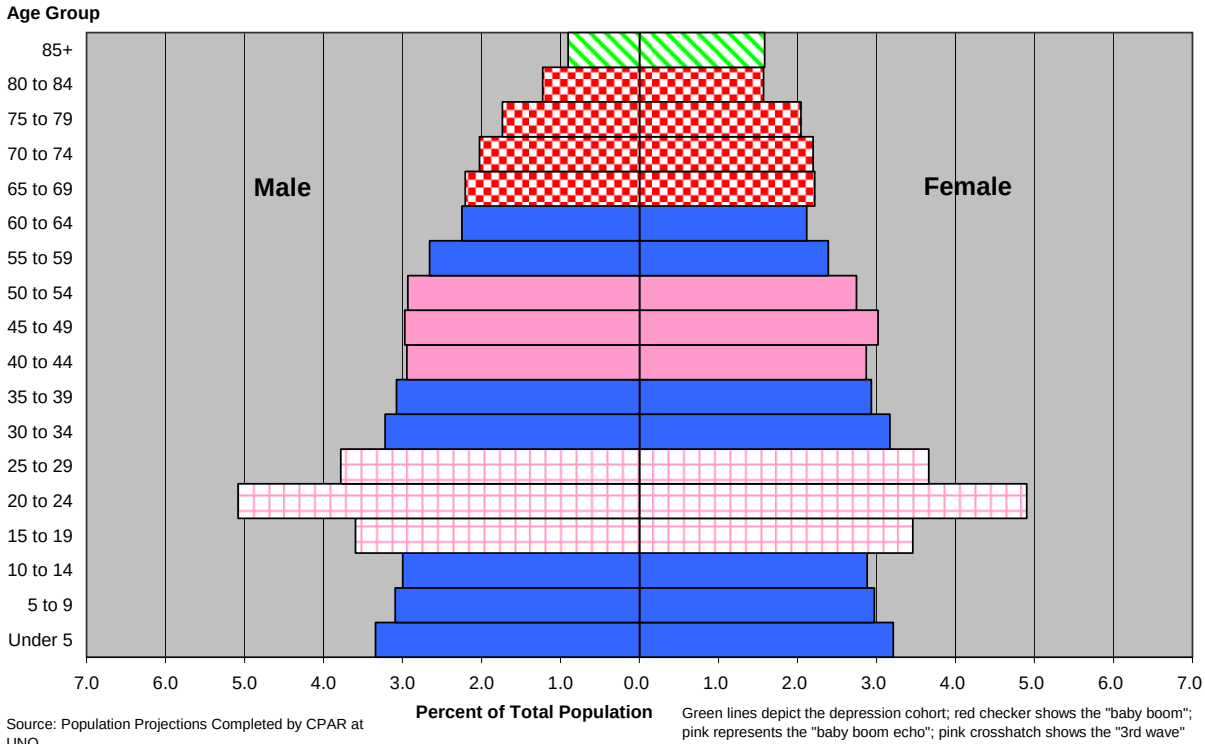
Figure 15: Lancaster County Population by Sex and Five-Year Age Group: 2020 Projection based on Trend Model



Source: Population Projections Completed by CPAR at UNO

Green lines depict the depression cohort; red checker shows the "baby boom"; pink represents the "baby boom echo"; pink crosshatch shows the "3rd wave"

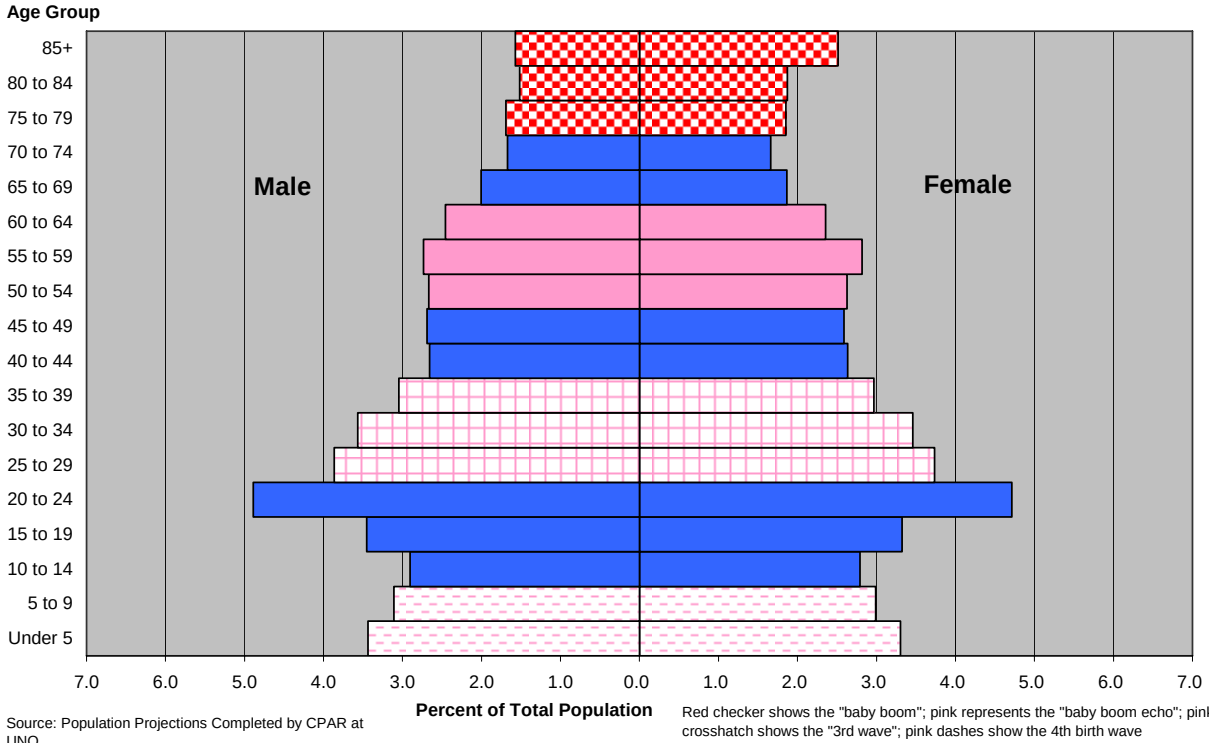
Figure 16: Lancaster County Population by Sex and Five-Year Age Group: 2030 Projection based on Trend Model



Source: Population Projections Completed by CPAR at UNO

Green lines depict the depression cohort; red checker shows the "baby boom"; pink represents the "baby boom echo"; pink crosshatch shows the "3rd wave"

Figure 17: Lancaster County Population by Sex and Five-Year Age Group: 2040 Projection based on Trend Model



Source: Population Projections Completed by CPAR at UNO

Red checker shows the "baby boom"; pink represents the "baby boom echo"; pink crosshatch shows the "3rd wave"; pink dashes show the 4th birth wave

Table 5: Comparison of Lancaster County Projection Models by Major Age Groups with Changes and Percent Changes from 2000 to 2040

										2000 to 2040	
Total Population	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**Change**	**Percent Change**
Low Series	250,291	268,604	282,434	297,229	311,915	327,881	344,864	364,809	384,781	134,490	53.7
Trend Series	250,291	268,604	286,955	306,711	326,864	347,088	368,844	390,838	412,697	162,406	64.9
High Series	250,291	268,604	291,371	316,218	341,752	366,713	393,900	418,456	442,507	192,216	76.8

										2000 to 2040	
Under Age 18 Pop.	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**Change**	**Percent Change**
Low Series	58,828	60,603	63,434	67,190	71,607	74,687	77,385	81,451	86,544	27,716	47.1
Trend Series	58,828	60,603	64,538	69,405	74,518	77,930	80,985	84,951	90,122	31,294	53.2
High Series	58,828	60,603	65,051	70,670	76,337	80,396	84,327	88,520	93,939	35,111	59.7

										2000 to 2040	
Age 18 to 64 Pop.	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**Change**	**Percent Change**
Low Series	165,383	179,845	188,080	192,638	194,382	198,621	205,614	216,597	228,342	62,959	38.1
Trend Series	165,383	179,845	191,046	199,163	204,947	212,153	222,560	235,254	247,379	81,996	49.6
High Series	165,383	179,845	194,825	207,125	216,929	226,275	238,492	251,627	264,397	99,014	59.9

										2000 to 2040	
Age 65+ Pop.	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**Change**	**Percent Change**
Low Series	26,080	28,156	30,920	37,401	45,926	54,573	61,865	66,761	69,895	43,815	168.0
Trend Series	26,080	28,156	31,371	38,143	47,399	57,005	65,299	70,633	75,196	49,116	188.3
High Series	26,080	28,156	31,495	38,423	48,486	60,042	71,081	78,309	84,171	58,091	222.7

Table 6: Lancaster County Household Characteristics from Various Historic Censuses and Projections from 2010 to 2040

Sources: 1970 Census (Characteristics of the Population - Vol. 1, part 29 - table 36, pg 133);
1980 Census (General Population Characteristics - PC80-1-B29 - Table 47, pg 139 & Table 31, pg 56);
1990 Census (General Population Characteristics - 1990 CP-1-29 - Table 57, pg 120); 2000 Census (SF 1 data, AFF Quick Tables DP-1, QT-H1, and QT-P10)
2006-2008 American Community Surveys (AFF tables DP-1, DP-2, B25007, B25009); all from the U.S. Census Bureau
Note: Projected data represent the "trend series" regarding total population. Some categories of the projected data may not sum to totals due to round-off error.

	Actual Historic Data					Projected Data						
Category	1970	1980	1990	2000	2006-08	2010	2015	2020	2025	2030	2035	2040
Total Population	167,972	192,884	213,641	250,291	274,848	286,955	306,711	326,864	347,088	368,844	390,838	412,697
In households	156,002	180,612	202,170	238,094	259,968	271,316	290,425	309,508	327,998	347,931	368,052	387,935
In group quarters	11,970	12,272	11,471	12,197	14,880	15,639	16,286	17,356	19,090	20,913	22,786	24,762
% of total population in households	92.9	93.6	94.6	95.1	94.6	94.6	94.7	94.7	94.5	94.3	94.2	94.0
Total Households	53,912	71,769	82,759	99,187	108,246	113,048	122,542	131,705	139,574	148,688	156,618	165,079
Nonfamily households	12,986	24,190	29,774	38,485	40,819	39,523	44,896	50,374	55,850	61,714	67,081	72,052
Family households	40,926	47,579	52,985	60,702	67,427	73,526	77,646	81,332	83,724	86,974	89,537	93,027
With own children under 18	21,828	23,942	26,385	30,059	34,163	36,763	38,745	40,503	41,611	43,139	44,321	45,955
% of family hholds with children < 18	53.3	50.3	49.8	49.5	50.7	50.0	49.9	49.8	49.7	49.6	49.5	49.4
% Family households	75.9	66.3	64.0	61.2	62.3	65.0	63.4	61.8	60.0	58.5	57.2	56.4
% of all hholds with own children < 18	40.5	33.4	31.9	30.3	31.6	32.5	31.6	30.8	29.8	29.0	28.3	27.8
Persons per household (average hhold size)	2.89	2.52	2.44	2.40	2.40	2.40	2.37	2.35	2.35	2.34	2.35	2.35
Head of household/householder by age												
15 to 24 years	7,566	10,930	8,635	11,070	9,977	10,020	10,605	11,193	12,330	13,193	13,536	14,001
25 to 34 years	10,709	19,498	20,466	19,847	22,805	24,210	24,616	24,645	24,673	26,035	28,528	30,380
35 to 44 years	8,794	10,802	18,481	21,251	20,750	19,109	21,437	23,870	24,161	23,874	23,810	25,193
45 to 54 years	16,503	9,230	10,832	19,025	21,556	21,869	20,280	20,107	22,143	24,379	24,606	24,393
55 to 64 years		8,747	9,108	10,757	15,963	18,807	21,559	21,988	20,394	20,093	22,102	24,416
65 to 74 years	10,340	7,122	8,074	8,457	8,322	8,782	12,640	16,896	19,151	19,365	17,967	17,814
75 to 84 years		5,440	5,406	6,533	6,420	7,248	7,613	8,820	12,191	16,278	18,547	18,958
85+ years			1,757	2,247	2,453	3,002	3,792	4,187	4,531	5,470	7,523	9,924
Household Size												
1-person	n/a	n/a	22,770	28,831	31,603	34,553	38,744	42,832	46,874	51,395	55,176	58,570
2 or more persons	n/a	n/a	59,989	70,356	76,643	78,495	83,798	88,873	92,699	97,293	101,442	106,509
% 1-person households	n/a	n/a	27.5	29.1	29.2	30.6	31.6	32.5	33.6	34.6	35.2	35.5

Figure 18: Comparison of the Population in Households and Group Quarters: Lancaster County Projections from 2010 - 2040 based on Trend Model

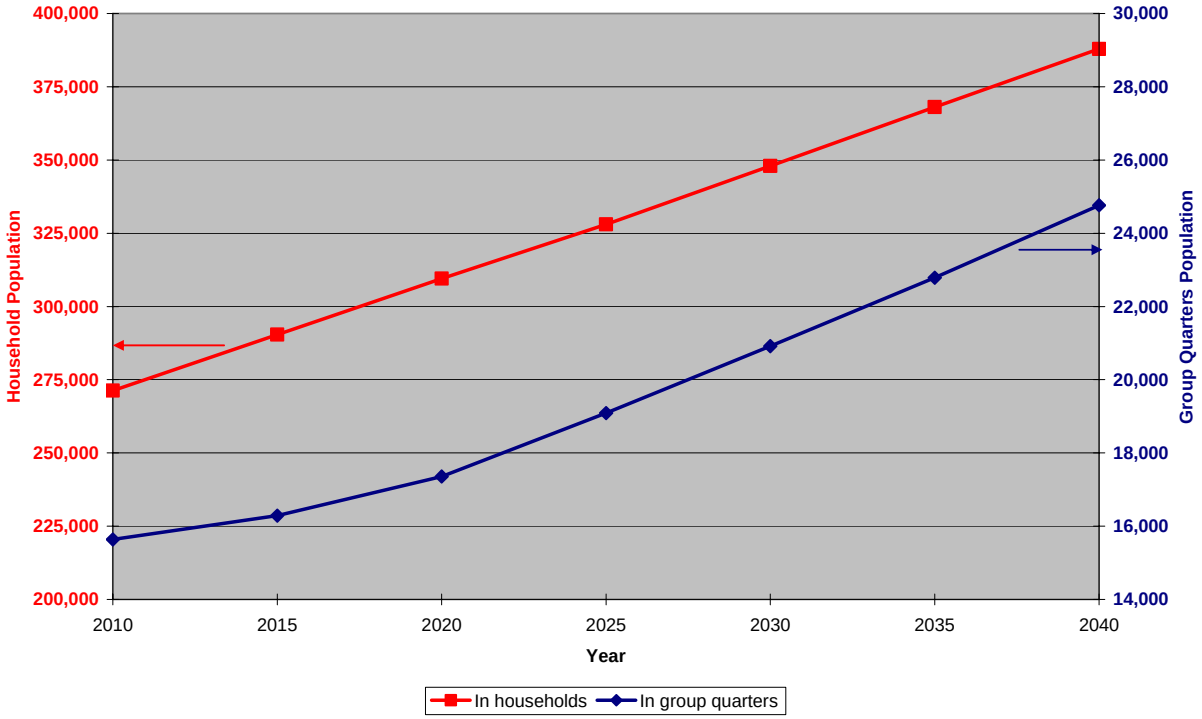


Figure 19: Comparison of the Number of Total Households and Family Versus Nonfamily Households: Lancaster County Projections from 2010 - 2040

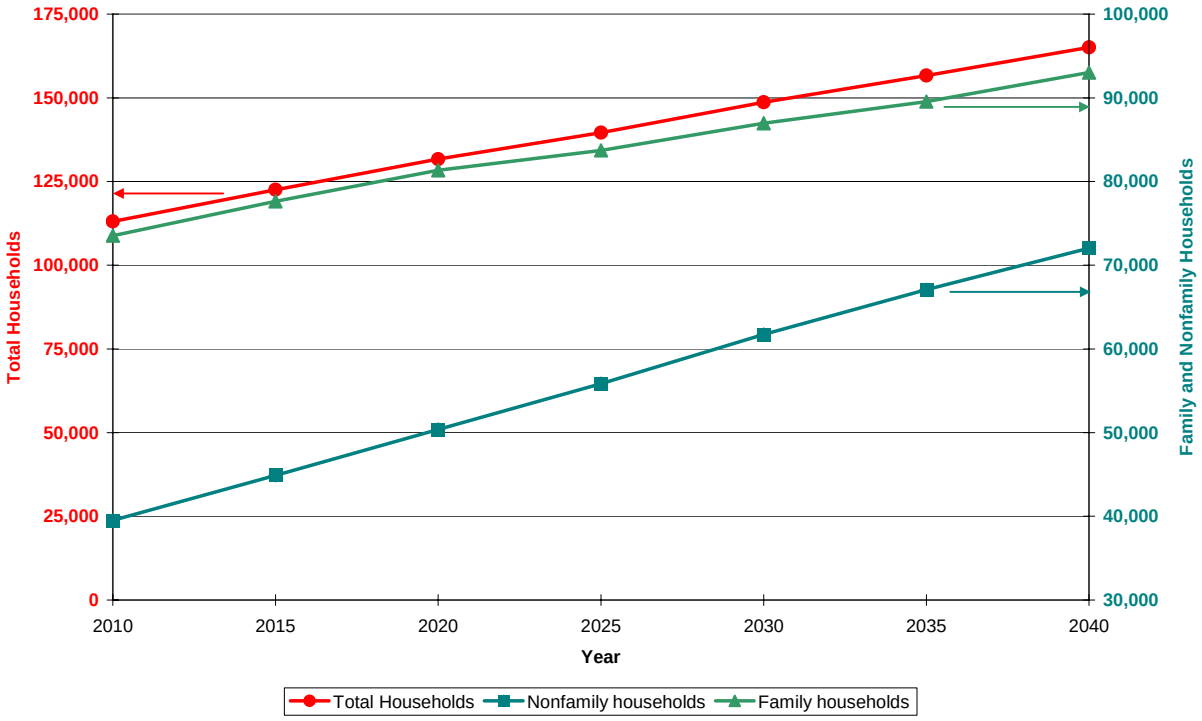


Figure 20: Number of Lancaster County Households by Age of the Householder: 2010 - 2040 Projections for Younger Age Groups

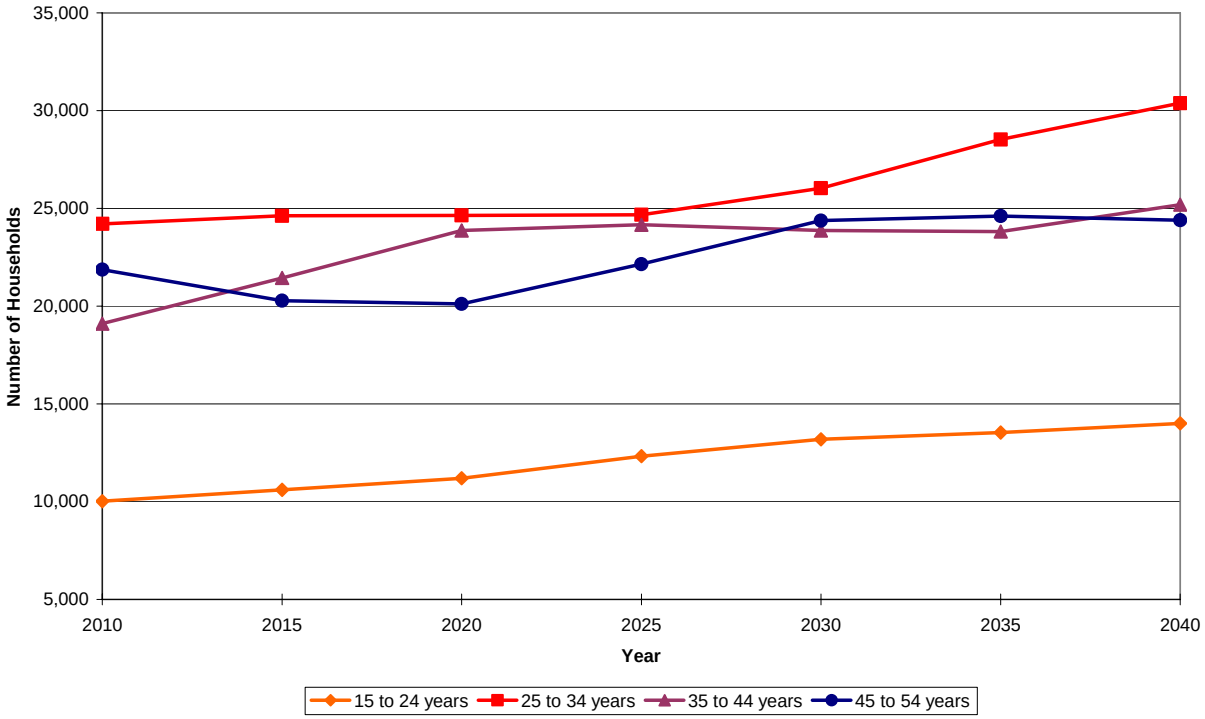


Figure 21: Number of Lancaster County Households by Age of the Householder: 2010 - 2040 Projections for Older Age Groups

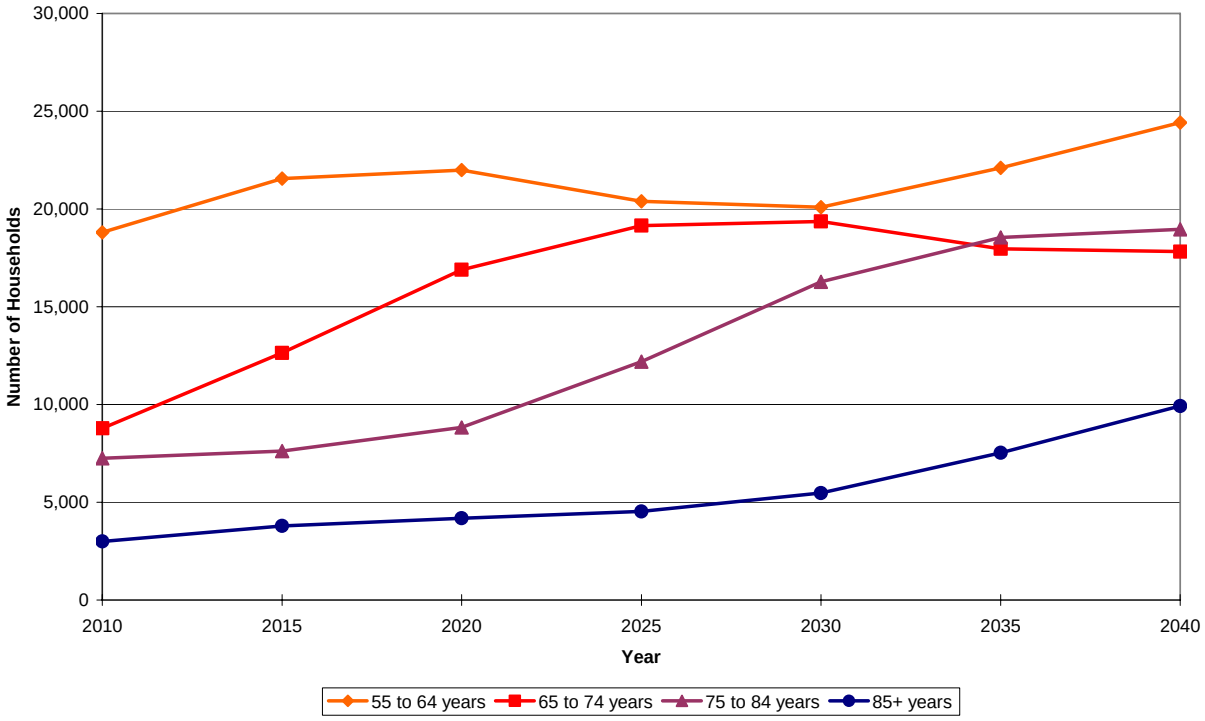
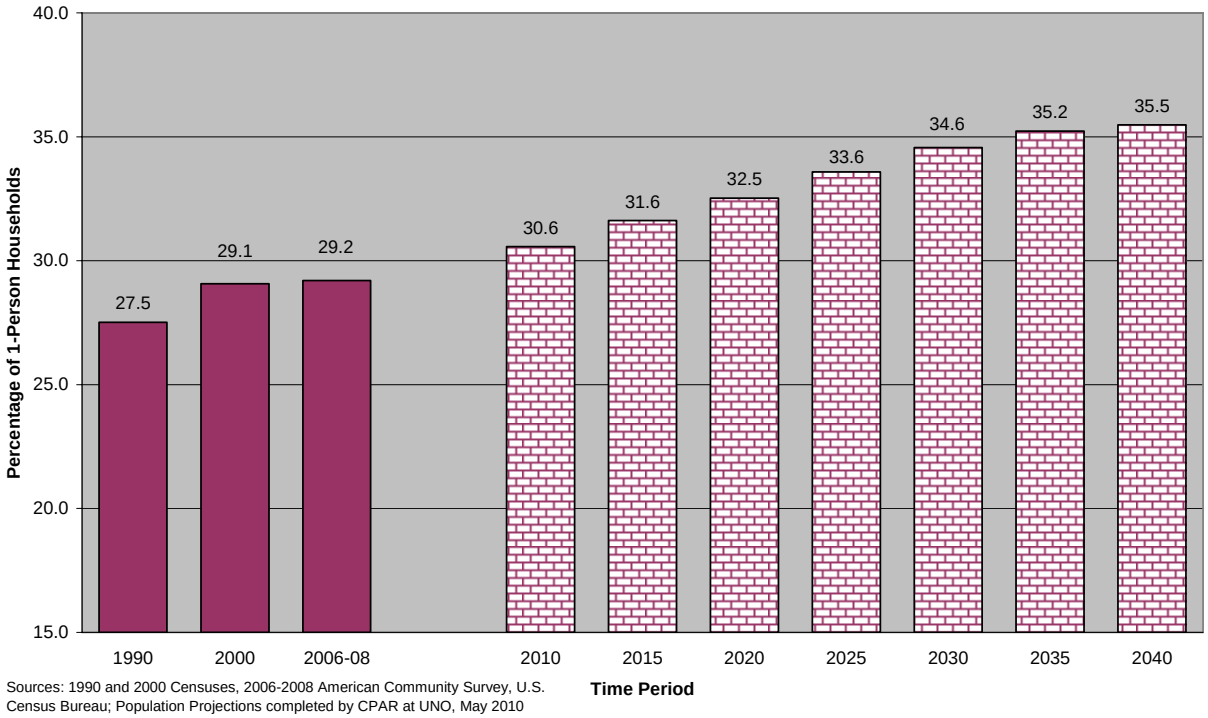


Figure 22: Percentage of Households that are 1-Person Households: Historic Data and 2010 to 2040 Projections based on Trend Model

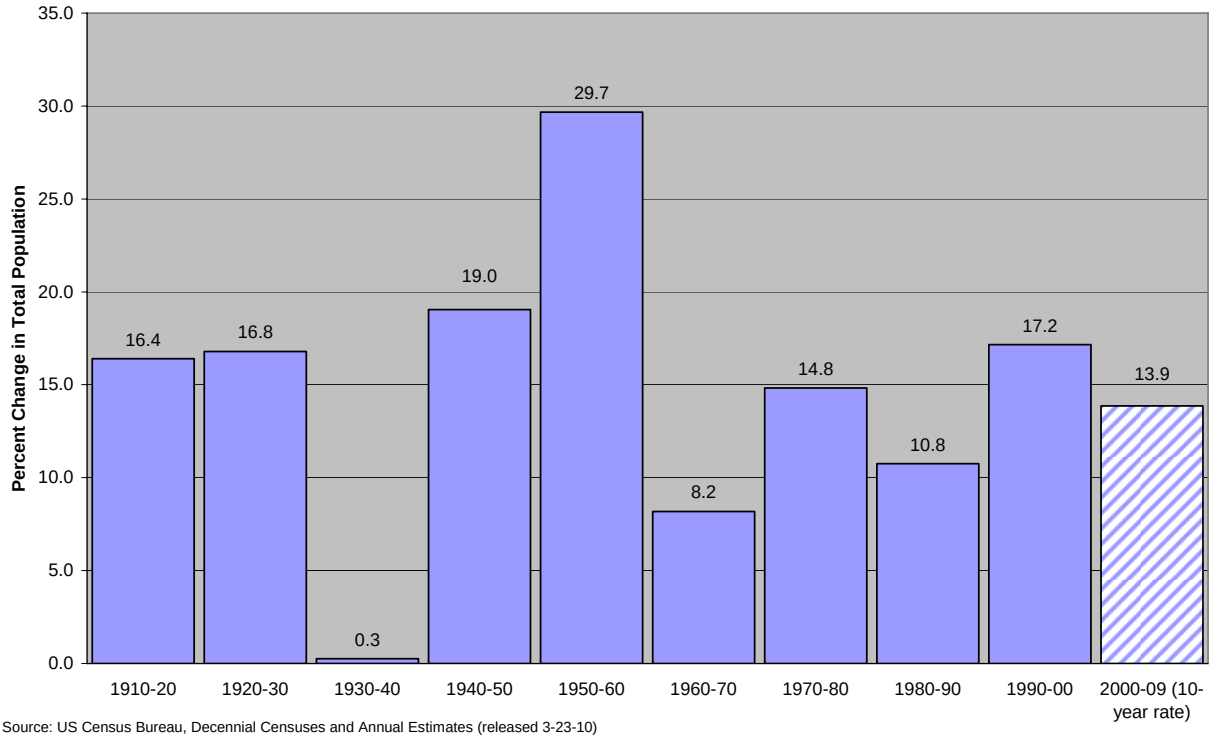


Sources: 1990 and 2000 Censuses, 2006-2008 American Community Survey, U.S. Census Bureau; Population Projections completed by CPAR at UNO, May 2010

Graphs of Historical Lancaster County Data

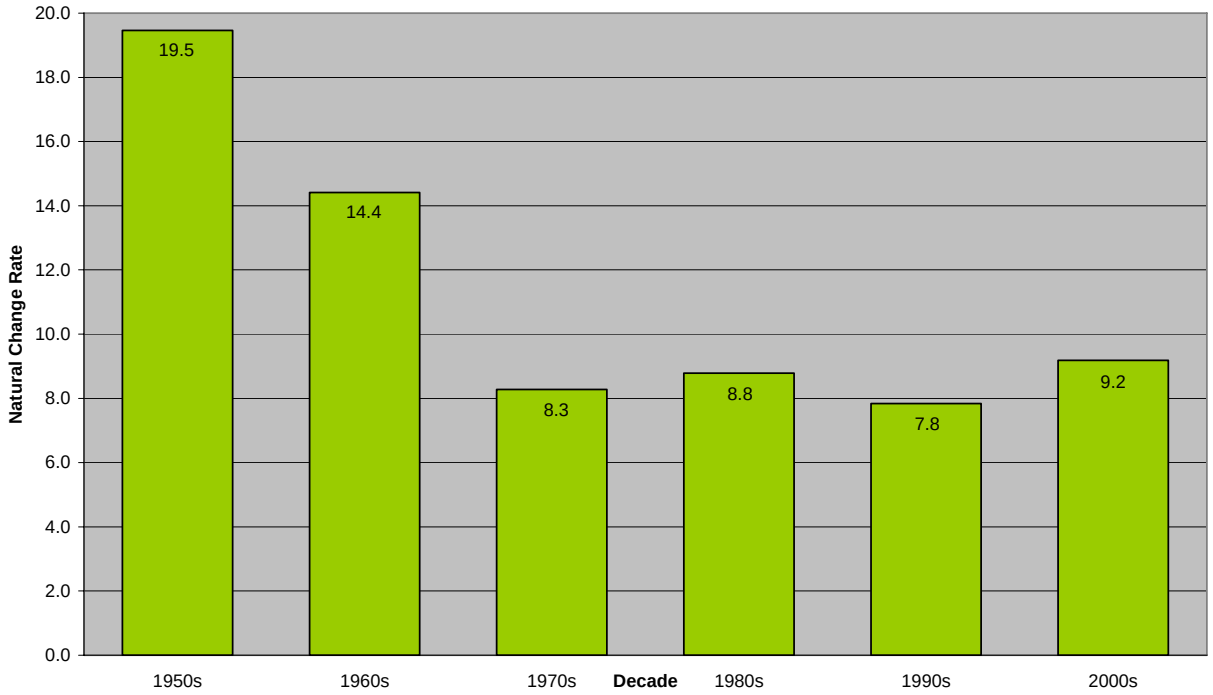
These graphs help illustrate the history of Lancaster County regarding population change and its components, natural change and net migration. The graphs show some of the values and trends upon which the assumptions of these projections are based. They provide both the historical and current context for how the Lancaster County population has changed.

Figure 23: Lancaster County Population Change by Decade: 1910 to 2009



Source: US Census Bureau, Decennial Censuses and Annual Estimates (released 3-23-10)

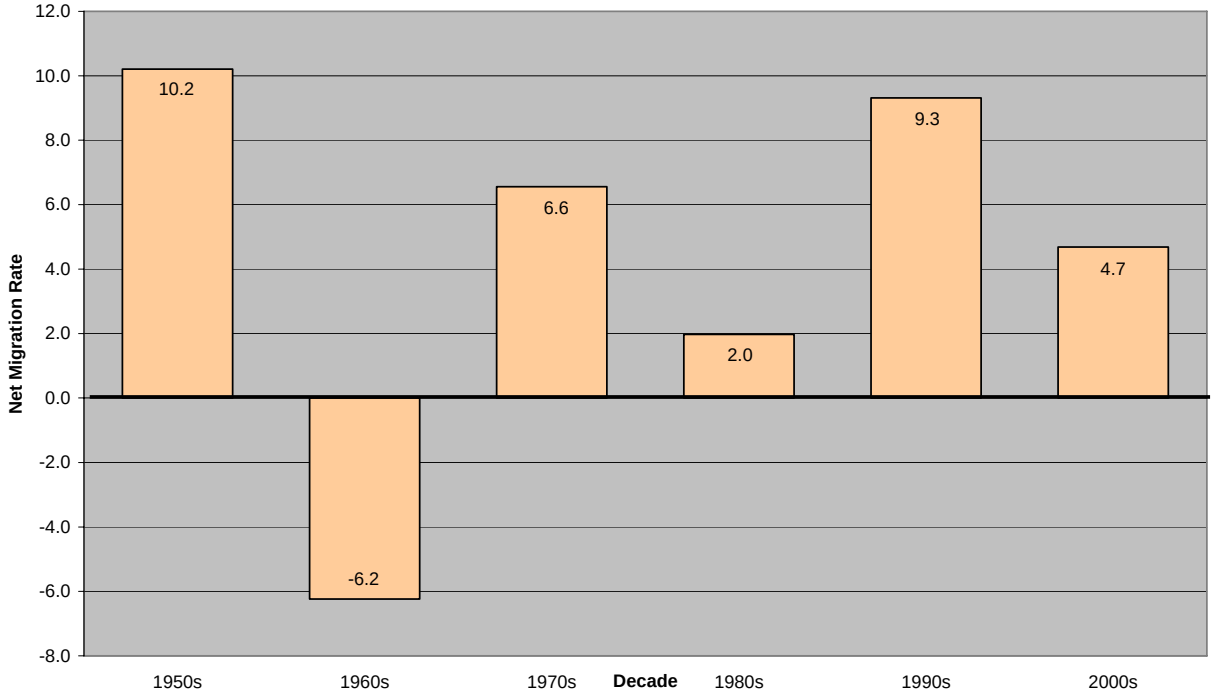
Figure 24: Natural Change Rates for Lancaster County: 1950 to 2010



Sources: Decennial Censuses and Annual Estimates (released 3-23-10), U.S. Census Bureau; Vital Statistics Reports, NE Dept of Health & Human Services

Note: A positive natural change rate reflects having more births to area residents than deaths of area residents.

Figure 25: Net Migration Rates for Lancaster County: 1950 to 2010



Sources: Decennial Censuses and Annual Estimates (released 3-23-10), U.S. Census Bureau; Vital Statistics Reports, NE Dept of Health & Human Services

Note: A positive net migration rate is referred to as net inmigration, where more people are moving into than out of an area; negative rates show net outmigration.

Figure 26: Lancaster County Population and Population Change, 1969-2009

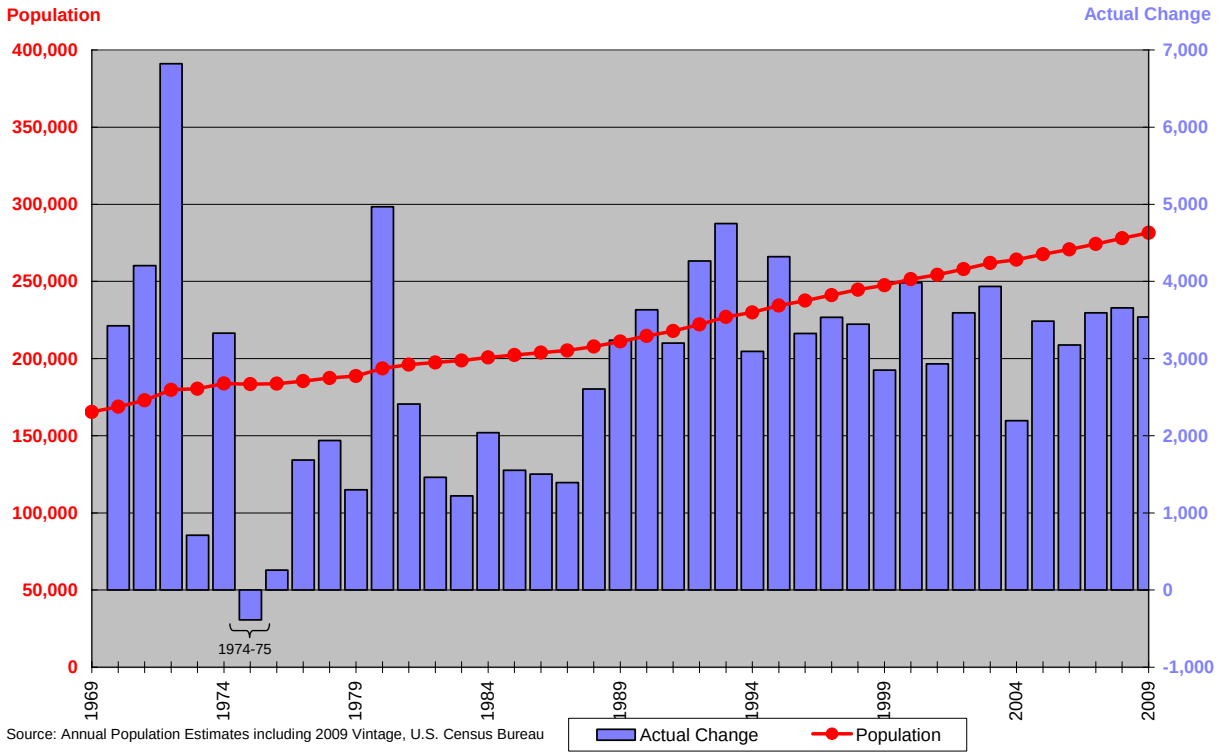


Figure 27: Lancaster County Components of Population Change, 1970-2008

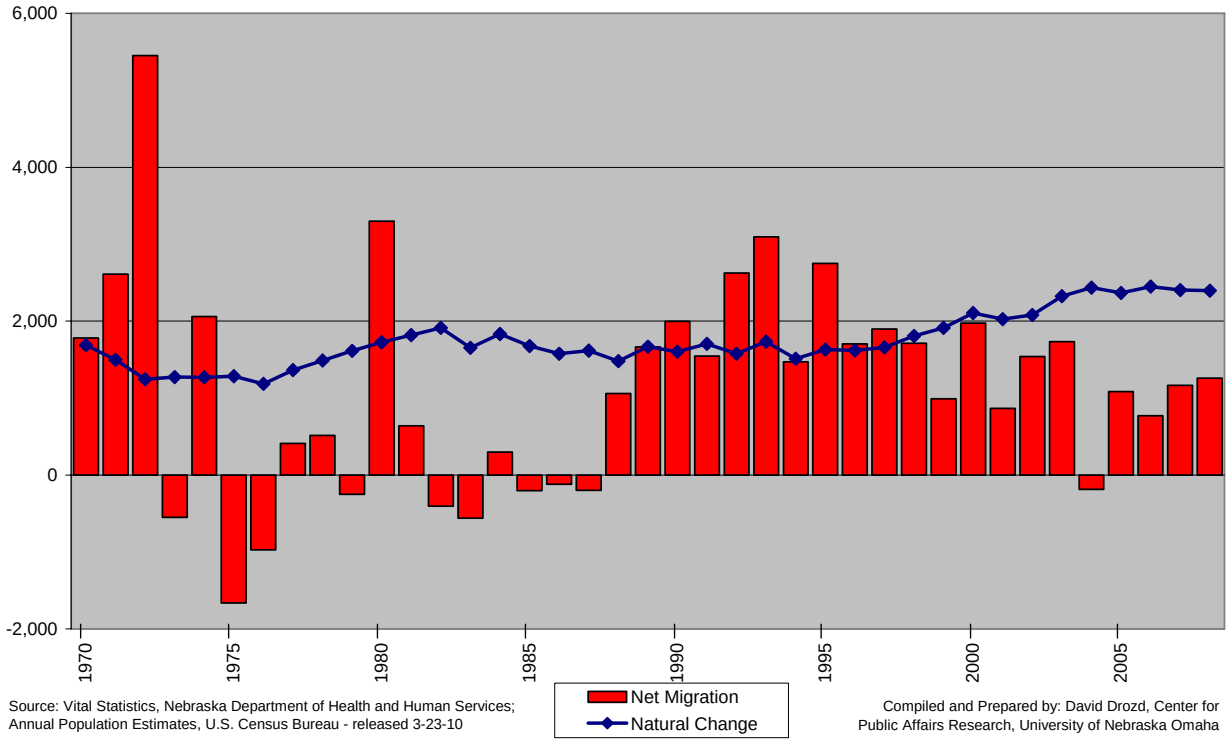
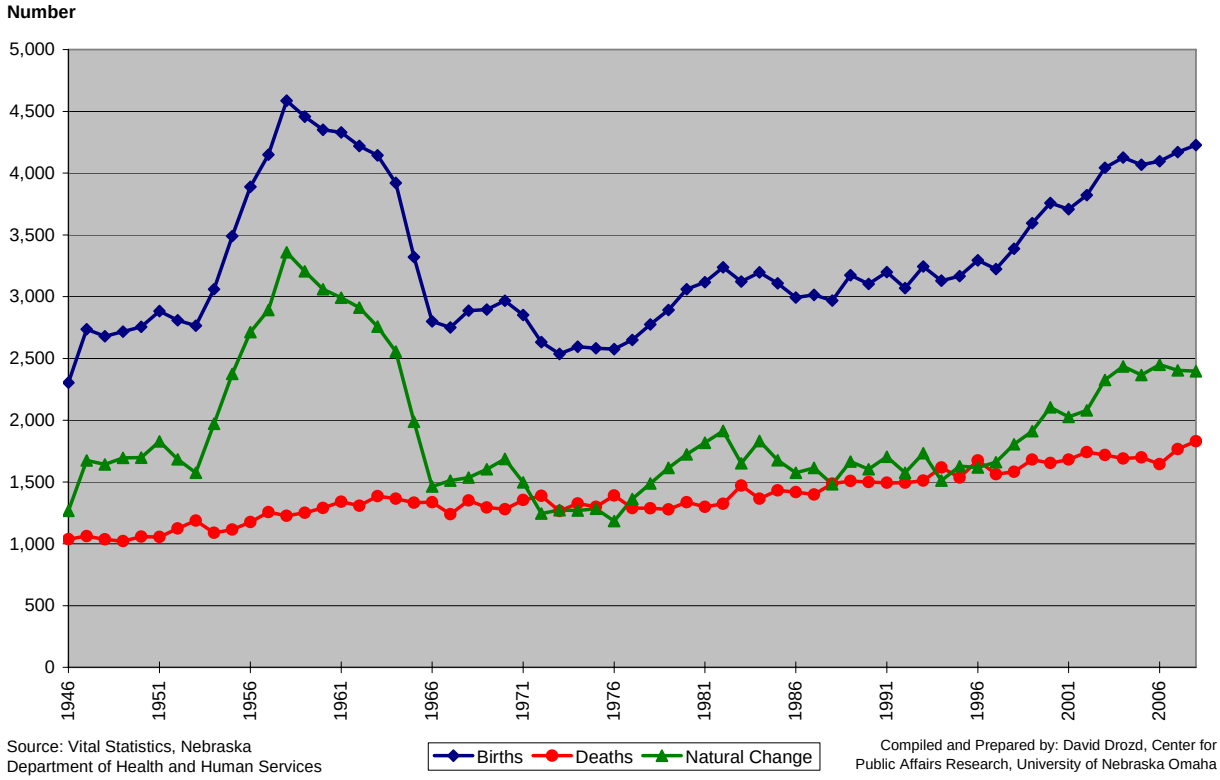


Figure 28: Lancaster County Births, Deaths, and Natural Change: 1946-2008



Source: Vital Statistics, Nebraska Department of Health and Human Services

Compiled and Prepared by: David Drozd, Center for Public Affairs Research, University of Nebraska Omaha

Methodology

The methods utilized in preparing the projected values varied by the type of data being projected and the amount of available historic and projected data for the United States and/or Lancaster County. The methods also varied between Phase I of the project (population projections) and Phase II (household projections). The following section details the methods used for each phase of the project.

Phase I – Population Projections

Age-Specific Migration Rates

A major piece of data impacting the projections was the determination of age specific migration rates. Given Lancaster County's structure as home to a major university, the county experiences a relatively high level of migration as many move to the county for college and often subsequently move away upon completion of a degree. Migration is not limited to college-age persons of course. Those of working age along with their families are moving into and out the area and many persons move upon entering retirement. Establishing these migration rates were a key part of the projections process.

In order to calculate the migration rates, we analyzed the "flow" of persons between the 10 year periods between 1980 and 1990 as well as 1990 to 2000. It was known that the county gained persons at a relatively low rate of 2.0 percent during the 1980s and a relatively high rate of around 9.0 percent in the 1990s. The average of these rates was about 5.5 percent and represented the "trend" level of migration. The trend value was also supported by estimates of migration in the post 2000s period released by the U.S. Census Bureau and the average longer term trend looking back to migration since 1970. What was not known was how the migration differed for specific five-year age groups.

Starting with the 1980 Census distribution of the population by single year of age, we flowed the population forward in time, adding actual births and subtracting the actual number of deaths by the specific age of the deceased as provided by the Lancaster County Health Department. The department had these data from 1987 to the present. For earlier years they provided us with information on deaths for 5-year age groups. Thus, we had to calculate the number of deaths for single years of age for 1980 to 1986 by establishing the percentage of deaths of specific 5-year age groups that occurred for each of the specific single-years during the 1987 to 1989 period. These percentages were applied to the number of deaths in each 5-year age group to establish how many deaths occurred for each single year of age.

We compared the values obtained via this flow to the estimates for the 1985 population of Lancaster County by age from the Census Bureau's population estimates program. The difference effectively gave us the amount of population change due to migration for each 5-year age group. The flow from the 1985 population estimates to the 1990 Census count gave additional amounts of migration for each 5-year age group. The levels were turned into rates of migration for each 5-year age group and then averaged to establish the 1980-1990 migration rates for each 5-year age group, which established the "low" series of migration. The same

process as just described was used with the 1990 census distribution by age flowed through to the 2000 Census to establish the "high" series of migration rates.

These migration rates were reviewed and some minor adjustments were made so that they fully represented intuitive sense. For example, the 1980s migration rates initially showed a small inmigration for 5-9 year olds. However, outmigration had occurred for each 5-year age group from 25-29 year olds to 65-69 year olds (after adjustment) so it was unlikely children were arriving on net if their parents were net outmigrants. Thus, the migration rate for 5-9 year olds was adjusted to be a small outmigration. Another such intuitive adjustment was to take the small but widely fluctuating rates for those aged 85 and older and adjust them to be zero as little migration occurs among this demographic group.

The migration rates for 5-year age groups were then applied to single-year ages via a moving average approach. The 5-year rates were listed for each relevant single-year of age and then the average for a total of the 5-nearest years was calculated. Those 5-nearest years included that specific year of age along with the next two youngest and next two oldest years. This process smoothed the changes from one five-year rate to the next rather than having large jumps and gaps in the data. A migration rate for single-years of age was also necessary to be as accurate as possible in flowing the eventual projection model through from its Census 2000 starting point. The same process was used for calculating single year migration rates for each of the low, trend, and high-series models.

Migration rates for single years of college ages were aided by an analysis of the ratios for how the total population of one year compared to the next in Census 2000 data. The ratios established the level of migration needed to maintain the proper age structure for those of college age. In some instances, specific age ratios for 2000 appeared inconsistent with apparent trends – in such cases data for 1980 and 1990 were also utilized to determine an appropriate value. Without targeting these specific age-based migration rates, the total number of persons flowing through the model would not have matched the way it actually occurs. These efforts, while difficult, did improve the overall structure of the model for identifying how the college-age population changes as related to migration.

Age-Specific Birth Rates (for age of the mother)
Data were compiled on the number of Lancaster County births, the number of Lancaster County women by 5-year age groups from ages 15 to 44, and the corresponding birth rates for 5-year age groups from 1990 forward. These birth rates by 5-year age groups were then compared to corresponding values for the United States. Ratios of the Lancaster County rates to the U.S. rates were calculated for each 5-year age group. The ratios indicated that Lancaster County has a lower birth rate than the U.S. for women aged 15-19 and 20-24, and Lancaster County rates are higher for other age groups.

The ratios for 1990 and 2000 were relied upon more heavily to determine the overall values as they were based on more reliable statistics from the decennial Census. Estimates from non-census years can vary widely and are often revised, so the general trend since 2000 was noted and applied in conjunction was the rates from 1990 and 2000. The subsequent ratios were assumed to hold constant throughout the 2010 to 2040 projection time period. The ratios were

applied to national projections of birth rates calculated by CPAR to provide Lancaster County specific birth rates by age of mother in the projections period. The corresponding 5-year birth rates were applied equally to each single-year of age for mothers in that 5-year age group.

Age-Specific Survival Rates

The model used survival rates for single years of age to calculate the number of persons surviving from one year to the next. This provided the number of deaths by specific ages as well as the total number of deaths. Survival rates were taken from U.S. Census Bureau projection models.

When comparing the initial projections of deaths to those that actually occurred in Lancaster County in the post 2000 period, the models number of deaths was too high. This was due to projected survival rates not accurately predicting the increased levels of survival attained recently with medical advances. Thus, in order to more accurately project deaths, survival rates for 15 years into the future were utilized at the starting point. In other words, when calculating deaths for the year 2000 in the model, the survival rates for 2015 were applied, for 2001 the survival rates for 2016 and so on. This formula gave the closest match of projected versus actual deaths in the 2000 to 2008 timeframe, for which actual vital statistics data were available. The model used the survival rates for Whites rather than the total population as Lancaster County demographics indicate that those in age groups most likely to become deceased (ages 75 and over) are predominately White. The minority population in Lancaster County is primarily younger than age 35, at least at the 2000 starting point of the projection. Only at the end of the projections period would the minority population move into the lower survival rate age groups of being aged 75 or older.

The projected survival rate data from the Census Bureau was listed for major years ending in 0 or 5 (2010, 2015, etc.) from 2000 to 2055. The changes in survival over 5 years for each single year of age were distributed evenly between the five years. Thus, the changes over each 5-year period were implemented evenly in a linear pattern to each individual year.

Flow through of population along with components of change

In order to project the population in 2010, the models started with the Census 2000 population distribution by single years of age. The age-specific survival rates and birth rates by age of mother were applied to this data. Additionally, the smoothed migration rates by single-year of age were also applied, effectively transitioning the population forward from 2000 to 2001. The process was repeated for each subsequent year.

Since factual data on vital statistics existed for the 2000 to 2008 timeframe, these values were compared to figures from the model. This comparison drove the decision to adjust the survival rate projection by 15 years as previously discussed. It also aided the final calls on the ratios between Lancaster County and U.S. birth rates for the various 5-year age groups of women of childbearing age.

Population estimates from the U.S. Census Bureau also illustrated how the model's total population values compared to those officially prepared by the bureau. Figures in the trend model were similar to the estimates as the Census Bureau has shown their data and models

indicate the level of migration in the post 2000 period has been similar to the trend level. However, a comparison of the 1990s estimates program to the final Census 2000 count indicated the Census Bureau underestimated the Lancaster County population by about 10,000 persons. Thus, we view that the 2010 Census headcount may be up to 10,000 above or below the current 2009 estimate. For that reason, the low and high series of population projections are presented, as well as to illustrate how the structure of the population would change under varying scenarios.

The low and high series of projections work under the assumption that the low and high rates of migration will be in effect for the latter part of the first decade (2005 to 2010) and then from 2010 to 2020. The models are held at the trend level from 2000 to 2005 as otherwise they are believed to present scenarios deviating too far from what is believed to have happened in the 2000s. Applying the high and low models' specific values from 2005 still shows how they diverge by 2010.

After 2020, the low and high models start a return to the trend level of migration. This was accomplished by adjusting the migration rates to represent 75 percent of the high or low series and 25 percent of the trend values during 2020 to 2030. Conversely, 25 percent of the high or low series and 75 percent of the trend series was applied during 2030 to 2040. This effectively scaled the high and low series rates back toward the trend rate. This assumption was viewed to more likely pattern reality than to keep the low and high migration rates constant decade after decade.

The number of deaths in each annual period was calculated as the inverse of the survival rate multiplied by the corresponding number of persons in that age group. For example, when a survival rate of a male 70-year old is say 0.975 then the death rate is one minus that value, or 1 – 0.975 or 0.025. This means that 2.5 percent of those 70 year olds would become deceased prior to achieving their 71st birthday. Thus, multiplying 0.025 times the number of person age 70 at that time would give the corresponding number of deaths for 70 year-olds. Total deaths were calculated as the sum of the deaths by specific years of age.

Total births were identified in a similar fashion, with the exception that the birth rate was directly multiplied by the number of women of that age. Summing the number of births for women of each of the specific ages from 15 to 44 years gave the total number of births. While in reality births occur to mothers younger than age 15 and older than age 44, the rates, as calculated in these projections models utilizing a ratio of Lancaster County birthrates to the U.S. average, take into account these low levels of births at the age extremes so that the total number of births is accurate.

Birth and death rates remained the same in each projection model, regardless of the level of migration the specific model was using (low, trend, or high).

Net Migration and Domestic and International Components of Migration

In this analysis, net migration represented the residual value from subtracting natural change (births minus deaths) from the total population change. While age-specific migration rates were applied in the model, the easiest method to identify the level of net migration was through this residual method, as is often done for population change components within projections.

Detailed calculations regarding migration identified how much of the total net migration was from other domestic areas within the United States versus from international areas outside the U.S. The U.S. Census Bureau has made calculations for projecting the level of international inmigration from 2010 to 2050. Their projections have a main model, a high series and a low series of international migration rates. The bureau's projections were relied upon to forecast international inmigration in the local area.

Lancaster County and Nebraska have lower rates of international inmigration than the U.S. as a whole. An analysis of post 2000 population estimates showed that Nebraska was attracting international residents at about 60 percent of the U.S. rate while Lancaster County did so at a pace of about 80 percent of the U.S. rate. Thus, while the U.S. rates had a high, low, and trend series, these rates were further adjusted to better represent international inmigration to Lancaster County. For the trend series, the U.S. international inmigration rates were multiplied by 80 percent to represent the typical level for Lancaster County. If international inmigration is lower than trend nationally, so also will it likely be in Lancaster County, so the low series was multiplied by 60 percent, the typical level of Nebraska international inmigration. The high series of migration for Lancaster County was left equivalent to the U.S. rate, since if international inmigration was at a higher level nationally, so would it also be in Lancaster County. Under this approach, the high and the low series of international inmigration specific to Lancaster County were an equivalent 20 percent above and below the trend level respectively.

The annual international inmigration rates were multiplied by the total population to project the level of international inmigration. International inmigration rates for years prior to 2010 were held constant at a round value similar to the 2010 rate. Annual international inmigration values were summed over five year periods and are presented in the tables to show the level of international inmigration during each five years of the projection period. Domestic migration values were determined as the simple plug figure from subtracting the level of international inmigration from the total level of net migration for each period.

Phase II – Household Projections

Determination of Household versus Group Quarters Population

All data for Phase II of the project was based upon the population projection using the trend level of migration. The population projection gave the total number of persons every 5 years from 2010 to 2040. To determine household statistics, the first item to be calculated was the percentage of population that actually lived in housing units, rather than group quarters housing (college dorms, nursing homes, prisons, etc.).

Historic information regarding the total population and the population in both households and group quarters was compiled, starting with the 1970 Census and utilizing each decennial census through 2000. Additionally information from the Census Bureau's newest data product, the American Community Survey (ACS), was compiled to provide an additional data point, namely the 2006-2008 timeframe. The data showed a slow increase in the percentage of the population residing in households from 1970 to 2000 before a small decline occurred in the 2006-08 data

(See Table 6). This decline is presumably due to the completion of new college dorms at the University of Nebraska-Lincoln and generally higher incarceration rates.

To project the percentage of the population in households into the future, values from Census 2000 for that variable by age were obtained. Then, those age-specific percentages of the total population that resided in households were lowered so that the total equaled the 94.6 percent the 2006-08 ACS showed. ACS tables provide the total number in households but do not break that data down for specific age groups. While all age group percentages were adjusted (increases in incarcerated population), the largest adjustments were made to college ages based on additional dorms known to have been built. The age 80 and over population also had a relatively large adjustment based on a likely greater need for and presence of nursing homes.

These percentages by age made to equal 94.6 for the full population when summed, were then applied to the projected populations by age from Phase I of the project to calculate the total number of persons living in households for each time period. The total population in households divided by the total projected population gave the total percentage that would be expected in households from the various population shifts. These data indicate a decline in the percentage of the population residing in households is expected as the population ages over time and the baby boom generation has an increased need for nursing homes (a group quarters style facility). The percentages as calculated were used directly in the model; no adjustments were made to smooth or otherwise modify these changes.

Average Household Size and Total Number of Households

Viewing historic census data from 1970 to the present 2006-2008 ACS showed a generally decreasing average household size. The average household size did remain the same between 2000 and 2006-08 at 2.40 persons per household (See Table 6). The average household size was projected into the future every 5 years between 2010 and 2040 utilizing these trends and published projections for other places like Sacramento, California, the state of Wisconsin, and the United States. The projection for Sacramento was relied upon more heavily as it represented another state capital for a city with similar age demographics.

The average household size in 2010 was held at the same level that the 2006-08 ACS showed as not much change was expected in the interim. From there, the average household size resumed its downward trend until it was projected to bottom at 2.34 persons per household in 2030. The average size rebounded a bit to 2.35 persons per unit in 2035 and 2040 as relatively more births occurred over this timeframe as the fourth wave stemming from the baby boom began. Grandchildren of baby boomers born in 2000 to 2010 would be entering their peak childbearing ages of 25-35 over this timespan, leading to relatively higher levels of births and the subsequent slightly higher average household size.

The total number of households was then calculated via the simple formula of dividing the total population living in households by the average household size.

Distribution of Households by Age of the Householder

We again compiled the number of households by age of the householder historically from 1970 to the present 2006-08 timeframe. Census data by age of the householder have categories with

householders as young as 15 years old. The figures were turned into percentage distributions by age of the householder and then compared to the percentage of the population in those same age groups for the same population aged 15 and older. Dividing the two percentage distributions provided a ratio of relatively how much of a certain age group were in fact householders.

Plugging in the projected populations by age from the trend model and applying the ratios calculated led to the figures for householders by age. We applied the ratio obtained from the 2006-08 data for the nearby 2010 point in time, and then the average ratios from the last three historic datapoints (1990 and 2000 Censuses along with 2006-08 ACS) for 2015 to 2040. How this ratio would change into the future would be speculative at best, so it was held constant for the majority of the projection.

Calculation of the Number and Percentage of 1-Person Households

While historic data for Lancaster County was only available since 1990, it has shown that the percentage of households that have only one resident has been increasing. The number of 1-person households by age of the householder was available for 1990 and 2000 but not for all ages from the detailed tables of the 2006-08 ACS. Thus, we custom calculated those values using the 2006-08 Public Use Microdata Samples (PUMS) provided by the Census Bureau.

The PUMS are designed so that researchers can calculate custom tables. They show the raw data to a select subsample of the actual survey responses obtained in the ACS. Weights are provided in the file so that the sample represents the entire population.

Any PUMS analysis must be based on an adequate number of cases in the file. In this analysis we felt that Lancaster County alone had too few cases on which to base such an analysis so we added Douglas County cases in as well. Both counties had similar percentages of 1-person households by age group in 2000, with Douglas County tending to have a slightly higher percentage for most groups.

The PUMS analysis showed changes in 1-person households well for younger age groups. Given the limited number of cases among older age groups, the PUMS analysis gave what in our view were some figures that had certain quirks and low reliability. American Factfinder tables from the Census Bureau did specifically show 1-person households for householders age 55 and older. Thus, values and changes since 2000 for the U.S. were used for these older age groups.

Data for age groups younger than 55 starting in 2010 was determined as the calculated level for 2006-08 for Douglas and Lancaster Counties minus the small differential that existed between the two counties in 2000. This effectively provided the percentages of 1-person households by age for Lancaster County in the 2006-08 timeframe. These values were applied to the 2010 point in time as they were viewed to not have changed in the interim.

Changes between 2000 and 2006-08 for Lancaster County were annualized and applied over five years to get the percentage of households that had one resident for each age group in 2015. Thus, the full change witnessed by the trend in increasing levels of 1-person household per age group of the household was applied between 2010 and 2015. In our view this trend would not continue at a linear rate as changes in an item increasing year-over-year tend to slow over time. Thus, the

full change was scaled by to 80, 60, 40, and 20 percent of the full change over the 2020 to 2035 timeframe. The 2040 value was held at the 2035 level.

These projected percentages of one-person households by age of the householder were applied to the calculated number of total households by age of the householder. When summed, these calculations gave the total number of 1-person households and simple division into the total number of households gave the projected percentage of 1-person households from 2010 to 2040.

Nonfamily and Family Households along with Family Households with Children

With the percentages of 1-person households calculated as described above, the percentage of nonfamily and family households could then be projected. Households that have only 1 resident are nonfamily households by definition. Historic data was analyzed to view the amount and change in other nonfamily households (roommates, unmarried partners, etc.).

The historic analysis showed that other non-family households had increased an average of 0.12 percentage points per year or 0.60 percentage points over 5 years. The 2006-08 ACS showed the percentage of nonfamily households was 33.4 percent, of which 29.2 percent were one-person households and the remaining 4.2 percent were other nonfamily households. The increase in other nonfamily households was expected to continue. Since the 2006-08 ACS data can be viewed as centered around calendar year 2007, the percentage of other nonfamily households in 2010 was calculated by multiplying the 0.12 average annual increase by 3 years (.36) and adding it to the 4.2 percent from the 2006-08 timeframe to equal 4.6 (as rounded to the nearest tenth). The aforementioned 0.60 percentage point increase was added linearly for each 5-year period in the projection timeframe until 2040.

With these percentages of other nonfamily households and the calculated percentages of 1-person households from earlier stages of the projection, the total percentage of nonfamily households was found via simple addition. These percentages of nonfamily households were multiplied by the total number of households to determine the overall number of nonfamily households. The number of family households was determined by subtracting the number of nonfamily households from the total number of households.

The percentage of families with children under 18 years of age was analyzed historically for both Lancaster County and the U.S. The percentage of family households that had children under 18 has remained remarkably stable in Lancaster County since 1980, with about 50 percent of family households having a child under age 18. Nationally, the percentage has declined slightly. Based on these factors, the Lancaster County percentage of family households with kids was projected to decrease slightly over the projection period, near the rate of the average decline nationally. The starting value was based on the average values of preceding time points in Lancaster County. Multiplying these percentages by the total number of family households provided the number of family households that were projected to have children under 18 at future points in time.

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