

**FAIRFAX COUNTY PUBLIC SCHOOLS
POPULATION AND ENROLLMENT FORECASTS AND
METHODOLOGY REVIEW, 2006 - 2016**

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EXECUTIVE SUMMARY – POPULATION AND ENROLLMENT FORECASTS

1. Fertility rates for the Fairfax County Public Schools District over the life of the projections are below replacement levels. (District TFR equals 1.98 versus replacement level of 2.1)
2. Most in-migration to the district occurs in the 0-to-14 and 25-to-45 age groups.
3. The locally born 18-to-24 year old population continues to leave the district, going to college or moving to other urban areas.
4. The primary factor causing the district's enrollment to grow at a slower rate at the elementary level is the continued and growing rate of out-migration in the 18-to-24 year old age group and the slowing in-migration of younger families.
5. Changes in year-to-year enrollment (particularly after 2009) largely will be due to smaller cohorts entering and moving through the system in conjunction with larger cohorts leaving the system.
6. As in-migration of young families continues and larger grade cohorts enter into the school system, total enrollment will continue to grow. However, enrollment will increase at a slower rate than during the last several years, particularly after 2012. After 2011, the district's elementary enrollment will begin a slow decline.
7. The number of sales of existing households currently outnumber the sales of new homes by a 6 to 1 margin in the district. This ratio will increase over the next 10 years. Consequently existing home sales will be the primary indicator of enrollment trends for the vast majority of the district's attendance areas.

INTRODUCTION

By demographic convention, a distinction is made between a projection and a forecast; a projection extrapolates the past (and present) into the future with little or no attempt to take into account any factors that may impact this extrapolation (e.g., changes in fertility rates or migration patterns); a forecast results when a projection is modified by judgment to take into account such factors and changes.

As the results of this study are to be used as a planning tool, the ultimate goal is not merely to project the past into the future, but to assess what the likely future may be. Not all of the historical trends have been extended throughout the study period with modification. Forecaster's judgment has been used to modify some of the demographic trends to more accurately take into account likely changes. Therefore, strictly speaking, this study is a forecast, not a projection; but the two terms will be used interchangeably throughout the report.

When calculating population projections of any type, and particularly for "small" populations such as a school district or its attendance areas, reasonable assumptions must be made as to what the future will bring. The demographic history of the school district in relation to the social and economic history of the area is the starting point and basis of most of these assumptions. The unique nature of each district's demographic composition and rate of change over time must be accounted for and assumed to be factors throughout the life of the projection series. Furthermore, no two populations, particularly at the school district and attendance area level, have exactly the same demographic characteristics.

The first part of the report will examine the assumptions made in calculating the population projections for the Fairfax County Public Schools District. The remainder of the report is an explanation and analysis of the district's population projections and how they will affect the district's grade level enrollment projections.

ASSUMPTIONS

For these projections, the mortality probabilities are held at 2000 levels. Death rates rarely move rapidly in any direction, particularly at the school district or attendance area level. Thus, no significant changes are foreseen in district mortality rates between now and the year 2016.

Fertility rates are assumed to stay fairly constant for the life of the projections. The total fertility rate (TFR), the average number of births a woman will have in her lifetime, is estimated to be 1.98 for the total district for the ten years of the population projections (however, there is some significant variation between individual attendance areas). A TFR of 2.1 births per woman is considered to be the theoretical "replacement level" of fertility necessary for a population to remain constant in the absence of in-migration. Therefore, over the course of the projection period, fertility will not be sufficient, in the absence of in-migration, to maintain the current level of population within the Fairfax County Public Schools District. It is important to remember the primary factor that determine how many birth will occur in any given area is not the fertility rate but rather the number of women in child bearing ages.

The pattern of net migration is assumed to be nearly constant throughout the life

of the projections for each attendance area. While the number of migrants has changed in past years for the Fairfax County Public Schools District, (and will change again over the next ten years) the basic age pattern of the migrants has stayed nearly the same over the last 30 years, and is expected to remain unchanged into the future. These primary patterns of age-specific migration are: the out-migration of locally born 18-to-25 year olds; in-migration of out of county 18-24 year olds attending local colleges; in-migration 25-45 year old parents and their 0-14 year old children and the out migration of people age 65 and older.

The projections also assume the current economic, political, social, and environmental factors of the district remain the same through the year 2016. In particular, the projections assume that throughout the study period:

- a. there will be no short term economic recovery in the next 18 months and no further deterioration of the economic conditions;
- b. interest rates have reached an historic low, and will not fluctuate more than one percentage point in the short term;
- c. there will be no building moratorium within the district;
- d. business within the district will remain viable;
- e. housing turnover rates (sale of existing homes in the district) will remain at their current levels;
- f. private school attendance rates will remain constant; and
- g. there will be no major infrastructure changes.
- h. the boundaries of the school district remain constant for the next 10 years.
- i. The interest rate for a standard 30 year fixed home mortgage stays below 7%.

- j. All current planned, platted and permitted housing developments are constructed and built out by 2012.

If an additional major employer in or near the district either moves out of the economic area or expands its operations, the population projections would need to be adjusted to reflect the changes brought about by the change in economic conditions. The same holds true for any type of natural disaster, major change in the local infrastructure (e.g., highway construction, water and sewer expansion, etc.), further economic downturn, or any instance or situation that causes rapid and dramatic change that could not be foreseen at the time of the projections.

The high proportion of high school graduates from the Fairfax County Public Schools District that continue on to college or move to urban areas outside of the district for employment is a significant demographic factor. Their departure is a major reason for the extremely high out-migration in the 18-to-22 age group and was taken into account when calculating these projections. The out-migration of graduating high school seniors is expected to continue over the period of the projections, and the rate of out-migration has been projected to increase slightly over the life of the projection series as the proportion of district's graduates attending post-secondary education institutional facilities increases.

Finally, all demographic trends (i.e., births, deaths, and migration) are assumed to be linear in nature and annualized over the projection period. For example, if 1,000 births or deaths are projected for a 5-year period, an equal number, or proportion of the births are assumed to occur every year, 200 per year. Actual year-to-year differences may and usually occur, however the overall trends are expected to maintain the

projected magnitude of change.

DATA

The data used for the projections come from a variety of sources. Enrollments-by-grade and attendance centers were provided by the Fairfax County Public Schools District for school years 2001-02 to 2006-07. Birth and death data were obtained from the Virginia Department of Health for the years 2001 through 2004. Housing permit, occupation and building location data was provided by the Fairfax County Planning Department. Housing sales data was obtained from the National Association of Realtors. The net migration values were calculated using Internal Revenue Service migration reports for the years 2001 to 2004. The data used for the calculation of migration models came from the United States Bureau of the Census, 1990 and 2000, and the models were assigned using an eco-demographic system. The base age-sex population counts used are from the results of the 2000 Census.

To develop the projection models, past migration patterns, current birth patterns, rate and type of existing housing unit sales, and future housing unit construction were primary variables. In addition, the change in household size relative to the age structure of the projection area was addressed. While there was a substantial drop in the average household size in Fairfax County as well as most other areas of the state during the previous 20 years, the rate of this decline has been projected to slow noticeably over the next ten years.

METHODOLOGY

The population forecasts presented in this report are the result of using the Cohort-Component Method of population forecasting (Siegel, and Swanson, 2004: 561-601) (Smith et. al. 2004). As stated in the **INTRODUCTION**, the difference between a projection and a forecast is in the use of explicit judgment. Strictly speaking, a cohort-component projection refers to the future population that would result if a mathematical extrapolation of historical trends were applied to the components of change (i.e., births, deaths, and migration). A cohort-component forecast refers to the future population that is expected because of a conscious selection of the components of change believed to be the most likely that the population will experience.

Five sets of data are required to generate population and enrollment projections.

These five data sets are:

- a. a base-year population (here, the 2000 Census population for the Fairfax County Public Schools District and its attendance areas);
- b. a set of age-specific fertility rates for each attendance area to be used over the forecast period;
- c. a set of age-specific survival (mortality) rates for each attendance area;
- d. a set of age-specific migration rates for each attendance area; and
- e. historical enrollment figures by grade.

The most difficult aspect of producing enrollment projections is the generation of the population projections in which the school age population (and enrollment) is embedded. In turn, the most difficult aspect of generating the population projections is found in deriving the rates of change in fertility, mortality, and migration. From the standpoint of demographic analysis, the Fairfax County Public Schools District and its

80 elementary attendance center districts are classified as “small area” populations (as compared to the population of the state of Virginia or to that of the United States). Small area population projections are more difficult to make because local variations in fertility, mortality, and migration may be much wider than those at the state or national scale. Especially difficult to project are migration rates for local areas, because changes in the area's socioeconomic characteristics can quickly change current patterns (Peters and Larkin, 2002.)

The population projections were calculated using a cohort-component method with the populations divided into male and female groups by five-year age cohorts that range from 0-to-4 years of age to 85 years of age and older (85+). Age- and sex-specific fertility, mortality, and migration models were constructed to specifically reflect the demographic characteristics of the attendance center districts and the total school district.

The enrollment projections were calculated using a modified average survivorship method. Average survivor rates (i.e., the proportion of students who progress from one grade level to the next given the average amount of net migration for that grade level) over the previous five years of year-to-year enrollment data were calculated for grades two through twelve.

The survivorship rates were modified, or adjusted, to reflect the average rate of projected in-migration of 5-to-9 and 10-to-14 year olds to each of the attendance centers for the period 1999 to 2004. These survivorship rates then were adjusted to reflect the projected changes in age-specific migration the district should experience over the next five years. These modified survivorship rates were used to project the

enrollment of grades 2 through 12 for the period 2004 to 2009. The survivorship rates were adjusted again for the period 2009 to 2014 to reflect the predicted changes in the amount of age-specific migration in the districts for the period.

The projected enrollments for kindergarten and first grade are derived from the 5-to-9 year old population of the age-sex population projection at the elementary attendance center district level. This procedure allows the changes in the incoming grade sizes to be factors of projected population change and not an extrapolation of previous class sizes. Given the potentially large amount of variation in Kindergarten enrollment due to parental choice, changes in the state's minimum age requirement, and differing district policies on allowing children to start Kindergarten early, first grade enrollment is deemed to be a more accurate and reliable starting point for the projections. (McKibben, 1996) The level of the accuracy for both the population and enrollment projections at the school district level is estimated to be $\pm 2.0\%$ for the life of the projections.

RESULTS AND ANALYSIS OF THE POPULATION PROJECTIONS

A number of general demographic factors will influence the growth rate of the Fairfax County Public Schools District during this period, and include the following:

- a. The Baby Boom generation will have passed through prime childbearing ages by 2003, thereby reducing the overall proportion of the population at risk of having children;

- b. The remaining population in childbearing ages (women ages 15-45) will have fewer children;
- c. The 18-to-24 year old population, in prime childbearing ages, will continue to leave the area to go to college or to other urban areas, with the magnitude of this out-migration flow slowly increasing; and,
- d. The district will experience continued increase in housing stock, with an average of 3,200 new units being built each year until 2011. New housing construction will continue after that point, but at an increasing slower rate.
- e. The household type in the district that is the most dominate is home owners with no children living in the household. The percent of household in the category will increase steadily in Fairfax County over the next 10 years.

The Fairfax County Public Schools District will continue to experience significant in-migration (movement of new young families into the district) over the next 10 years. However, the size and age structure of the pool of potential in-migrants will change and the in-migration of families will be greatly offset by the continued steady out-migration of young adults as graduating seniors continue to leave the district and as some 30-40 year old parents and their children moving primarily to Louden and Prince Williams Counties. The Internal Revenue Service County-to county migration flow file for each of the last five years has shown that Fairfax County has experiences a net out migration of 15,000 people each year (60,000 in-migrants and 75,000 out-migrants per year).

While all attendance areas will see some amount of gross in-migration, (usually in the 0-to-14 and 25-to-45 age groups,) all areas also will continue to see gross out-migration. This out-migration primarily will be young adults, 18-to-24 years old, as graduating seniors continue to leave the district to go to college or seek employment in large urban areas.

As stated in the **ASSUMPTIONS** and emphasized above, the impact of the high proportion of high school graduates that leave the district to continue on to college or to seek employment in large urban areas is significant to the size and structure of the future population of the district. Up to 70% of all births occur to women between the ages of 20 and 29. As the graduating seniors continue leave the district, the number of women at risk of childbirth during the next decade declines. Consequently, even though the district's fertility rate is just slightly below the state average, the relative small number of women in the district in prime child bearing ages will keep the number of births fairly stable despite a rapidly growing population. This will require the district to become quite dependant on the in-migration of children to maintain current grade cohort sizes.

As a general rule of thumb, for every two seniors that leave the district, one new household must move into the district to replace the young adults that have left and to replace the lost potential fertility. Over the course of the projection period, the average number of graduating seniors will be approximately 12,200 per year and at least 70% of them will move out of the district within three years of graduation. Using the general rule, approximately 4,270 new families will be required to move into the district every year or 42,700 new families for the ten-year study period to replace the graduating seniors and their lost fertility. It is projected that the impact of the steady increasing out-migration of young adults will continue to be somewhat offset by young families (25-45 year old householders) in-migration and that the total number of births will be remain fairly constant throughout the projection period.

Another factor that needs to be considered is the birth dynamics of the last 20

years. An examination of national birth trends shows there was a large "Baby Boomlet" born between 1980 and 1995. This Boomlet was nearly as large as the Baby Boom of the 1950s and 1960s. However, unlike the Baby Boom, the Boomlet was a regional and not a national phenomenon (McKibben, et. al. 1999). Because Virginia experienced only a moderate Baby Boomlet, a large proportion of any enrollment growth will have to be the result of in-migration and not from an increase in the grade cohort size.

Of additional concern are the issues of the district's aging population and the growing number of "empty nest" households, particularly in the eastern and northern attendance areas. For example, after the last school age child leaves high school, the household becomes an "empty nest" and most likely will not send any more children to the school system. In most cases, it takes 20 to 30 years before all original (or first time) occupants of a housing area move out and are replaced by new, young families with children. Areas in the school district that experience most of the new home construction in the mid to late 1980s and early 1990s are beginning to empty nest at this time. Barring a large amount of "in fill" development, these areas will begin to experience a slow decline in enrollment as the proportion of households with school age children (and pre-school age children) starts to decline.

As a result of the "empty nest" syndrome, the many attendance areas in the Fairfax County Public Schools District will see a steady rise in the median age of its population, even while the district as a whole continues to attract some new young families (the median age of the district's population increases from 36.4 in 2005 to 40.7 in 2015). It should be noted that many of these "childless" households are single persons and/or elderly. Consequently, even if many of these housing units "turnover" and attract

households of similar characteristics, they will add little to the number of school age children in the district. Furthermore, many of the empty nest households that “down size” to smaller households (frequently moving to townhouses) within the district. In these cases new housing units may be built in an area, yet there is no corresponding increase in school enrollment.

There are several additional factors that are responsible for the difference between growth in population and growth in housing stock. Included among these factors are: people building new "move up" homes in the same area or district, (an important point since the children in move up homes tend to be of middle or high school age); children moving out of their parents homes and establishing residence in the same area; the increase in single-individual households; and divorce, with both parents remaining in the same area.

For a complete listing of selected demographic variables from the 2000 Census by elementary attendance area, please refer to the Census Data Results section in the appendix.

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