

Rockland County Population Projections, 2005-2035: Methods and Assumptions Used in Projecting County Population, Households and Housing Units

1) Introduction

The Cornell Program on Applied Demographics has prepared population projections for Rockland County using a cohort-component model. The Census Bureau's estimates of Rockland County's population by detailed characteristics for 2005 serve as the starting point. The projections cover a 30 year period and progress in 5-year increments to 2035.

2) Methods and Assumptions

Cohort-component model. Changes in population are a function of births, deaths, and migration. These are the components of change. In our model population is broken into 5-year age groups—0-4, 5-9,...,80-84, 85+—by sex and each of these cohorts is then projected forward using age-sex specific survival and migration rates. The survival rates are derived from a life table we created for Rockland County based on the New York State Department of Health's vital statistics of Rockland County for 1999, 2000, and 2001 and the Census 2000 counts of population. We have prepared separate life tables for males and females. Using these life tables we have calculated the proportion of each age group that will survive over the next five-year interval. The survived population is then migrated. We use age-sex specific data on migration streams from the 2000 Census for Rockland County in order to determine an age pattern. The population residing in the county at the beginning of each 5-year interval is survived, and then an out-migration rate is applied to this population. This is based on the county's age-sex specific pattern of out-migration to other parts of the United States between 1995 and 2000. In-migration comprises two streams, those from other parts of the United States, and those from abroad. In-migration from other parts of the United States is based on rates for the population at risk of in-migrating, that is persons living in the United States but not the county at the beginning of the 5-year interval. Finally in-migration from abroad—which includes persons from foreign countries as well as outlying parts of the United States such as Puerto Rico—is based on the county's shares of in-migrants from abroad to New York State.

We use the age and sex composition of the migration streams reported in the 2000 Census to establish an age pattern, not the direction or magnitude of migration. For that we use the experience of Rockland County over the period 1990 to 2005. We estimate net migration of the total population between the periods 1990-1995, 1995-2000, and 2000-2005 as a residual after removing natural increase as a component of population change. We adjusted the 1990 Census counts for undercount but did not make any adjustments to the 2000 Census count. We did not adjust the 2000 counts because of a lack of solid data on the extent of undercount, combined with indications that overall undercount was substantially reduced in 2000.

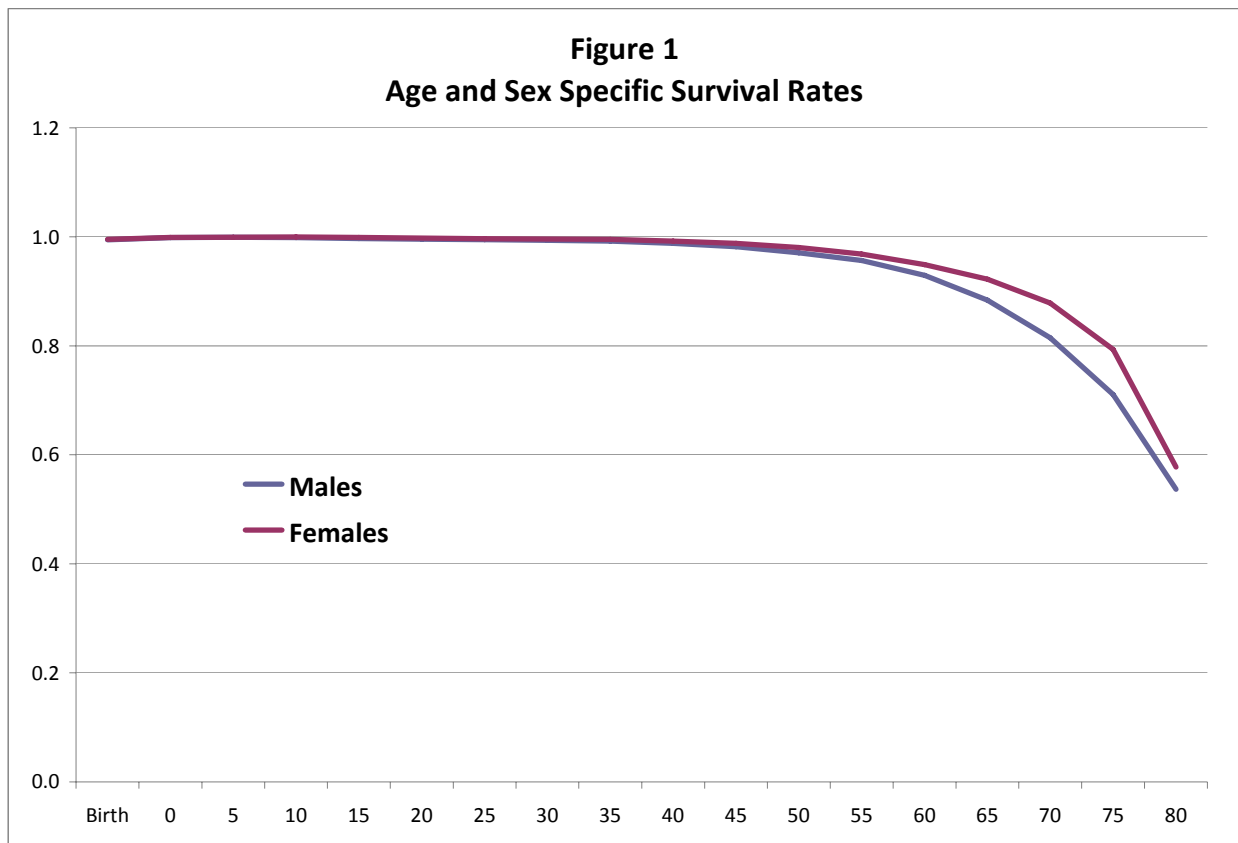
Migration Assumptions

Our assumption for total net migration is that there will be a small rate of net out-migration over the projection period of -0.5% every five years. Working with the Technical Advisory Group we examined the rates of net migration experienced since 1990, the assumption of increases in the fertility rate, and concluded that a rate of -0.5% was consistent with the county's long term trend. The projection model uses crude net migration rates of the population to scale up or down the age-sex specific rates observed in the period 1995-2000 as reported in the 2000 Census. The crude net migration rate is simply the percentage change in population due to net migration. There are two major factors that account for population change: natural increase and net migration. The crude net migration rate for Rockland County over the period 1990-2005 has fluctuated around zero. That is the volume of in-migrants to the county has been approximately equal to the flow of out-migrants from the county. Thus, net migration is not contributing to growth of the population, and natural increase is fueling population growth. That is not to imply that there has been no migration. The aging of the population and the age-specific patterns of gross migration (in and out migration streams) has brought about changes in the age composition of the county's population.

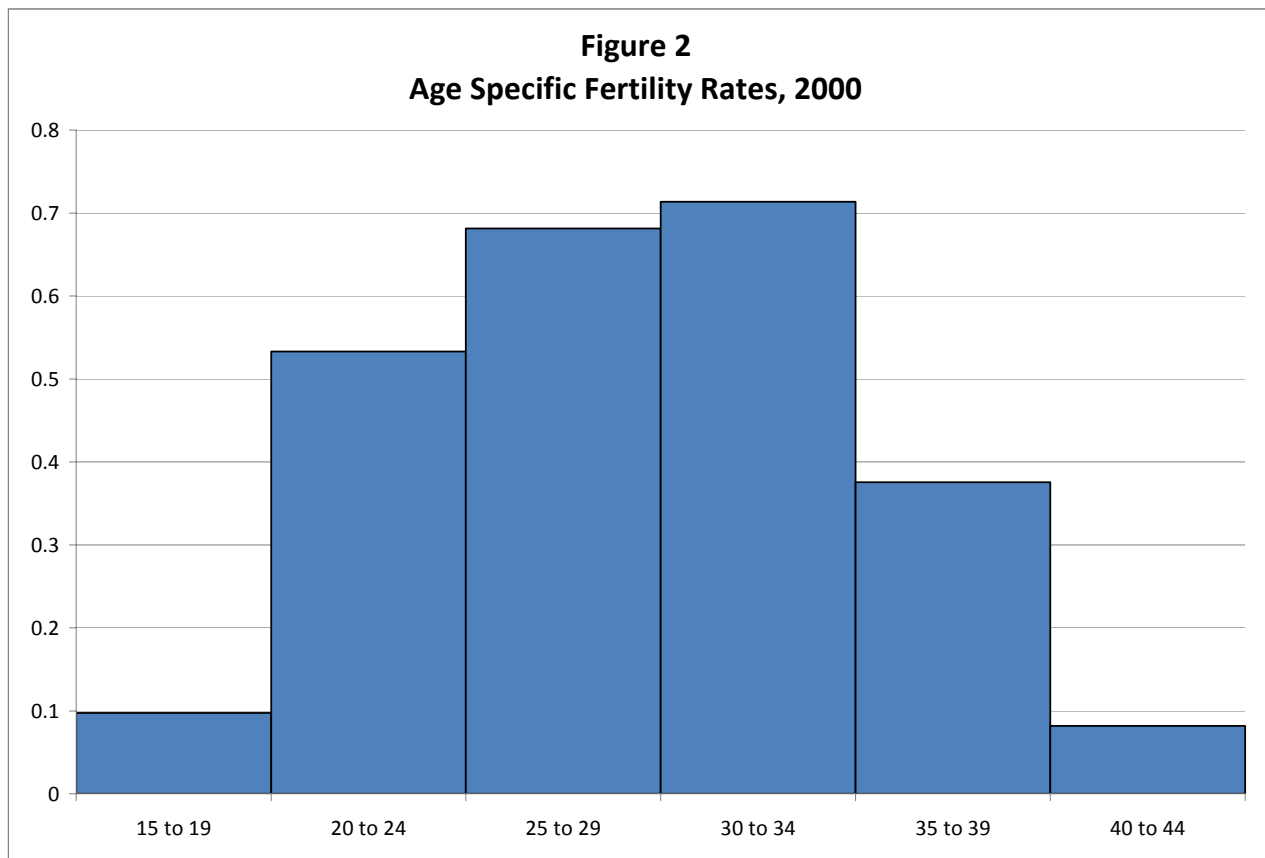
Components of Change

Mortality. Mortality rates are calculated from age and sex specific death data provided by the New York State Department of Health. We use the data on deaths for 1999, 2000, and 2001 in combination with the Census 2000 count of persons by age and sex to create a life table for Rockland County. The life expectancy in 2000 for males was 77.0 years and for females was 81.0 years. We hold life expectancy constant throughout the projection period. Life expectancy is higher in Rockland County than in the U.S. in general. While the national life expectancy is projected to increase, it is not until 2025 that it equals

the current life expectancy in Rockland County. A typical way to connect an area's projected life expectancy is to trend it in the same direction as the U.S. and have it meet the U.S. projected value toward the end of the projection period. Since life expectancy in Rockland County is already higher than the national life expectancy and what is projected nationally for the next 20 years, we felt it prudent to hold life expectancy constant. The growth in the county's older population, and in particular persons aged 85 and older, is already substantial. Life expectancy is a factor that could be adjusted to see what impact longer life expectancy might have on the population. Figure 1 is a graph of the age and sex specific survival rates.



Fertility. Fertility rates are calculated from the data on births supplied by the New York State Department of Health. The births are reported by age of mother and we use the birth data for 1999, 2000, and 2001 in combination with the Census 2000 count of females by age to create age-specific fertility rates. Figure 2 is a graph of these fertility rates.



The total fertility rate (TFR) is a measure of the average number of children born to a synthetic cohort of woman over their childbearing years. The TFR for Rockland County in 2000 was 2.483. A TFR of 2.1 is considered replacement level. Our usual practice is to hold TFR constant throughout the projection period because it is very unpredictable at the national level let alone the county level. However in a separate analysis of Rockland County’s population we examined current fertility rates for census tracts in areas of the county with heavy concentrations of persons of Hispanic and West Indian ethnicity and persons belonging to Hasidic and other traditionally Orthodox Jewish groups. The fertility levels of these

groups compared with the population of the balance of the county are vastly different. We simulated what the impact would be if these four groups—Hispanic, West Indian, Hasidic and other traditionally Orthodox Jewish groups, and balance of the county—maintained their current fertility levels and decided to use the aggregate fertility to project the county population. The TFRs we used were:

Projection Interval	TFR
2005 – 2010	2.483
2010 – 2015	2.588
2015 – 2020	2.694
2020 – 2025	2.799
2025 – 2030	2.905
2030 – 2035	3.010

This is also a component that could be varied to determine the impact of overall changes in the fertility rate.

Migration. Migration rates are calculated for net migration of the total population and for gross migration by age and sex. The gross migration rates are not directly comparable since out-migration is a rate based on an estimate of the persons residing in the county in 1995; domestic in-migration is a share based on an estimate of the persons living in the balance of the U.S. outside of the county in 1995; and in-migration from abroad is a share based on an estimate of persons migrating from abroad to New York State. The number of in and out migrants is proportionally adjusted to agree with the target rate of total net migration by the plus-minus adjustment method.

Special Population and Group Quarters. For counties with a substantial special population, such as college students in dormitories, military personnel in barracks, or prisoners in a state or federal correctional facility, projections distinguish between special and regular populations. The distinction between special and regular populations is similar to distinctions between household and group quarters populations. Except in our approach we treat persons in nursing homes, and other group facilities that draw their residents primarily from the county population as part of the regular population and project them using the cohort-component model. According to the Census 2000, 2.7 percent of the residents of Rockland County lived in Group Quarters. Nursing homes accounted for 0.7 percent of the

county residents and were the major type of group quarters. Rather than distinguish between persons in group quarters and in households for the purpose of modeling population change, we treated the total population as conforming to the age and sex specific components of population change—births, deaths and migration. In order to distinguish between persons living in group quarters and in households we used age and sex specific rates based on the Census 2000 and assumed no differences in the future.

Household and Housing Projections

The projections of households and total housing are driven by the size of the household population and its age and sex composition. We project the population living in households and group quarters based on age and sex specific shares of the total population in households and group quarters as reported in the Census 2000. The number of households is projected using headship rates by age. Headship rates are simply the proportion of an age group, such as persons aged 30-34 years old, who are householders. There is a one-to-one relationship between householders and households. The way the Census Bureau reports household status of persons there is always one and only one householder per household. Others, whether they are children, spouses, partners, or other adults, are members of the household. Our assumption is that these rates will persist into the future.

Occupied housing units also maintain a one-to-one relationship with householders and households. So our projection is also the projected number of occupied housing units. We assume that occupancy rates will remain constant over time at 97.5 percent and therefore derive the projected number of total housing units by dividing the households by the occupancy rate. Occupancy rates will vary as the balance between demand for and supply of housing units varies in response to cycles affecting the housing market. We do not attempt to project the cyclical nature of housing markets. Another factor that could alter occupancy rates is whether the proportion of the population that is composed of seasonal residents increase. The decennial census determines a person's residency based on the concept of "usual place of residence" which means where the person resides at least 6 months of the year. If the projected increase of older persons in the population of Rockland County results in a higher proportion of persons living in Rockland County less than 6 months of the year due to dual residences, then occupancy rates could decline. However housing units that are vacant in the decennial census definition because they are held for seasonal use are not generally vacant and available for sale or rent. That is there will not be a surge in the supply of housing on the market should this increase in seasonal occupancy occur.

Housing Units by Type of Structure. The projection of housing units by type of structure is driven by recognition of the trends in housing and the land use pressures encouraging higher density residential development. We have examined regional trends in housing type, looking in particular at Westchester County, NY and Bergen County, NJ for an indication of where Rockland may be headed. Based on Rockland County, NY and regional trends reported in the decennial censuses we are using the following percentages to distribute net additions to the housing stock:

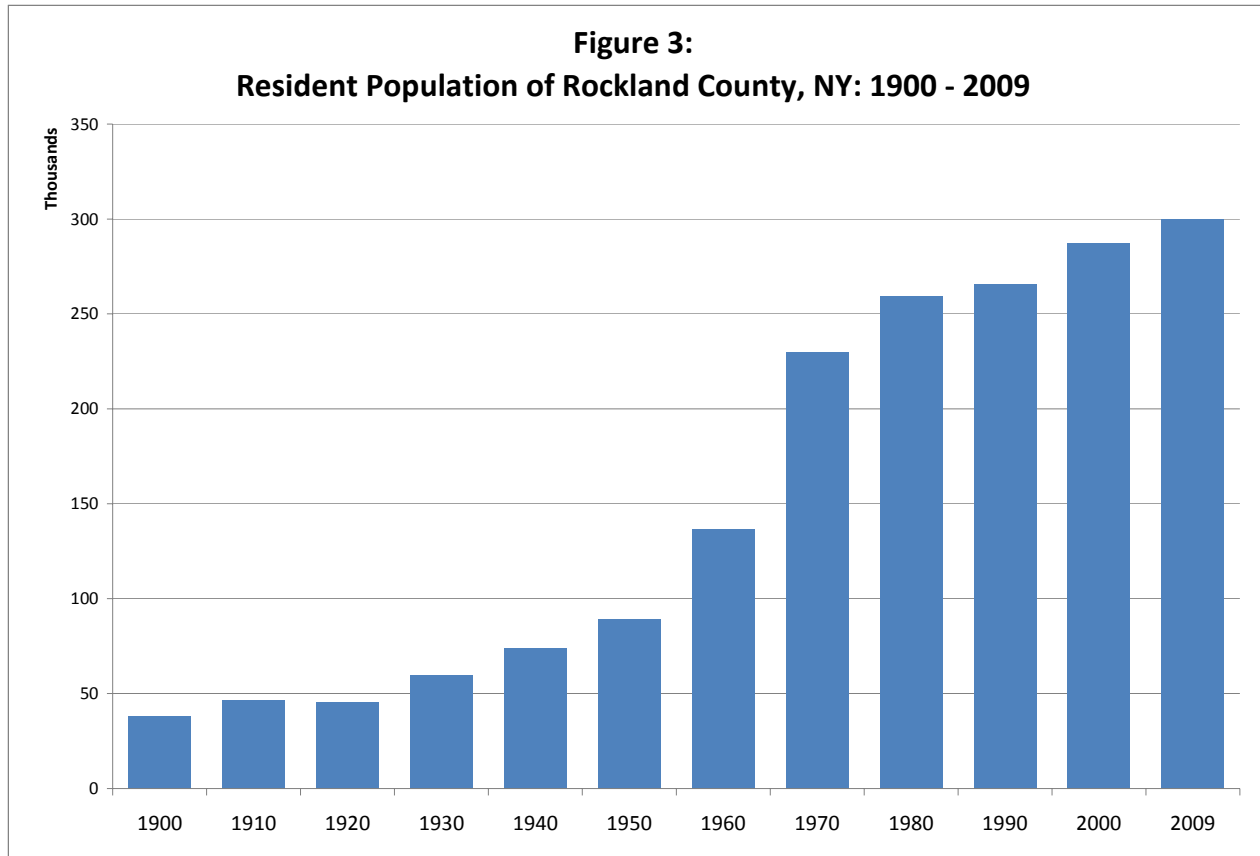
	Single	Family		
	Detached	2	3-19	20+
2005-2014	53%	8%	29%	10%
2015-2024	51%	8%	31%	10%
2024-2035	49%	8%	33%	10%

The category “3-19 units” is somewhat different from the Census Bureau’s classification. In it we include townhouses and row homes that the Census Bureau would classify as “Single Family Attached.”

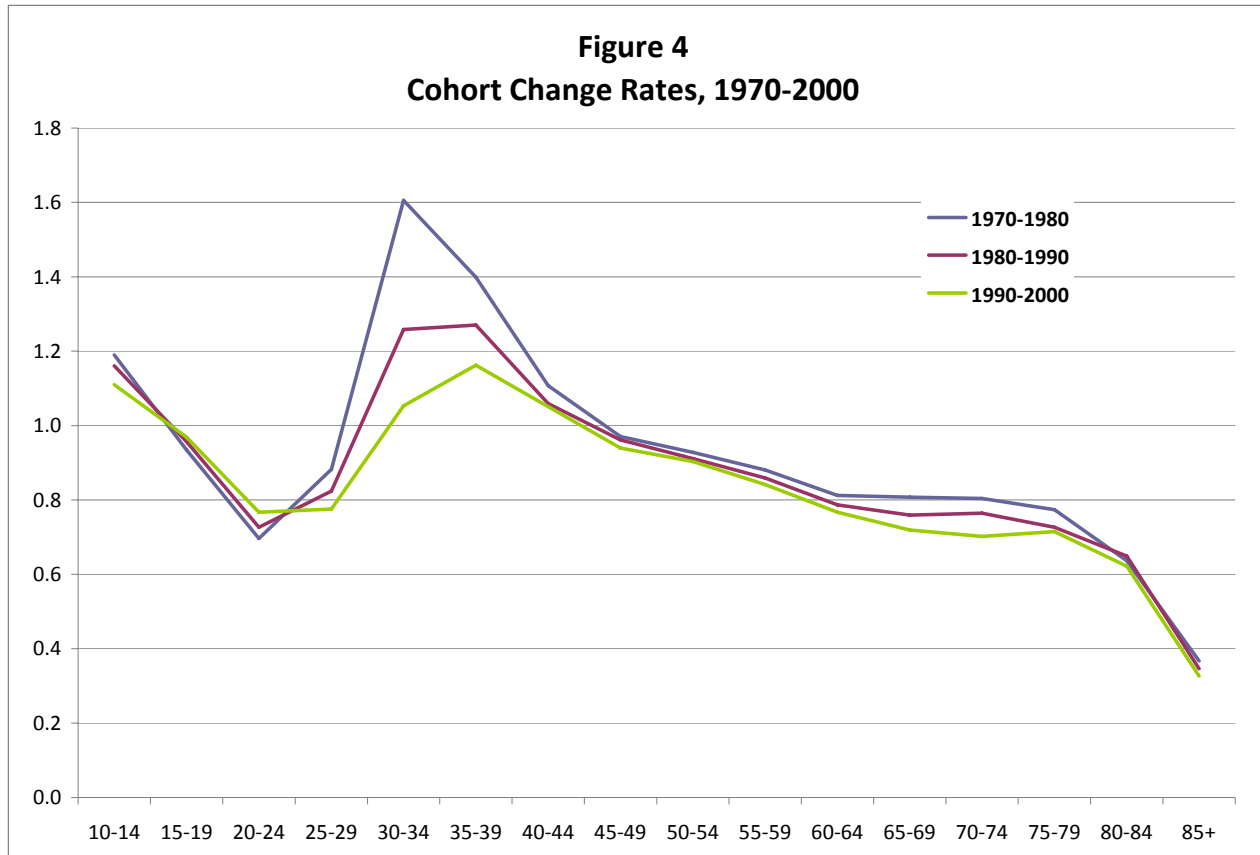
Households by Size. In order to project the number of households by size of household, we used our projections of age of householder in combination with the number of households by size from the Census 2000, as well as other basic demographic characteristics, to fit the household population by size of household with our projected average household size . Average household size is derived by dividing the household population by the number of households. We projected seven categories of household size: 1, 2, 3, 4, 5, 6, and 7 or more persons. The size of the household for each of these categories is self-evident except for the category “7 or more persons.” Since it is an open ended category it includes households with 8, 9, 10 or more persons. We found the average for the “7+” category to be 8.435 persons. We used an iterative proportional fitting process to determine a solution for households by size category that met our projected totals of households and household population.

3) Historical Trends

The resident population of Rockland County exploded during the 1950s and 1960s. Figure 3 illustrates the long term pattern of growth from 1900 to the most recent estimates by the Census Bureau for 2009. The growth of the population has followed a classic S-curve pattern. Rapid growth occurred during the 1950s and 1960s and then slowed down following 1970. Substantial growth has continued since 1970 but at a reduced pace from the earlier years.

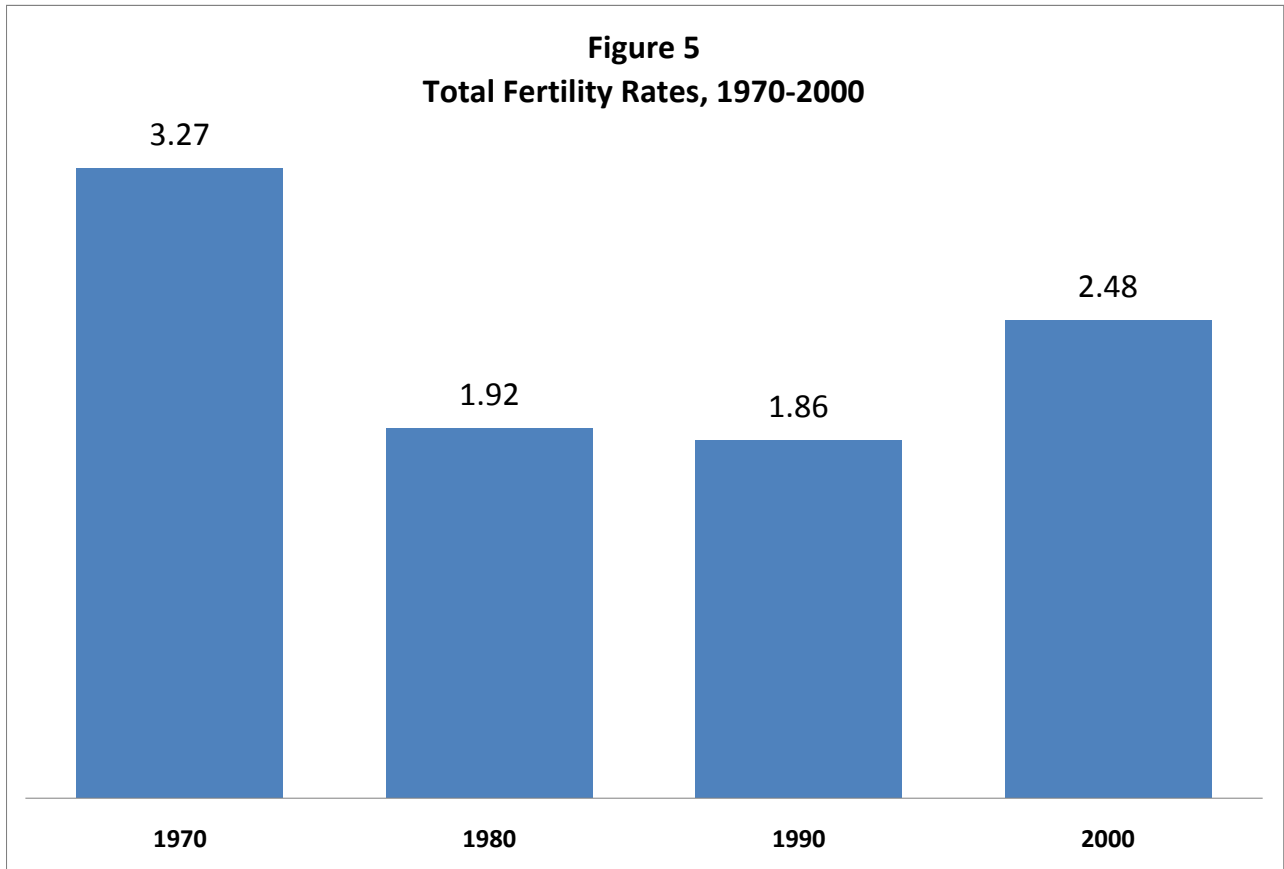


The pattern of population growth by age group is one of a shift from younger families in the 1970s toward slightly older households approaching their prime earning years in succeeding decades. Figure 4 presents a comparison of the cohort survival rates since 1970 based on decennial census counts of the population.



The long term trend from 1970 to 2000 shows the county’s ability to attract families with children. Between 1970 and 1980 younger persons in their early 30s formed the largest groups of in-migrants to the county. A slowing of overall growth in the county population was primarily due to a reduction in the rate of in-migration among persons in their early and late 30s. The decline in the number of older residents has been a result of some out-migration at retirement ages and the inevitable consequences of mortality among the older population. For the decade 1990 to 2000 the cohort survival rate shows that the peak attractiveness for age groups has moved from the early 30s to those in their late 30s. The larger cohort change rates for youth are consistent with the county’s attractions for larger households with more children. A consistent pattern across time has been the out-migration of young adults following high school as they leave the county to continue their education and join the workforce. The patterns of growth and attractiveness to households at distinct points in the life cycle are widespread among suburban counties, especially ones that have reached or are reaching build out.

The rate of childbearing, shown in Figure 5, has decreased in the county since 1970 when the total fertility rate—the average number of children born to a women throughout their childbearing years—was 3.27 children per woman.



By 1980 the rate of childbearing had dropped to 1.92 and by 1990 was down to 1.86. Rockland County's change is similar to the national decline in the childbearing rate. The upturn in childbearing in 2000 and sustained in 2005 is a surprising development, largely due to the changing composition of the county's population.