THE EXPECTED GROWTH OF POPULATION
IN THE UNITED STATES

ARTHUR A. CAMPBELL

Scripps Foundation for Research in Population Problems, Miami University, Oxford, Ohio

At the outset, it must be emphasized that nobody can predict population growth with a high degree of accuracy. Population experts have had many opportunities in the past to demonstrate their inability to foresee the future clearly, and they will undoubtedly have many more opportunities to do so in the future. The trouble is, of course, that people do not always behave as we expect them to.

Some of the strengths and weaknesses of earlier attempts to forecast population growth can be illustrated by projections prepared by Pascal K. Whelpton in 1927 (Whelpton, 1928). These were the first projections for the United States made by the so-called component method. With this method each of the three components of growth—fertility, mortality, and migration—is projected separately. Projections are prepared for each age-sex group, and the results are added to obtain a figure for the total population. Whelpton's 1927 forecasts were only 0.5 percent above the correct 1930 population, but by 1940 they were 4.6 percent too high. They nearly hit the mark in 1950, 23 years after they were prepared, with a deviation of only 0.5 percent from the true figure, but by 1955 they were 4.3 percent too low. What had happened was this: the forecasts were too high by 1940 because Whelpton had failed to foresee the low birth rates of the depression decade of the 1930's. However, the 1950 forecast was just about right because the low birth rates of the 1930's were balanced by high birth rates after the war. The 1955 forecast was too low because actual fertility between 1950 and 1955 was higher than expected back in 1927. You will note that I assign the major responsibility for the successes and failures of these projections to fertility, which is the major unknown in population forecasting for the United States as a whole. Although there were defects in Whelpton's forecasts of mortality and migration, they did not affect greatly the accuracy of his forecasts of total population.

One way of overcoming the deficiencies of such early attempts to forecast population growth is to project not a single series of figures, but a range within which the true figure seems likely to fall. A major attempt to do this was undertaken by Whelpton, Eldridge, and Siegel for the Census Bureau in 1945 and 1946 (Whelpton, 1947). Seven series of projections were prepared by a very

careful application of the component method. Forecasts of the total population for 1970 ranged from a low of 152 million to a high of 177 million. In all probability, we will reach the high figure in June of 1959—11 years ahead of schedule.

Again, the failure of the 1945–46 projections was due primarily to the forecasters' inability to predict fertility accurately. You will note that the projections were prepared just before the unprecedented and unforeseen postwar "baby-boom." With the release of millions of men from the armed forces in 1945 and 1946, marriages reached a record high in 1946 and births shot up in 1947. The birth rate has been high ever since. Even in the high fertility series, the numbers of births projected for 1945–49 were 18 percent too low, and those for 1950–54 were 27 percent too low.

Such an impressive failure of the methods then in use could not fail to stimulate a search for new methods of forecasting fertility. The most significant first step was Whelpton's development of the cohort approach to the analysis of fertility (Whelpton, 1958). With this technique, the reproductive behavior of a group of women is followed from the beginning to the end of the childbearing period. The groups considered are called cohorts and consist of women born in a given 12-month period.

The cohort approach soon revealed an important defect in the older methods of forecasting fertility rates. In the projections referred to previously, future annual fertility rates were extrapolated from past annual rates on the assumption that the future would not depart radically from a relatively simple extension of past trends. The medium fertility assumption in the 1945–46 projections, for example, was that birth rates at each age would resume their long-time downward trend after the brief upturn observed during World War II. Cohort analysis demonstrates clearly that past changes in annual rates by themselves do not provide good indicators of future rates, simply because fluctuations in annual rates are so strongly influenced by *when* women have births rather than by how many they will have eventually. This holds true for such sophisticated measures as gross and net reproduction rates.

We now know, for example, that many of the women who reached the beginning of the reproductive period in the 1930's delayed marriage and, if they married, delayed childbirth during the depression and war years only to make up for most of these postponed marriages and births during and after the war when economic conditions and marriage prospects were more favorable. In addition, after the war women married at younger ages than formerly, and we have good reason to suspect that they are advancing their births to the early years of marriage and that they will have fewer births in later years of marriage than was commonly the case for previous generations.

In other words, the annual rates of the 1930's were low in large part because of the postponement of marriages and births. Those of the late 1940's and the 1950's are high partly because of the advancing of marriages and births that would ordinarily occur later.

Variations in eventual family size have been of less importance than these variations in timing in determining the trend of annual birth rates.

It became apparent, then, that projections of births might better be made on the basis of assumptions about how many of the women in each cohort will marry, when they will marry, how many births they will eventually have, and when they will have them. Past developments indicate that the most important unknown in this equation, for long-range projections, is eventual family size. How can we make a good guess about how many children women will eventually have?

Here we come to the second important forward step in fertility analysis in the postwar period—a study known originally as the Growth of American Families. In this venture, the Scripps Foundation staff joined Ronald Freedman and the

Survey Research Center of the University of Michigan. Under their direction, a national sample of white wives, 18–39 years old, was interviewed in early 1955. The purpose of this survey was to discover married couples' hopes and plans for future childbearing, their physiological ability to bear as many children as they wanted, and their success or failure in limiting their family size to the desired number. The findings of this study have been published by McGraw-Hill in a book called *Family Planning, Sterility, and Population Growth*, by Freedman, Whelpton, and myself. In the remainder of this paper I shall present a brief summary of our findings with respect to family size and population growth.

In the first place, we found that American women do not expect to have large families. Most of them expect to have two to four births. The average is about three for women who recently began their childbearing. This does represent a rise over the family size of women who have recently completed their families, however. The broad historical picture for all women (white and non-white) is this: women who were born in the early 1870's and who married and lived to the end of the childbearing period, had about 4.4 births on the average. This average declined to a low of 2.4 births for women born in 1906–10. Later cohorts have already surpassed this low, and the most recent cohorts for which we have data will probably have an average of about three births per married woman living to middle age. The latter figure is a medium guess based in large part on the replies of the women in our study.

On the basis of our study information and cohort fertility tables, we prepared three series of population forecasts to the year 1980.

The low series is based on the assumption that only 90 percent of the women in the more recent cohorts will marry, that the completed family size of those who live to middle age will be 2.5 births, and that the ages at which they marry and have babies will be later than has recently been the case.

The medium series is based on the assumption that 94 percent will eventually marry, that they will average three births, and that the timing of migrations and births will be about the same as recently observed for younger women.

The high assumption is that 98 percent will marry, that they will have 3.3 births, and that the tendency to marry and have births at younger ages will continue.

We do not expect that any of these assumptions will describe with precision the future course of fertility, but we do hope that we have bracketed the trends that will develop and that the medium assumption will approximately describe the central trend around which deviation will occur.

Our assumptions about the future course of mortality and migration were borrowed from the United States Government. The mortality assumptions allow death rates to decline to levels considered probable by experts in the Department of Health, Education, and Welfare (Greville, 1957). The migration assumptions allow for an annual influx of 240,000 people, in accordance with projections prepared by the United States Census Bureau in 1955 (Bur. Census, No. 123, 1955). This volume of net immigration is somewhat lower than the average observed during the 1950's. We do not expect deviations from these assumptions to have much effect on the accuracy of our projections. We are, of course, specifically leaving out of account the possibility of an atomic war.

Before preparing our projections, we allowed for an estimated undercount of 5.5 million in the 1950 census. This is not an official figure, but one that was arrived at after careful analysis by Ansley Coale at the Office of Population Research at Princeton University (Coale, 1955). Please keep in mind that this adjustment makes the projected figures I cite about 3.3 percent higher than figures consistent with Census Bureau estimates.

Starting with an estimated population of 170.7 million in 1955, our projections for 1980 are as follows:

Fertility Assumption	1980 Population	Percent increase since 1955
Low	215×10^6	26
Medium	239×10^6	40
High	262×10^6	54

The year 1980 was as far as we cared to extend the low and high assumptions because we considered that they represented extreme conditions that were not likely to prevail for very long if they were approached at all. However, we did extend the medium series to the year 2000, and this calculation gives us 312 million. If this figure proves correct, the total population will double in the last half of the century just as it did in the first half. Over the whole century, our population will have increased by a multiplier of four.

Realizing that there are many people, like those present, who are interested in long-range population prospects from the point of view of planning the development and use of our natural resources, we made some rough computations for the year 2050. Extending our medium series that far into the future would increase the United States population to 575 million, or over three times as many people as we have now. This emphasizes the fact that fertility need not be high to obtain rapid population growth. The average of three births per family, on which this forecast is based, is certainly not high from the point of view of a human potential of nine or ten births on the average. It seems reasonable in terms of the experience of ourselves and our friends. Yet, the implications of the continuation of such moderate fertility leads eventually to population totals that may easily frighten conservationists. By way of illustrating what *could* happen, I might add that if we extended our *high* assumptions of 3.3 births per family to the year 2050, we would obtain a population of nearly one billion.

Coming back to what is often erroneously called the foreseeable future, I should like to present briefly some of the more visible population trends in the years ahead.

In the first place, the birth rate seems likely to decline in the next five years or so, not because of any reduction in completed family size, but only because of the advancing to the 1950's of births that would ordinarily have occurred in the 1960's. This decline will not occur if our high assumptions prove to be more accurate than our medium assumptions. Our medium forecasts show a birth rate of about 20 per 1,000 in the 1960's, as compared with about 24 in the 1950's. So, if you see reports of declining birth rates in the next few years, don't write off our long-range forecasts as improbable. We can expect wide fluctuations in annual birth rates in the future because most people have learned how to control not only how many children they will have but also *when* they will have them.

If our medium assumptions are correct, the birth rate will probably vary around a level of 20–22 for the rest of the century. The low assumptions indicate the possibility of decline to 15–17. Only the high series yields a continuation of the high rate of 24–25 experienced in recent years.

What will happen to the size of the school-age population? The number of children eligible to attend elementary school (grades 1 through 8) is now increasing rapidly and will continue to increase up to 1965. At that time the age group 6–13, which includes the large bulk of those enrolled in elementary schools, will contain approximately 32 million children, as compared with only 25 million in 1955. Thus, the problem of how to increase the capacity of our elementary school system as rapidly as the number of school-age children rises will continue for several more years.

After 1965, however, the elementary schools should enjoy a respite from the pressure of a rapidly increasing child population. If our medium fertility assump-

tions prove to be approximately correct, the number of children 6–13 years old will change little between 1965 and 1975. Actually, the medium series shows a slight decline in this 10-year period.

After 1975, however, the pressure on the elementary schools will again rise, as the result of an increase in births expected to begin in the late 1960's. This rise is expected as a result of an increase in numbers of young parents. The medium series shows the number of children 6–13 years old constantly rising after 1975 to 45 million by the end of the century—80 percent more than in 1955. Such a long-range forecast is, of course, highly speculative.

Children of high-school age, taken here as 14–17 years, will continue to increase until 1975. By the latter year there will be 16 million such children surviving from babies already born, or two-thirds more than the 9.5 million in 1955. Present high-school facilities will have to expand considerably to handle this increase.

Between 1975 and 1980 the population of high school age will decline by about 1.3 million, if marriage and fertility patterns stabilize during the next few years, as postulated in our medium projections. After 1980, the medium assumptions yield a steadily rising number in the age range 14–17, reaching 21 million by the end of the century. This is over two times the 1955 population in this age group.

The high fertility projections indicate that the population of high school age could reach 19 million by 1980, whereas the low assumptions show only 11 million by that time. Both forecasts are regarded as unlikely extremes.

The 4-year age group, 18–21, is critical for several institutions in our society. It includes the bulk of college students and a large proportion of the people looking for their first job and starting new households. The number of persons in this age range is virtually certain to increase—from 9 million to about 16 million between 1955 and 1975, a rise of over 80 percent in only 20 years.

This rise will certainly tax the colleges and will very likely strain the ability of our economy to absorb new workers. At the same time, however, the increasing numbers marrying and entering the labor market will mean more new consumers for important products. They will want houses, automobiles, and the many other goods and services on which our economy depends. Whether the net effect of the rising number of young men and women will be to stimulate the economy by creating more consumer demand or depress it by glutting the labor market, remains to be seen. All we can say now is that a very large increase in the population 18–21 years old will occur and will very probably have an important effect on the economy. The most rapid rise is expected from 1965 to 1970, when the number of such persons very probably will jump from 12.5 to 14.7 million, or by 17 percent in only five years.

The population of working age 18–64 is virtually certain to increase from 99 million in 1955 to 127 million in 1975. The most rapid gain in the 18–64 age group will occur in the 10 years between 1965 and 1975, when the number increases by 18 million, or 17 percent. This rise is due primarily to the much larger number of births during 1947–57 than during previous years.

After 1975, the trend in the number of persons in the working ages becomes less certain. By 1980, it could be as small as 133 million or as large as 138 million, according to our low and high projections. If fertility in future years follows the trend described by our medium assumptions, the number in the 18–64 age group will continue to increase fairly rapidly in the last quarter of the century. The medium forecast for the year 2000 is 176 million, which is 78 percent above the 1955 figure.

People of retirement age, taken here as 65 years old and over, constitute one of the most rapidly and steadily growing age groups in our population. Between 1955 and the end of the century their number will more than double, increasing from 14.7 million to 31.9 million. This is a rise of 117 percent, which is considerably above the rise of 83 percent expected for the total population according to the medium series.

In summary, if present family growth plans are continued and realized, the American population will grow rapidly although there may be important troughs and crests in the growth curve. The moderate families Americans expect will produce substantial population growth if present marriage and childbearing patterns persist. This growth will occur even if there is no significant reduction in mortality and little or no immigration. That *large families are not required for large population increases* may be one of the most important conclusions to be drawn from the projections prepared for this study. With little change in mortality, marriage patterns, or immigration, the three-child family would lead to a population of 312 million by 2000 and of nearly 600 million by 2050. Projecting the same assumptions for another century would lead to astronomically large population figures. Even *the forecast for the year 2000 means a population so large as to imply a fundamental change in many aspects of our society.* Americans may soon have to choose between the consequences of a very large population or a revision of their present values about marriage and childbearing.

REFERENCES

Coale, A. J. 1955. The population of the United States in 1950 classified by age, sex, and color: a revision of census figures. J. Am. Statistl. Assoc. 50: 16–54.

Greville, T. N. E. 1957. Illustrative United States Population Projections, Actuarial Study No. 46. Social Security Adm., U. S. Dept Health, Educ. and Welfare. Washington, D.C.

U. S. Bureau of the Census. 1955. Revised projections of the population of the United States by age and sex: 1960–1975. Current Population Reports, Series P-25 No. 123. The Bureau, Washington, D.C.

Whelpton, P. K. 1928. Population of the United States, 1925–1975. Am. J. Sociol. 34: 253–270.

———. 1954. Cohort Fertility. Princeton Univ. Press. See also Chapter 9, "Cohort fertility" in: W. H. Grabill, C. V. Kiser, and P. K. Whelpton, 1958. The Fertility of American Women. John Wiley and Sons, Inc., New York. See also P. K. Whelpton and A. A. Campbell, 1959. Fertility Tables for Birth Cohorts of American Women. National Office of Vital Statistics.

Whelpton, P. K., H. T. Eldridge, and **J. S. Siegel.** 1947. Forecast of the Population of the United States, 1945–1975. U. S. Bureau of the Census, Washington, D.C.