

birth rate has tended to decrease slightly, but it has probably never gone above or below the intermediate range of 30–40 births per 1,000 persons per year.

Correlation of Fertility with Industrialization Since the Industrial Revolution the fertility of populations and their average level of industrialization have been strongly and inversely correlated. The relationship between present crude birth rates and average values of GNP per capita for various nations of the world is illustrated in Figure 2-8.* Apparently, as nations industrialize, new forms of labor utilization, human settlement patterns, health care, and material comforts cause numerous social adjustments within the family. The net effect of these adjustments is to decrease the average birth rate. Although individual variations occur in the timing and extent of this effect, there have been no significant exceptions to the general pattern. The correlation was noted by observers of population changes in the eighteenth century, and it has been extensively documented for subpopulations within nations as well as across nations since 1900 (U.N. 1953, p. 86).

The empirical correlation between increasing GNP per capita and decreasing birth rate is obvious, but it does not imply anything about the direction of causation

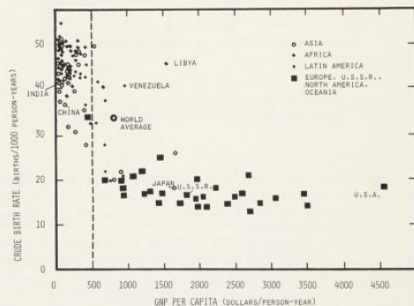


Figure 2-8 Crude birth rates versus GNP per capita, 1971
Source: USAID 1972.

of this phenomenon. Plausible arguments have been advanced to demonstrate that higher incomes cause lower birth rates and that lower birth rates cause higher incomes. In fact, both arguments may be correct. As we shall discuss later, birth rate and industrialization are probably related through several different feedback loops. Thus fertility and industrialization may influence each other in many ways, and causal links may actually operate in both directions. A collection of data such as that plotted in Figure 2-8 only captures the state of this complex system at a particular time and can tell us little about the underlying causal structure.

Delayed Response

Demographic responses to new external conditions, through changed birth and death rates, are often significantly delayed. The two major sources of the delay are the age structure of the population and the inherent slowness of social change.

Population Age Structure It takes at least 15 years for a newborn child to mature and become a parent. There is a delay of more than 50 years before the child reaches the ages of highest probability of death. These obvious facts have profound implications for the dynamics of population growth. The long delays inherent in the biological processes of maturation and aging give every human population a strong momentum—a tendency to keep following the same dynamic behavior it has followed in the past. Because of that momentum, a population that has been growing rapidly will continue to grow for decades, even after fertility has fallen to the equivalent of two surviving children per married couple. Similarly, a population that has experienced fertility lower than the replacement level may continue to decrease for some time after fertility has again risen to the replacement level.

A population has momentum because it retains in its age structure a living “memory” of its past demographic history. A population’s age structure is defined as the relative number of people in each age group. Population age structures can vary greatly, as illustrated by the different population pyramids in Figure 2-9. The shape of a population pyramid is determined by the past birth and death rates of the population, the very top of the pyramid reflecting the birth rate of 70 or more years ago as well as the cumulative death rate over the past 70 years. If the birth rate has been consistently high, the pyramid is a broad-based triangle, with many more young people than old people, as illustrated by the age structure of Peru in Figure 2-9. If the birth rate has been low, the number of people in each age group becomes more even, since each generation tends just to replace itself. An example is the population pyramid of the United Kingdom. If there have been wide swings in the birth rate or events such as wars that have had a great impact on the death rate of specific age groups, the age structure can be quite uneven, as the pyramids of the United States and West Germany demonstrate.

The age structure is both a result of the past birth and death rates of a population and a partial determinant of future birth and death rates. The number of births in any year is a function of two things: the average fertility of each woman of childbearing age (roughly 15 to 45 years), and the total number of women of childbearing age in the population. Peru’s population pyramid indicates that every year for at least fifteen

*Data for plotting this and all other cross-sectional graphs in the population sector are summarized in Appendix D to this chapter. Although GNP per capita is not a very good measure of industrialization, it is generally the only measure available. For a discussion of the relationship between GNP per capita and industrial output per capita, see Chapter 3.