

# WORLD POPULATION GROWTH

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## I

### IN THE BEGINNING

The human race has a long history. Depending on which paleontologist or paleoanthropologist one consults, man's beginnings reach back from a third to more than a half million years. At the Darwin Centennial in Chicago, in November 1959, anthropologist L. S. B. Leakey told of an early man or late protoman, evidence of whom has been found in East Africa, who may mark the beginnings of the species. The available skeletal material and artifacts, which were uncovered deep in the side of a canyon that afforded quite an accurate geological dating, indicate that these "people" were, indeed, human.<sup>1</sup>

During the next 200,000 years or more of man's rather precarious foothold on Earth, his numbers were extremely small and our knowledge of him is quite meager.<sup>2</sup> Typically, he congregated in nomadic tribes and was completely subject to all of the vagaries of the weather and the ecological cycle of the game animals on which his existence depended. Food shortages were usually endemic, and the ravages of epidemics were routine—although the wide dispersal of the population tended to localize these hazards. Nevertheless, the picture that emerges is one in which births and deaths were roughly balanced, with births perhaps holding a narrow margin.

Despite the rigors of life, however, many "island civilizations" of a high cultural level prospered for a time in the rich river valleys of Egypt and Asia and then vanished. Populations apparently grew rapidly during the emergence of a "golden age," and then declined during the following period of regression and decay. In the most varied contexts, this cycle of growth and decline appears to have been repeated for millennia. Even in China, the location of a man's most stable culture, this seems to have been the recurrent pattern.

In any event, the competent consensus is that by the time of Christ, near the midpoint in the cycle of growth and decline of the Roman Empire, the population

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<sup>1</sup> Leakey, *The Origin of the Genus Homo*, an illustrative lecture presented at Darwin Centennial at the University of Chicago, Chicago, Ill., Nov. 25, 1959, in 2 SOL TAX (ED.), *EVOLUTION AFTER DARWIN [THE EVOLUTION OF MAN]* 17 (1960).

<sup>2</sup> For an excellent survey of archeological demography, see RAYMOND PEARL, *THE NATURAL HISTORY OF POPULATION* (1939).

of the world amounted to some 250,000,000 human beings.<sup>3</sup> During the next sixteen centuries, however, the picture of population growth becomes very hazy.<sup>4</sup> There appears to have been a gradual see-sawing upward in numbers, but the conditions of life for most of the human species ranged from deplorable to appalling. George Sarton has given us a vignette of the poverty, misery, and deprivation of life in thirteenth-century Italy:<sup>5</sup>

An interesting example of this struggle was given in the period under consideration by the nonconformists who preached the Eternal Evangel of Joachim of Floris. Their religious and social radicalism was condemned by the Church in 1255, but not suppressed. To stop the rebellion of those passionate hearts it would have been necessary to cure the unspeakable evils of the time, and this was beyond the power of any church. The fact is, social and spiritual conditions were terrible, the lot of the poorer people (i.e., of the great majority) was exceedingly miserable, personal security was very low, there was no hope for man but what the Church could give him, and if the priests disappointed him his own soul must create a new faith or share his body's starvation. A more striking revolt even was that of the Battuti, whole bands of half-naked men who crossed the towns scourging themselves by way of penitence, self-debasement, and edification. Their exaltation was as contagious as a disease, and their bands increased in numbers not only in Italy but in many other countries, spreading ecstasy, dissatisfaction, and terror everywhere. The fervor of the Italian Battuti manifested itself also in poetical form, and we owe to its inspiration one of the greatest poets of the Middle Ages, Jacopone da Todi. I wish that the scholars who magnify every evil of our own days and idealize the past beyond recognition would bear in mind these pathetic and frightful processions of Battuti. A spiritual revolt of such magnitude, and characterized by such frenzy, can only be explained by the intolerability of social circumstances.

Nor was this situation limited to Italy. In England, to cite another example, from the thirteenth to the sixteenth century, there was an average of six major famines per century, and the Black Death took a shocking toll of lives in the fourteenth century. Still, population growth continued, albeit erratically, and by 1650, it had reached the 500,000,000 mark.<sup>6</sup>

This last-mentioned date signalizes an important change in the pattern of population growth—this is the point where the curve of increase began to incline more

<sup>3</sup> For an excellent summary of the available information on population growth from ancient to modern times, see U.N. DEP'T OF ECONOMIC AND SOCIAL AFFAIRS, DETERMINANTS AND CONSEQUENCES OF POPULATION TRENDS ch. 2, at 5-20 (ST/SOA/Ser. A/17) (U.N. Pub. Sales No. 1953.XIII.3).

<sup>4</sup> The scientific study of population was not undertaken until the latter part of the seventeenth century. In 1662, John Graunt, a British mathematician, analyzed the registers of baptisms and burials that had been kept regularly by the clerks of the parishes in and around London since 1603 and computed therefrom sex ratios, the ratio of births to deaths, fertility ratios, and other broad aspects of population growth. JOHN GRAUNT, NATURAL AND POLITICAL OBSERVATIONS MADE UPON THE BILLS OF MORTALITY (1662). And in 1693, Edmund Halley, the astronomer who plotted the orbit of the comet that bears his name, constructed the first empirical life-expectancy table, based on data gleaned from church records in Breslau, Silesia. Halley, *An Estimate of the Degrees of Mortality of Mankind*, in 17 PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY OF LONDON 596 (1693).

<sup>5</sup> 2 GEORGE SARTON, INTRODUCTION TO THE HISTORY OF SCIENCE pt. 2, at 712 (1931).

<sup>6</sup> See *supra* note 3.

steeply.<sup>7</sup> Several factors appear to account for this phenomenon. In Europe, the frightful famines and epidemics that marked the Dark Ages seem to have decreased, although hunger and disease were still widespread. The discovery of the New World and the development of the scientific method and the application of this new knowledge to technology also began to have an effect. Why the response was so rapid is not entirely clear, but the fact remains that the increase in numbers steadily accelerated. World population doubled in about 250 years, passing the 1,000,000,000 mark about the middle of the nineteenth century.<sup>8</sup>

## II

### THE DEMOGRAPHIC TRANSITION

The beginnings of the nineteenth century saw several further developments—apparently unrelated—that were also marked to have profound effects on world population. First, the “era of faith and epidemics,” extending back into remotest prehistory, was drawing to a close—giving way to the “vital revolution,” in which the genius of the human mind began to deal effectively first with mortality and then with fertility.<sup>9</sup> Compounding this, the industrial revolution, followed by a spate of other technological revolutions, increased human productivity and began to shrink the earth.

Throughout the preceding hundreds of thousands of years, the survival of the human species had been a touch-and-go affair, in which high mortality had been balanced by high fertility. Reproduction somewhere near the physiological limit of the human female—a relatively slow breeder, even among mammals—had been essential to the survival of any culture. Against this background, Jenner’s dramatic discovery of vaccination was ushered in. This application of the scientific method to biology, together with improved agricultural technology, better transportation, and the whole complicated nexus of an emerging industrial culture, set in motion forces that were destined eventually drastically to affect the death rate and profoundly to alter the pattern of population growth.

Initially, mortality changes were slow in manifesting themselves. There is scattered evidence that by 1750, however—fifty years before any massive attack on death rates had taken place—birth rates had begun to decline in France. The reasons are not very apparent, although there is an impressive accumulation of literature attempting to explain what happened.<sup>10</sup> A semiritualized form of exposure was also employed to check population growth, and a significant proportion of the baptisms recorded in Paris in the middle of the eighteenth century was of foundlings, among whom as

<sup>7</sup> See A. M. CARR-SAUNDERS, *WORLD POPULATION: PAST GROWTH AND PRESENT TRENDS* (1936); Willcox, *Increase in the Population of the Earth and of the Continents Since 1650*, in 2 WALTER F. WILLCOX (ED.), *INTERNATIONAL MIGRATIONS* 38 (1931).

<sup>8</sup> See *supra* note 3.

<sup>9</sup> See NORMAN E. HIMES, *MEDICAL HISTORY OF CONTRACEPTION* 391-94 (1936).

<sup>10</sup> See JOSEPH J. SPENGLER, *FRANCE FACES DEPOPULATION* (1938).

well the mortality was unquestionably high. Fertility was so reduced, in fact, that it occasioned grave alarm in certain quarters. This downward trend continued for over a century.

In Ireland, too, fertility was checked—somewhat later, but before the middle of the nineteenth century. A veritable explosion of population growth had been set off by the introduction of the potato into Ireland before 1660. During the eighteenth century, the population grew from 1,200,000 to 4,500,000; and by 1845, it had grown to 8,300,000.<sup>11</sup> The Irish halted this alarming and economically debilitating rate of population growth, however, by adopting and rigidly maintaining a custom of late and few marriages, which has continued until the present day.<sup>12</sup>

It is interesting to note that these first instances of a falling national birth rate were found in Roman Catholic countries. The birth rate in England and the Scandinavian countries, by way of contrast, did not begin to decline until after 1850. Thereafter, the pattern of birth limitation extended steadily southward, until today it covers the entire European continent. In North America and other places colonized from northern Europe, this same cycle was later repeated.<sup>13</sup>

In all of these countries, this demographic transition has typically followed a rather leisurely course. First, the death rate begins to decline; then, after an interval of a generation or more, the birth rate begins to decline. This trend has not been the result of any formal action on the part either of the government or of private agencies—indeed, it has sometimes run counter to governmental pronatalist policies. It appears rather to have reflected the general recognition that with the chances of survival of progeny steadily improving, a level of fertility urgently necessary when a third, a quarter, or even a half of the children died in infancy or childhood was no longer in the best interest of the family. Too large a brood put a serious burden on the family economy and impaired the chances of all the children to get an adequate education and a good start in life.

Bertrand Russell has expressed the conviction that the small-family pattern that has thus evolved is perhaps the only basic contribution that Western Christian civilization has made to human culture.<sup>14</sup> It is paradoxical, therefore, that it has excited such violent opposition in some parts of the West.

### III

#### WHAT LIES AHEAD?

A century and a half after the onset of the vital revolution, the demographic situation of the world abounds in contrasts. As may be seen in the accompanying

<sup>11</sup> See ROBERT C. COOK, *HUMAN FERTILITY: THE MODERN DILEMMA* 58-59, 93-94 (1951).

<sup>12</sup> The contrast between marriages of young women in the United States and Ireland is striking. In 1951, the proportion of women of 20 to 24 years of age in the United States who were married was 67.7%; in Ireland, it was 17.7%. Kiser, *Current Mating and Fertility Patterns and Their Demographic Significance*, 6 *EUGENICS Q.* 65 (1959).

<sup>13</sup> For information concerning current birth rate trends, see the *Population and Vital Statistics Reports* that are published quarterly by the United Nations.

<sup>14</sup> BERTRAND RUSSELL, *NEW HOPES FOR A CHANGING WORLD* 49 (1951).

table, world population now stands at roughly 2,900,000,000 and the 3,000,000,000 mark will shortly be passed. It is estimated that during the coming decade, world population will increase by about 570,000,000. At this rate, world population will double in just forty years—by the year 2000—to 6,000,000,000. And with falling death rates in many areas of traditionally high birth rates, total population could conceivably be as much as 1,000,000,000 greater.

The great disparities in rates of population growth are not reassuring. During the next decade, present trends will tend to divide the world even more markedly into two distinct groups:

TABLE

POPULATION PROJECTIONS TO THE YEAR 2000, FOR THE WORLD, CONTINENTS, AND REGIONS  
(MILLIONS)

Area	1950	1960	1970	1975	2000
World total.....	2,500	2,920	3,500	3,860	6,280
Africa.....	199	237	294	331	517
North Africa.....	43	53	67	76	147
Middle & Southern Africa.....	156	185	227	254	370
Northern America.....	168	197	225	240	312
Latin America.....	163	206	265	303	592
Asia (excluding the Asian part of the Soviet Union & Japan).....	1,296	1,524	1,870	2,093	3,717
Japan & Ryukyu Islands.....	84	96	110	117	153
Europe (excluding the European part of the Soviet Union).....	393	424	457	476	568
Northern & Western Europe.....	133	140	148	154	180
Central Europe.....	128	140	151	156	183
Southern Europe.....	132	144	158	166	206
Oceania.....	13.2	16.3	19.4	21.0	29.3
Australia & New Zealand.....	10.2	12.7	14.9	16.0	20.8
Pacific Islands.....	2.9	3.6	4.5	5.0	8.6
Soviet Union (Asian & European parts combined).....	181	215	254	275	379

SOURCE: U. N. DEP't on ECONOMIC and SOCIAL AFFAIRS, THE FUTURE GROWTH OF WORLD POPULATION tables 1A and 1B(ST/SOA. Ser. A/23) (U. N. Pub. Sales No. 1958. XIII. 2).

1. The demographically stable, industrialized, "have" countries, enjoying high levels of living, where effective fertility regulation either exists or is developing. This includes all of Europe, the Soviet Union, North America, the temperate-zone countries of Latin America, Oceania, and Japan.

2. The demographically unstable, "have-not" countries that are now struggling toward economic development, in which almost two-thirds of the world's people live, where there is, as yet, no effective fertility regulation. This includes all of Asia (except Japan and Israel), tropical Latin America, and most of Africa. The "rising expectations" that swept the world of the early 1950's are in danger of being extinguished here by the new multitudes to be fed, clothed, and housed.

Organized efforts to achieve fertility control are being initiated in certain Asian countries, notably India and Pakistan,<sup>15</sup> although the situation in Mainland China is

<sup>15</sup> For more extended discussion, see, e.g., Agarwala, *Population Control in India: Progress and Prospects*, *infra* p. 577.

unclear.<sup>16</sup> Intensive programs, which may prove to be important as "pilot operations," moreover, are under way in a few West Indian Islands, notably Barbados, Puerto Rico, and Jamaica.<sup>17</sup> None of these, however, has yet achieved an approximate balance of births and deaths.

The one real basis for encouragement has been the widespread increase in concern about overpopulation in recent years. There is now virtual unanimity on the part of experts that the present rate of population growth is dangerously high. Dr. Frank Notestein has warned that growth can and must be checked by either rising death rates or falling birth rates.<sup>18</sup> Dr. Vannevar Bush, a scholar of notable competence in the area of science and technology, warns:<sup>19</sup>

. . . we can see that [man] is headed for catastrophe unless he mends his ways and takes thought for the morrow. This is quite apart from the immediate question whether he will use the split atom or a trained virus to turn civilization back and force it to begin again its slow upward climb. . . .

But, wars aside, man is still headed for trouble. The world's population is increasing at a rate which renders distress, famine and disintegration inevitable. . . .

During 1959, two notable policy statements in the matter were released to the public. On July 13, the Third Interim Report of the President's Committee to Study the United States Military Assistance Program warned: "No realistic discussion of economic development can fail to note that development efforts in many areas of the world are being offset by increasingly rapid population growth."<sup>20</sup> After reviewing the current population situation, the Report concluded:<sup>21</sup>

Basically, the problems of rapid population growth and of adequate economic progress must be faced and solved by the individual countries. The United States and the other more advanced countries can and should be prepared to respond to requests for information and technical assistance in connection with population growth. Such information will help to point up the seriousness of the problem, and to encourage action in countries where population pressures exist. Such information is also useful in defining the areas in which initial efforts will be most effective. Recognizing an immediate problem created by the rapid growth, the United States should also increase its assistance to local programs relating to maternal and child welfare.

*We Recommend:* That, in order to meet more effectively the problems of economic development, the United States (1) assist those countries with which it is cooperating in economic aid programs, on request, in the formulation of their plans designed to deal with the problem of rapid population growth, (2) increase its assistance to local programs relating to maternal and child welfare in recognition of the immediate problem

<sup>16</sup> For more extended discussion, see, e.g., Mauldin, *Population Policies in the Sino-Soviet Bloc*, *infra* p. 490.

<sup>17</sup> For more extended discussion, see, e.g., Back, Hill & Stycos, *Population Control in Puerto Rico: The Formal and Informal Framework*, *infra* p. 558.

<sup>18</sup> Quoted in PAUL F. RUSSELL, *MAN'S MASTERY OF MALARIA* 248 (1955).

<sup>19</sup> Bush, *Report of the President of the Carnegie Institution of Washington*, in *CARNEGIE INSTITUTION OF WASHINGTON YEARBOOK* 4, 5 (1954).

<sup>20</sup> PRESIDENT'S COMM. TO STUDY THE UNITED STATES MILITARY ASSISTANCE PROGRAM, *THIRD INTERIM REPORT, ECONOMIC ASSISTANCE PROGRAMS AND ADMINISTRATION* 42 (1959).

<sup>21</sup> *Id.* at 44-45.

created by rapid population growth, and (3) strongly support studies and appropriate research as a part of its own Mutual Security Program, within the United Nations and elsewhere, leading to the availability of relevant information in a form most useful to individual countries in the formulation of practical programs to meet the serious challenge posed by rapidly expanding populations.

A formal policy statement of the American Public Health Association, adopted in October 1959, also warned:<sup>22</sup>

There is today an increase of population which threatens the health and well-being of many millions of people. In many areas of the world substantial population increase means malnutrition and outright starvation. In other areas it may mean increased stress in family life, reduction of educational opportunity and the retardation of the industrial development on which a nation's rising standard of living depends. No problem—whether it be housing, education, food supply, recreation, communication, medical care—can be effectively solved today if tomorrow's population increases out of proportion to the resources available to meet those problems. . . .

The public health profession has long taken leadership in defeating disease, disability, and death. It must now assume equal leadership in understanding public health implications of population imbalance and in taking appropriate action.

By far, the most intensive study and evaluation of population problems has originated in the United Nations, which shortly after its organization evinced an appreciation of the impact of population change on plans to bring peace and security to all the world by creating the Population Commission. The work of this body has included:

- (1) the carrying out of research studies dealing with various aspects of the determinants of population trends and their economic and social consequences;
- (2) the preparation of population estimates and projections and the evaluation of the quality of demographic statistics;
- (3) the training of personnel in the less-developed countries in the techniques of demographic research and analysis;
- (4) the sponsoring of seminars and other technical conferences to disseminate knowledge of population trends and draw attention to their practical applications in the planning of economic and social development;
- (5) the carrying out of demographic pilot studies in the less-developed countries to demonstrate methods of obtaining information on various demographic characteristics and their relations to economic and social factors; and
- (6) the provision of technical assistance in the field of population to those governments requesting such assistance.

Some of the publications that have issued from these undertakings are classic. The encyclopedic *Determinants and Consequences of Population Trends*, published in 1953, is a monumental survey and bibliographic source.<sup>23</sup> The *Demographic Yearbooks* and the quarterly demographic reports, too, are invaluable. And the

<sup>22</sup> *Policy Statement on the Population Problem*, 15 POPULATION BULL. 158-59 (1959).

<sup>23</sup> U.N. DEP'T OF ECONOMIC AND SOCIAL AFFAIRS, DETERMINANTS AND CONSEQUENCES OF POPULATION TRENDS (ST/SOA/Ser. A/17) (U.N. Pub. Sales No. 1953.XIII.3).

recent publication on *The Future Growth of World Population*<sup>24</sup> and the *Report on World Social Situation*<sup>25</sup> also make notable contributions to understanding and progress that can hardly be overestimated. Finally, among the latest publications is a report of particular significance on the "ECAFE" (Economic Commission for Asia and the Far East) countries, which spells out inexorably the urgent—indeed, desperate—need to concentrate on a reduction of birth rates.<sup>26</sup>

The *Report on World Social Situation* spells out the three major ways in which rapid population growth in the underdeveloped countries adversely affects their social and economic development:<sup>27</sup>

First, it can increase the pressure of population on land that is already densely settled and so retard increases in the productivity of agricultural labour. This effect is seen not only in countries where nearly all the cultivable land is now occupied but also in many under-developed countries where the density of agricultural population in the cultivated areas is high, although large amounts of potentially productive land lie unused because of land ownership systems, lack of capital or techniques to exploit available land, or for other reasons.

Second, accelerating population growth can aggravate the problem of capital shortage, which is one of the most important obstacles to economic development of nearly all under-developed countries. The faster the population grows, the larger the share of each year's income which must be invested in increasing the stock of productive equipment merely to maintain the existing level of equipment per worker. The larger the investments required for this purpose, the smaller the share of annual income that will be available either to raise the level of current consumption *per capita*, or to make investments which would increase productivity and permit higher levels of consumption in the future.

While in a well-developed dynamic economy the demand for such capital investments may serve as a stimulus to continuing economic growth, the case of the under-developed countries, with their narrow margin of income over subsistence needs, is different. For most of them it is difficult to save and invest enough from their meagre annual income to permit economic development to proceed at a satisfactory pace, even without rapid population growth. It is true that if these countries can industrialize and better utilize their human as well as their natural resources, some of them, at least, will undoubtedly benefit in the long run from a substantially larger population. But even where a larger population would be advantageous in the long run, economic progress will be hindered if numbers increase so rapidly as to put an excessive strain upon the economy.

Third, the high birth-rates of the under-developed countries create a heavy load of dependent children for the working population. . . . the percentages of children under 15 years of age in the less developed countries of Asia, Africa, and Latin America are generally in the order of 40 per cent or more of the total population, while the range of this ratio in the European countries is from about 20 to 30 per cent. This difference is the consequence of the higher birth-rates in the former areas. The necessity of supporting

<sup>24</sup> U.N. DEP'T OF ECONOMIC AND SOCIAL AFFAIRS, *THE FUTURE GROWTH OF WORLD POPULATION* (ST/SOA/Ser. A/28) (U.N. Pub. Sales No. 1958.XIII.2).

<sup>25</sup> U.N. DEP'T OF ECONOMIC AND SOCIAL AFFAIRS, *REPORT ON WORLD SOCIAL SITUATION* (ST/SOA/33) (U.N. Pub. Sales No. 1957.IV.3).

<sup>26</sup> *POPULATION OF ASIA AND THE FAR EAST, 1950-1980* (ST/SOA/Ser. A/31) (U.N. Pub. Sales No. 1959.XIII.3).

<sup>27</sup> U.N. DEP'T OF ECONOMIC AND SOCIAL AFFAIRS, *REPORT ON WORLD SOCIAL SITUATION 24* (ST/SOA/33) (U.N. Pub. Sales No. 1957.IV.3).

so many children puts the workers of the under-developed countries at an added disadvantage in their effort to save and invest for economic development. It also complicates the problem of providing the children with the education that is essential for social and economic advancement in the long run.

Elsewhere this theme is reiterated:

As a result of the various fertility and mortality trends, the world population has been growing at an ever-accelerating pace during the period under review. The present rates of population growth in some of the economically under-developed countries are higher than any that have been known in the history of the human race. Increases of 3 percent per annum are not exceptional at present among these countries. Population growth at such rates cannot fail to have important economic and social—and quite possibly, political—consequences. For example, a very high annual rate of investment in schools, hospitals and other forms of social capital becomes necessary.<sup>28</sup>

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Faced with the problem of checking this growth, we are swimming against the tide and, in extremity, having discovered how to increase the flood waters we now also possess the means of arresting them. It now depends on us whether this awakening of consciousness within the stream of life ends in failure or success. If tomorrow mankind loses the desire to live or, more correctly, to survive, the history of life on earth will have lost all meaning. This explains why those who have undertaken to be the custodians of man's moral heritage are questioning his moral preparedness to govern his own destiny.

The growth of world population during the next twenty-five years, therefore, has an importance which transcends economic and social considerations. It is at the very heart of the problem of our existence.<sup>29</sup>

#### CONCLUSION

Since there is now an apparent genuine awareness of the gravity of the problem, the next step would seem to be the perfection of effective methods to cope with it. This is easy to say—and perhaps it is easily accomplished in theory—but in practice, it is incredibly complicated, and no more than the most elementary beginnings have been made.

The problem of controlling human fertility is not merely a matter of immunology or physiology. More basic and important than either of these factors is the psychology of emotions and motivations. It is not necessary to "sell" people on the desirability of avoiding death. It is a far different thing, however, to convince them that births, too, must be limited. But without the development of effective motivations—the establishment, somehow, of a "will" not to propagate—simple, cheap, otherwise effective contraceptive techniques will not solve the problem. Some external force must be devised, therefore, that will encourage the voluntary abandonment or modification of ancient, deeply-rooted mores suited to an age now happily past. Current efforts along this line, centering around "village studies" and other minor forms of sociological and anthropological inquiry are wholly out of scale in

<sup>28</sup> *Id.* at 3.

<sup>29</sup> U.N. DEP'T OF ECONOMIC AND SOCIAL AFFAIRS, *THE FUTURE GROWTH OF WORLD POPULATION* preface (ST/SO/Ser. A/28) (U.N. Pub. Sales No. 1958.XIII.2).

terms of the magnitude and urgency of the crisis. Time is short; the growth of peoples is accelerating; and if these trends continue for even another generation, the end result is certain, and it is not pleasant to contemplate.

The first essential is the development of understanding of the basic elements of human arithmetic by the highly educated and by peoples virtually devoid of education. The next step is to build through this understanding motivations to control fertility. If this cannot be done—and soon—an appalling prospect confronts the human race. Dr. Bush knew whereof he spoke when he warned of "distress, famine, and disintegration." This cannot be averted by appeals to magic or by make-believe, by a resort to ancient aphorisms, or by promises of pie and plenty out yonder in space.