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POPULATION GROWTH—DEMOGRAPHIC AND SOCIOLOGICAL VIEWPOINTS

THE fear that the world is rushing headlong to catastrophe through excess fertility has been so often stated that further comment about the basic demographic situation today may be considered superfluous. Furthermore, a demographer who has any respect for his science is very reluctant to leave the facts of life and death in order to join in speculation about the *distant* future. Yet enough evidence has been accumulated to warrant fairly firm statements about the present world population, its rate of increase and the *short-run* prospects—say to the end of the present century.

Very briefly, the basic demographic facts now generally accepted are: a world population today of about 3,200 million; and a natural increase of at least 1·8 per cent. (or currently 58 million additional people) a year emanating from world vital rates of about 34 births and 16 deaths per 1,000 of population. A rate of growth of 1·8 per cent. doubles a population in just under 39 years, so a continuation of the present rate would produce over 7,000 million people by the end of the century. In other words, this assumption means that whereas it took mankind thousands of years to reach the first 3,000 million, the second 3,000 million could be reached in a mere 39 years. Even with a substantial reduction in growth rates there would still be 6,000 million people in the world by A.D. 2000. This seems the minimum population that can reasonably be expected by the end of the century.

This is the sort of arithmetic that strikes terror into the hearts of so many of those concerned with the welfare of mankind, not least those concerned with food production. If 6,000 million by A.D. 2000, why not 12,000 million by 2040, 24,000 million by 2080, and so on, piling Pelion on Ossa as it were, until standing room only is reached in about a mere 700 years time? Of course this will not happen: all sorts of events can arise to forestall it: thermo-nuclear war on a vast scale could prevent it at any time; new ravages of disease like the Black Death of the fourteenth century could again devastate the

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world; economic systems could break down leading to mass starvation; or mankind as a whole could learn to control his own fertility.

War apart, however, there is little evidence to suggest that the other factors will have sufficient application to prevent the attainment of the 6,000 million mark, and if reached this will be the evidence of man's greatest achievement—his continued victory over disease and his mastery of the world's resources. The arithmetic that goes beyond A.D. 2000, although leading to a nonsense conclusion in the long run, does serve to suggest how short is the time remaining for the completion of a victory which is so far apparent only in the world's relatively affluent areas—namely, the rational control of fertility, which I take to be the only way out of the population dilemma consistent with human dignity.

Professor Raymond Pearl wrote somewhere, about 1939, that considering the natural impediments designed to prevent the conjunction of the sperm and the ovum, human reproduction is not an expected result, but is a miracle. In any case, an average of a birth every 2 years from menarche to menopause (say 25 years), or 12 births in a lifetime, seems to be about the theoretical maximum female reproduction. In practice no society attains this. Restraints upon early marriage, upon widow remarriage, non-marriage, sterile marriages, all operate to curtail fertility. While there have been isolated cases of completed average fertility as high as about 9 births per woman (e.g. French Canadians at the beginning of the eighteenth century, or the Cocos Islanders and the Hutterites today), an average of between six and seven is the more usual mark of high fertility and implies a birth rate of 40 or more per 1,000 of population.[1]

Now such fertilities do not necessarily produce high rates of population growth: the growth rates depend upon the gap between fertility and mortality, and until the twentieth century high fertility has almost always been associated with high mortality. The historical truth of this proposition can be simply illustrated. A single couple living at the time of Christ and increasing at the rate of 1·2 per cent. a year (compared with the estimated current world figure of 1·8 per cent.) would have produced today's world's population.

When and how did the expansion of growth rates leading to the present world situation occur? No precise data can be ascribed to the

[1] See Lorimer, F., 1954. *Cultural and Human Fertility*, by F. Lorimer, *et al.*, pp. 26–27, Paris, UNESCO. Also, Smith, T. E., 1960. 'The Cocos-Keeling Islands. A Demographic Laboratory', *Population Studies*, xiv. 2, pp. 94–130.

'take-off' process, for the more remote the time period the more uncertain the data become. Estimates now generally accepted of the world's population in 1650 lie between 470 and 545 million. The

TABLE 1. *Examples of high fertility: Age specific rates per woman, together with total fertility*

Population	Age Group							Sum of specific rates, × 5 (i.e. total fertility)
	15–19	20–24	25–29	30–34	35–39	40–44	45–49	
Cocos Islands 1932–7	0·130	0·378	0·442	0·294	0·280	0·216	0·024	8·820
Hutterites 1946–50	0·120	0·231	0·383	0·391	0·345	0·208	0·042	8·600
Mauritius 1958	0·143	0·306	0·263	0·229	0·155	0·054	(0·020)*	5·850

* Estimated.

figures imply a steadily accelerating rate of growth over the last three hundred years. Accepting the higher figure of 545 million in 1650, the annual average increase of world population rises approximately as follows:

Period	*Rates*
1650–1750	0·3 per cent.
1750–1850	0·6 per cent.
1850–1950	1·0 per cent.
1950–60	1·6 per cent.
Today	1·8 per cent.

TABLE 2. *Estimates of world population in the past (in millions)**

Date	World Total	Africa	Northern America	Central and South America	Asia excluding U.S.S.R.	Europe and Asiatic U.S.S.R.	Oceania
1650	545	100	1	12	327	103	2
1750	728	95	1	11	475	144	2
1850	1,171	95	26	33	741	274	2
1900	1,608	120	81	63	915	423	6
1930	2,013	155	135	109	1,073	531	10
1960	2,990	273	199	212	1,651	639	16

* Figures adapted from W. S. Thompson, 1960. *Population and Progress in the Far East*, Chicago, p. 12. Estimates before 1920 are based on those of A. M. Carr-Saunders, 1936. *World Population*, Oxford, p. 42, with adjustments to include Asiatic U.S.S.R. with Europe. Estimates after 1920 are from UN publications, particularly *The Future Growth of World Population*, 1958, and the *Provisional Report on the World Population Prospects, as Assessed in 1963*, Department of Economic and Social Affairs, 1964.

The further back in time, the slower the average rate of growth. One estimate gives the average between the first and seventeenth

centuries A.D. at 0·05 per cent. a year, and the average from the beginning of the human race to the year A.D. 0 at 0·005 per cent.[1] Almost certainly there were short periods of rapid growth, but these tended to be followed by periods of decline: there was no breakthrough from subsistence levels and the ravages of disease until almost the contemporary period.

The transition from palaeolithic to neolithic culture about 7500 B.C. provided a new economic base for increased rates of growth through the cultivation of plants and the domestication of animals. Increases in available resources, leading to higher population densities, also followed from collective activity in the regulation of water, irrigation and the terracing of fields, as in the Lower Nile region and Lower Mesopotamia about 4000 B.C. From here begins the rise of urban and village-farming civilizations and extensions of their trading areas through new forms of transport, the division of labour, the use of new metals, and the emergence of complex but more efficient political systems, which increased the population growth potential over extending areas. At the beginning of the Christian era the Roman Empire is estimated to have covered 3,340,000 square kilometres, with a population of 54 million living at an average density of 16 persons per square kilometre,[2] compared with a world average density of 18 per square kilometre today, while records of the Han dynasty indicate a population of almost 60 million in China.[3]

These are very substantial numbers, yet innovation and technical development leading to tendencies towards accelerating growth rates never broke free from the Malthusian controls of subsistence: the expectation of life at birth was probably seldom above the minimum rates of today's 'developing' areas. One estimate boldly asserts that 'from the time of Neanderthal man to the 14th century A.D., life span appears to have hovered around 35 years', with the exception of a sudden but temporary leap forward to 48 years in thirteenth-century England.[4] An expectation of 48 years was probably seldom exceeded anywhere until the nineteenth century, and at times, particularly in towns, the expectation almost certainly fell well below 35 years. Recent research suggests, for example, that the expectation of life at

[1] Deevey, Edward S., Jr., 1960. 'The Human Population', *Scientific American*, September 1960, pp. 195–217. Also, Clark, Colin, 1958. 'World Population', *Nature*, 3 May 1958, pp. 1235–6.

[2] Beloch, J., 1886. *Die Bevölkerung der griechisch-römischen Welt*, Leipzig.

[3] Ping-ti Ho, 1959. *Studies on the Population of China*, Harvard U.P.

[4] Deevey, loc. cit.

birth for the urban population of the western Roman Empire during the first and second centuries A.D. may have been between 15 and 20 years, with an average expectation for the whole Empire not exceeding about 25 or 30 years.[1] The large cities of the ancient world had substantial populations even by today's standards. At their peaks, Rome may have had 350,000 people, and Alexandria and Byzantium about 200,000, with Athens, Syracuse, and Carthage ranging between 120,000 and 200,000. While the upper classes of some of these cities enjoyed reasonably satisfactory conditions of sanitation, the majority did not do so and the ravages of infectious diseases were a continual risk. These large cities held only a small fraction of the total populations of the European and Asian worlds, but the tendency of civilization to increase the agglomeration of people in villages and hamlets with only rudimentary sanitation was perhaps more important than inadequate food supplies in controlling population growth in much of the world until the nineteenth century.

Man's propensity for herding together in groups and increasing communications between groups tended to improve his mastery over his resources, but so long as his capacity to understand and check the spread of infectious diseases remained rudimentary, this life was a hollow victory that tended to spread the causes of death. The decimation of the populations of many Pacific Islands when first exposed to contact with European traders, missionaries and explorers provides a nineteenth-century illustration of a situation that must have applied far back into the European and Asian histories.

The exact sequence of events that led in the late eighteenth and nineteenth centuries to man's first major escape from the Malthusian controls of disease and inadequate subsistence is still a matter of some controversy. This was a victory of western man, but there is much more to the story than man's scientific control over disease. It does appear that birth rates were increasing in the late eighteenth century in many areas of western Europe, long before medical science and effective public health widened the gap between births and deaths, so accelerating the rates of growth. The factors involved in the eighteenth century appear to have been the absence of plague (for precisely what reason has yet to be elucidated), a succession of good harvests and improved economic conditions encouraging earlier marriage. Such factors tended to hold mortality at a constant level, and as

[1] Durand, J., 1960. 'Mortality Estimates from Roman Tombstone Inscriptions', *American Journal of Sociology*, lxv. 4, pp. 365–73.

epidemics of disease were particularly severe on the very young, their relative absence had a disproportionately beneficial effect on the survival rates of infants who subsequently grew into the expanding cohorts of young persons who married and in turn raised their children. But the increase in the rate of growth of much of western Europe in the late eighteenth and through into the early nineteenth century was still not a real breakthrough: it represented rather an elimination of the high peaks of mortality than a lowering of 'the plateau of mortality'.[1]

Up to this point the upsurge of population was not unique. It only became unique when improving levels of nutrition and public health amongst western European societies in the nineteenth century set mortality on a downward course to levels that had never before been attained. For some of these improvements, biological changes in the patterns of diseases may have been partly responsible, but the ingenuity of western man must be given due weight—the availability of the resources of new lands explored and in many instances settled by Europeans, innovation and technical advances in the production and distribution of foodstuffs and manufactured goods, and finally, but by no means least important, developments in public health, sanitation and medicine, which at last made the growing cities of advancing industrial society habitable places rather than death traps, all helped to create a living environment unique in man's history.

The results of these advances gradually became apparent in the vital indexes of western European nations. By 1840 the expectation of life at birth had been raised in most countries to about 40 years, and this time the improvement continued over ever widening areas, until by today expectations of life exceeding 70 years are common, both within Europe and amongst overseas countries settled by Europeans. This situation is unique in human history.

The steady fall in death rates throughout the nineteenth century never brought about growth rates amongst European man as explosive as many of those which exist today in Asia. Indeed growth rates were seldom as high as today's world average of 1·8 per cent. a year. Important factors were the relatively high marriage age in many European societies, and the relatively high proportions remaining unmarried, which generally tended to keep birth rates within the

[1] There is now a voluminous literature on these eighteenth-century population trends in Europe. For reprints of most of the significant articles see Glass, D. V., and Eversley, D. E. C., eds., 1965. *Population in History. Essays in Historical Demography*, London.

range of 30 to 35 per 1,000 of population and average family size lower than the high fertility patterns illustrated in Table 1. With mortality declining only slowly, growth rates seldom exceeded 1·5 per cent. a year, and were often little above 1 per cent. But today, with expectations of life climbing beyond 70 years, a birth rate of only 25 per 1,000 can yield a growth rate of 1·5 per cent. a year (which has recently been the approximate position in the United States, Canada, New Zealand and Australia), and a birth rate as low as 18 or 19 can

TABLE 3. *Illustrative expectations of life at birth*

(*approximate combined rates for males and females*)

Country	*Past*		*Recent*	
	Estimate	*Period*	*Estimate*	*Period*
England and Wales	41	1838–54	70	1958
Netherlands	36	1840–54	72	1953–5
U.S.A.	35	1789	70	1951–2
Australia	53	1891–1900	69	1953–5
Japan	44	1908–13	66	1955
India	24	1881–1901	32	1941–50

still yield a growth rate of about 0·8 to 1·0 per cent. (which is the approximate present position of many western European countries and of Australia).

Another way of stating the position is that with the mortalities prevailing at each period, a completed average fertility today of 3 births can achieve in much of the western world what 5 or 6 births did a century ago. Moreover the pattern towards very low and controlled fertility is now so widespread that it has broken ideological, economic and religious boundaries. U.S.S.R.'s fertility is probably almost as low as that of the United States, and Catholic Italy has one of the lowest birth rates of Europe. Low-income Greece has a lower birth rate than high-income Australia.

These figures for today's high income and controlled fertility areas illustrate a demographic balance unique in man's history. With the present low levels of mortality, and with upwards of 95 per cent. of women living to the end of the reproductive period, it is only efficient and very widespread control of fertility that prevents western man from attaining quite fantastic rates of population growth. Western man indeed is the unique phenomenon, not Asian man, in the light of human history. Yet with all his rational control, western man bids fair to make a substantial contribution to population growth in the future. Should present growth patterns continue, the 200 million

citizens of North America will exceed 350 million by the end of the century, and even Europe's 640 million (including U.S.S.R.) could increase to almost 900 million. Such increases at present day *per capita* income levels will make tremendous demands upon the world's

TABLE 4. *Illustrative growth rates around 1958–9**

(*rates per 1000 of population*)

	Area	*Birth rates*	*Death rates*	*Natural increase*
AFRICA:	Ghana	52·4	20·9	31·5
	Tunisia	47·0	9·6	37·4
	Mauritius	40·8	11·8	29·0
ASIA:	Taiwan	41·7	7·6	34·1
	India	39·1	19·4	19·7
	China (Mainland)	37·0	17·0	20·0
	Thailand	37·4	9·8	27·6
	Japan	17·5	7·4	10·1
SOUTH AMERICA:	Argentina	22·7	8·1	14·6
	Chile	35·5	12·1	23·4
	Ecuador	45·9	15·2	30·7
	Venezuela	44·7	9·4	35·3
NORTH AMERICA:	U.S.A.	23·6	9·5	14·1
	Canada	27·9	8·1	19·8
EUROPE:	Austria	17·6	12·5	5·1
	Czechoslovakia	17·4	9·3	8·1
	France	18·2	11·2	7·0
	West Germany	17·0	10·8	6·2
	Greece	19·0	7·1	11·9
	Italy	18·4	9·3	9·1
	Spain	21·8	9·0	12·8
	Sweden	14·1	9·5	4·6
	United Kingdom	16·9	11·6	5·3
	U.S.S.R.	25·3	7·2	15·1
OCEANIA:	Australia	22·6	8·9	13·7
	New Zealand	26·5	9·1	17·4

* Figures based on tables in UN *Demographic Year Books*.

agricultural and industrial resources. Prediction about the future of these controlled fertility areas is very difficult for, as the 1930s showed, birth rates can change rapidly in response to changing economic or social conditions;[1] but should these growth patterns prevail they will bring with them very complex problems of social and economic adjustment. Imagine, for example, the great conurbation running from Boston to Philadelphia carrying within half a century twice as many

[1] The recent sharp falls in birth rates of many of the most affluent countries (e.g. U.S.A., Australia, New Zealand) are reminders of how sensitive birth rates are to social and economic conditions. These declines are commonly attributed to the contraceptive 'pill'; but such an explanation seems far too simple, particularly in view of the considerably lower birth rates of the depression years of the thirties.

people as today. Or imagine increasing greater London by 50 per cent., or for that matter doubling the size of Sydney or Melbourne. Not all the problems of population growth are the prerogative of Asia.

There is, however, no evidence that western man will loosen his control over fertility in the near future—indeed the contrary.[1] But, by contrast there is not yet *conclusive* evidence that *this* century will see widespread and effective control over fertility amongst non-Europeans. There are grounds for hope, but no grounds yet for prediction.

The background of the current Asian situation is a marked contrast to the history of European man. The European world (including 'Europe overseas') has grown by a multiple of about 5·8 since the upward swing in growth rates began in approximately 1750. Yet over the same period the populations of Asia have also increased 3·4 times, which gives an average rate of growth much above the rates which could have prevailed in earlier centuries. In the case of Asia, a good deal of the explanation lies in the upswing in growth rates during the last thirty years. From 1750 to 1930 Asian population appears to have increased less than 2·2 times, whereas population of European origin had still increased five times. Within Asia, the most rapid increase from 1750 until this century was probably in China.[2]

The precise trends of population movements in China before the seventeenth century remain a matter of speculation.[3] Available statistics, if taken at their face value, suggest relative stability over a long period, but then a very substantial increase from about 65 million in the late fourteenth century to the neighbourhood of 150 million by 1600. Thereafter misgovernment and the outbreak after 1625 of great peasant rebellions and wars, which were as destructive in China as the Thirty Years war was in Europe, almost certainly checked growth until the end of the century; but recorded population totals and economic data revealing great agricultural expansion and rising prices in rice, despite rapidly increasing output, strongly support the conclusion that the period from 1700 until the outbreak of the Taiping Rebellion in 1851 was again a period of substantial growth, with population doubling to 300 million in 1800, and continuing to rise sharply thereafter to 430 million in 1850.

[1] The areas of efficient fertility control have spread rapidly since 1945—e.g. Italy, eastern European countries, U.S.S.R.; and amongst non-European peoples, Japan. All these areas have birth rates below 22 per 1,000 of population.

[2] For a brief history of the growth of human populations see UN Population Division 1953. *The Determinants and Consequences of Population Trends*, Part I. Department of Social Affairs, UN, New York.

[3] Ping-ti Ho, op. cit.

These figures imply an average annual growth rate of approximately 0·7 per cent., which means that through the eighteenth century the Chinese were probably increasing at a faster rate than western Europeans. They must also have been well up to the Europeans' growth rates until the middle of the nineteenth century. Approximately 1850 marks the point at which accelerating mortality control in much of western Europe began to widen the gap between births and deaths, whereas in China the long upswing was again checked after 1850. If the official estimate of 583 million people in mainland China in 1953 is accepted as accurate, this implies an average annual growth rate of only 0·3 per cent. since 1850, compared with an average almost 0·7 in the eighteenth century and with a world average between 1850 and 1950 of approximately 1 per cent.

The relatively rapid increase of Chinese population between approximately 1700 and 1850 further implies that growth in many other parts of Asia must have been much lower. On the basis of the above figures for China and those for Asia as a whole in Table 2, China's population was less than one-third of that of Asia in 1750, but 58 per cent. in 1850. Assuming mainland China's population to be 650 million in 1960, this represented just over 40 per cent. of Asia's total, excluding Asiatic U.S.S.R. Thus from this evidence it would seem that other parts of Asia have had a higher average growth rate since 1850 than China.

Accurate knowledge of past population trends in India, the other great and thickly populated land mass of Asia, is also lacking. A reasonable pattern of growth for India might be from approximately 125 million in 1600 to 255 million in 1871,[1] giving a growth rate perhaps half that of Europe over the same period. More secure census data from the latter date indicate a consistent increase in the population of pre-partition India (i.e. including Pakistan) from 255 million in 1871 to 464 million in 1955. While this increase is substantial, the pattern of growth throughout most of this period has been one of short bursts of relatively rapid increase (as between 1881 and 1891, with an estimated growth of 9·6 per cent., and again between 1901 and 1911 when the increase was 6·1 per cent.) followed by periods when famine and disease cut growth rates back to very low levels. Since 1921, however, following another severe setback to growth with the loss of some 12 or 13 million people in the influenza epidemic, growth rates have tended to move more consistently upwards with

[1] Davis, K., 1951. *The Population of India and Pakistan*, Princeton U.P.

increases of over 10 per cent. 1921–31, 15 per cent. 1931–41, 12 per cent. 1941–51 and 21·5 per cent. 1951–61.

This pattern of expanding growth rates in India has been exceeded in many of the smaller Asian countries. The part played by the application of western techniques of public health and medical science in boosting growth rates in today's 'developing' areas through reduced mortality is too well known to require detailed comment and is briefly illustrated in Tables 5 and 6. In addition, however, the social and cultural patterns of many Asian countries place fewer restraints upon fertility than was the case of Europe. Marriage occurs earlier, non-marriage is less common, and births during marriage tend to be higher. Consequently birth rates exceeding 40 per 1,000 are common, and in some countries (e.g. Taiwan and Malaya) where expectations of life are now climbing above 55 years, growth rates tend to exceed 3 per cent. a year, a rate which will double a population every 23 years. Such rates approach the maximum postulated by Malthus, and quite clearly some brake has to be applied fairly soon unless disaster is to overtake such countries.

So far the brakes are not much in evidence. Recent censuses in many Asian countries revealed that even the high growth rates which were earlier assumed are in error. For example, the 1961 Indian census, which enumerated 436·4 million people, was over 7 million above estimates and implies a growth between 1951 and 1961 of 21·5 per cent. Similar excesses were found in the censuses of Pakistan in 1961 (93·8 million compared with an estimate of 90 million), the Philippines in 1960 (27·5 million compared with an expectation of 23 or 24 million), and in Singapore and Malaya in 1957 and Taiwan in 1956. New censuses recently or about to be taken may contain more surprises of this kind.

While growth rates of between 2 and 3 per cent. are known to exist in many countries there are many other areas where data are still very meagre. This applies to many of the new African nations; but the evidence that is being pieced together here tends to show the typical pattern of high fertility of subsistence and agricultural economies. The position in much of Latin America appears to be similar. The greatest enigma in the current world demographic scene still remains mainland China, which probably contains about one-fifth of the world's people.

As already mentioned, a population count in 1953 provided a figure of 583 million Chinese. Analyses of the methods of taking the count

have tended to encourage the conclusion that this figure was probably an understatement. In the absence of a proper registration system there is also little accurate information regarding births and deaths, but some reconstructions based on some material in urban areas suggest that birth rates of about 37 and death rates of 17 or 18 per 1,000 may be reasonable guesses. Such growth rates would leave Chinese fertility still considerably below that of India and many other Asian countries, but would imply that there are now about 700 million mainland Chinese. Such rates would also imply that if continued there would be over 1,400 million Chinese by the end of the century. On the other hand, recent events suggest strongly that China has not yet escaped the grips of Malthusian controls, and the agricultural crises that followed the attempt at a great economic leap forward in 1957 may again be providing checks to the upsurge of Chinese population. However, it should not be assumed that substantial growth rates cannot be maintained in China for a very considerable period without any basic change in the traditional agricultural or industrial system, for throughout the eighteenth century China may have been growing at an average rate of 0·6 or 0·7 per cent. a year, or considerably in excess of the rate of growth of western European populations. There seems no reason to believe that the Chinese population cannot grow to at least 1,000 million over the next 40 years.

The demographic situation of the so-called 'developing world' is thus one of substantially uncontrolled fertility but quite extensive and expanding controls over mortality. Birth rates may go even higher in many countries because of the greatly expanded cohorts of young people already alive who will be entering the marriageable age groups in the near future. An increasing proportion of these will also be remaining alive through the child-bearing years if mortality controls remain as effective as they are at present. The Malthusian situation of a population with a life expectation of 30 or 35 years, which seems to have held throughout most of the world until almost the nineteenth century, is already an exception. Many Asian countries have expectations well above 50 years and some are extending beyond 60 years. Consequently, whereas half the children born would previously have been dead by age 35 or so, now upwards of 70 or 75 per cent. are living to ages at which female reproduction ceases.

In recent years many 'developing' countries have been adding 2 or 3 years of life for every 5 years of time, compared with 1 in 5 years in western countries in the nineteenth century. The gap between

the appalling loss of life after birth in many of the 'developing' countries on the one hand and the efficient death control of the Europeans on the other, has been taken as the hallmark of underdevelopment by the governments of low-income countries. Death control has been relatively inexpensive and simple, whereas economic development is expensive and complex, and having achieved a

TABLE 5. *Some recent trends in infant mortality (deaths of infants under 1 year per 1,000 live births)*

	1935–9	*1950*	*1960*
Ceylon	182	82	57
Malaya	149	102	69
Taiwan	144	61	33
Singapore	..	82	32
Japan	110	60	29

measure of death control, no country is going to give it up. Therefore, if demographic controls can aid economic development, as Coale has indicated they can,[1] the only practical plan is to aim at reducing fertility.

What is the prospect for fertility control? Scientifically it may at first sight seem poor. In 1962 the British physiologist, A. S. Parkes, could write: 'Established methods of fertility control, being archaic in principle, are a disgrace to science in this age of spectacular technical achievement.' In his view, they were then considered virtually useless

TABLE 6. *Some recent trends in life expectations at birth*

Ceylon	1945–7 = 45	1954 = 60
Taiwan	1936–41 = 43	1959–60 = 63
Philippines	1951–5 = 48	1956–60 = 53
Thailand	1947–8 = 50	1960 = 57
India	1941–50 = 32	1961 = 45
Japan	1947 = 52	1960 = 68

to those most needing assistance—illiterate and overcrowded people.[2] Yet, it must be emphasized that the experience of the west hardly supports the view that family planning must follow the attainment of universal literacy or a high degree of urbanization and industrialization. The lowest birth rates recorded in the west were in the economically

[1] Coale, A. J., and Hoover, E. M., 1958. *Population Growth and Economic Development in Low Income Countries*, Princeton U.P.

[2] Parkes, A. S., 1962. 'Fifth Oliver Bird Lecture: Biological Control of Conception' *Journal of Reproduction and Fertility*, iii. 1, pp. 159–72.

depressed years of the thirties when control measures were still fairly rudimentary.[1] Clearly parents wanted to limit families and they found ways and means. In France a century ago birth control was an established and effective fact. When the social and economic motivations were present ways and means—with abortion often playing an important role—were found. The rapid decline of birth rates in eastern Europe and in Japan since 1945, and again the prevalence of abortion in each area,[2] further emphasizes the fact that when the motivations are strong enough, a quite sudden and revolutionary change can occur.

On the face of it, the strongest motivating forces in the 'developing' world today are the high growth rates, often over 3 per cent., as a result primarily of mortality decline, and the lack of adequate economic development to meet these growth rates. The one clear case of decline amongst non-European countries is Japan,[3] but here the economic situation was not typical of the agrarian, 'developing' countries of the rest of Asia. In some 'developing' countries, for example in Latin America, religious and cultural factors may be restraining factors against fertility control. But throughout a great part of the non-Christian 'developing' world there are probably fewer religious and cultural barriers to fertility control than ever was the case in Europe.[4] Evidence of this is apparent in the positive measures now being instituted by many governments in Asia to institute family planning programmes.[5]

Positive action to reduce growth rates in 'developing' countries became apparent after the Second World War. At the World Population Conference held in Rome in 1954 the emphasis was upon the need for economic development rather than population control and it was

[1] See, for example, Lewis-Faning, E., 1949. *Report on an Enquiry into Family Limitation and its Influence on Human Fertility during the past Fifty Years.* Papers of the Royal Commission on Population, vol. i. London. For a popular treatment of the history of birth control see: Fryer, Peter, 1965. *The Birth Controllers*, London. Also, Eversley, D. E. C., 1959. *Social Theories of Fertility and the Malthusian Debate*, Oxford.

[2] Muramatsu, Minoru, 1960. 'Effect of Induced Abortion on the Reduction of Births in Japan', *Milbank Memorial Fund Quarterly*, xxxviii: 2, pp. 153–66. Also: Tietze, Christopher, 1964. 'The Demographic Significance of Legal Abortion in Eastern Europe', *Demography*, i. 1, pp. 119–25.

[3] For a history of Japanese population see Taeuber, Irene B., 1958. *The Population of Japan*, Princeton U.P.

[4] Fagley, Richard M., 1960. *The Population Explosion and Christian Responsibility*, Oxford.

[5] Berelson, Bernard, Anderson, Richmond K., *et al.*, eds., 1966. *Family Planning and Population Programs. A Review of World Developments.* Proceedings of the International Conference on Family Planning Programs, Geneva, August 1965, Chicago U.P.

widely assumed that the motivations for control would not operate until economic development had achieved a substantial measure of urbanization and literacy. By the second World Population Conference, held in Belgrade in 1965,[1] population control was discussed as a prerequisite and aid to economic and social development, and it was clear that many governments had already instituted, or were planning to institute, family planning programmes. Almost simultaneously the Economic and Social Council of the U.N. approved the principle of granting technical assistance in the field of family planning at the request of member governments and a major technical assistance mission was sent to advise the Indian Government in the matter.[2]

The inertia to be overcome amongst the illiterate peoples of developing countries is still tremendous, but with new and cheap devices (e.g. the intra-uterine coil) the very rational approach of many non-Christian peoples to the question of control (seen, for example, in the quite extensive use of male vasectomy) and the strong support of control programmes by governments, family planning may yet take quite a different course in its relation to economic development and literacy than it did in the classical pattern of transition of many European countries.

The extent of the positive action at present being taken in 'developing' countries is apparent in the following facts.[3]

The government of *South Korea* has sponsored a family planning programme which began in May 1964. Over 2,200 workers have been put in the field. The objective is to reduce a growth rate of about 3 per cent. to 2 per cent. a year by 1971 as an aid to economic plans to raise living standards. Major but not exclusive reliance is being placed on insertions of intra-uterine coil devices (IUD). It is estimated that the attainment of the target objective will require 1 million IUD insertions, 200,000 vasectomies, and 300,000 regular users of traditional contraceptives. That there is a strong desire or motivation for smaller families is implied in the facts that the target figures for the 1965 official programme (including 200,000 loop insertions) were attained and that in addition there has been extensive control practised outside the official programme, with abortion playing a very

[1] For a summary review of the Belgrade Conference see UN 1966. *World Population. Challenge to Development*, New York.

[2] UN Advisory Mission, prepared for the Government of India, 1966. *Report on the Family Planning Programme in India*, Commissioner for Technical Assistance, Department of Economic and Social Affairs, Report No. TAO/IND/48, New York.

[3] The Population Council 1966, 'Recent Events in Population Control', *Studies in Family Planning*, No. 9.

significant role. In 1965 abortions in Seoul were estimated at one for every two live births.

In *Taiwan* a similar programme is under way, although not directly under government control. Here one IUD has been inserted for every 12 women in the childbearing years. The monthly rate of insertions has reached approximately 5 per 1,000 women in the childbearing ages and funds to continue this level of activity have been assured up to 1970, the *per capita* cost of the IUD programme being about 2·5 cents a year. In late 1964 the Economic Planning Board also approved a 10-year health plan in which family planning was an integral part.

In *India*, following a UN Technical Assistance Mission to evaluate its programme—the first such mission under UN auspices—200 million dollars (or over 8 cents *per capita*) have been provided for the 5 years starting April 1966, with target objectives of 5 million vasectomies, 10 million effective users of traditional contraceptives and 1 million IUD insertions in the first year and 20 million planned over the 5 years.

In July 1965 the government of *Pakistan* adopted a 5-year plan averaging 12 cents *per capita* a year—that is considerably higher than India, Korea or Taiwan—and elevated the administration of the programme to near Cabinet status. Again IUD insertions are intended to become an important aspect of the programme.

In *Turkey* old anti-contraceptive laws have been repealed and a Family Planning Law has been laid down to implement a national programme through the Ministry of Health and Social Assistance. The budget is expected to reach 5·5 cents *per capita* a year.

Tunisia, the first Arab country to support a national family planning programme, aims to insert one IUD for every 12 women in the childbearing years and to reduce the birth rate by about a quarter in 5 years. Abortions are also permitted for women with 4 children. The *United Arab Republic* is now also on the birth-control line.

The evidence for official sponsorship and support for control measures is also extending through the new African states, appears to be infiltrating into Latin America, and is apparent in some of the Pacific Island territories. Even more significant is the fairly clear indication that, following a reversal of a trend to support family planning during the disastrous years of the failure of the Great Leap Forward following 1957, the government of *Mainland China* is again favourable to control.[1] The intriguing feature is that the main method

[1] Tien, H. Yuan, 1965. 'Sterilization, Oral Contraception and Population Control in China', *Population Studies*, xviii. 3, pp. 215–35.

of control advocated in this Marxist country appears to be the Malthusian, Protestant ethic of deferred marriage, continence outside marriage, and restraint within marriage.

Precise measurement of the effectiveness of these plans, most of which are of very recent origin, is not yet possible. The important fact is that they exist and are spreading in a manner which indicates increasing support for and very few cultural, religious or social prejudices against birth control. The increasing evidence of the role of abortion, in recent years in Japan and currently in Korea, Taiwan and in eastern Europe, also reveals the extent to which peoples will go—as indeed they also did earlier in many western European countries—when the motivations for control are present.

It is to be further noted that there have been marked declines in birth rates in many of the smaller peripheral countries of Asia—declines which cannot be attributed wholly to family planning programmes of the kind outlined above, but which perhaps indicate the rapidity with which fertility patterns can change once the need for control is felt. Furthermore, the rapidity and extent of these declines support the conclusion apparent from historical data that once rational control takes hold, there seems to be no prolonged phase of stability at intermediate levels. Without the means of control, completed family size may be around six or even seven children: once control is desired and available, the mean seems to settle around half of these figures.

TABLE 7. *Some examples of declining fertility (birth rates per 1,000 of population)*

	1930–4	*1961–2*	*1964*
China (Taiwan)	45	37	35
Singapore: Whole	39	34	32
Chinese	45 (1950–4)	32	..
Malaya: Whole	35	42	39
Chinese	42	38	..
Puerto Rico	41	31	30
Japan	32	17	18
Soviet Union	44 (1926–8)	22	21

Neither the play of forces that may be implied in these figures, nor the evidence of the recent past from such areas as the Soviet Union and Japan (to which could be added Italy, Hungary and Czechoslovakia and other countries of southern and eastern Europe) indicates that the world's population growth can be brought suddenly,

or even quickly to a halt. The world's average growth rate, which is probably above 1·8 per cent. a year, will only be substantially reduced when effective controls become apparent in the 'giants' of the developing world—mainland China, India and Pakistan. The governments of these vast countries are too realistic to look for miracles and the maximum to be expected might be the goal of the Indian programme,

TABLE 8. *Schedule showing assumed trend of crude birth, death and natural increase rates per 1,000 of populations applied in the projections of Table 9**

	1960–5			*1975–80*			*1995–2000*		
	B.R.	*D.R.*	*N.I.*	*B.R.*	*D.R.*	*N.I.*	*B.R.*	*D.R.*	*N.I.*
WORLD	34	16	18	31	13	18	25	9	16
North America	23	9	19	24	9	15	22	8	14
Latin America	39	11	28	36	8	28	30	6	24
Europe	18	10	8	16	10	6	16	11	5
U.S.S.R.	22	7	15	20	7	13	19	9	10
South Asia†	42	19	23	36	14	22	27	8	19
East Asia‡	33	19	14	27	14	13	20	11	9
Africa	46	23	23	45	18	27	40	13	27
Oceania	25	11	14	26	10	16	25	10	15

* Based on UN Department of Economic and Social Affairs, 1964. *Provisional Report on World Population Prospects as Assessed in 1963*, New York, pp. 44–45 and 310–11.

† South Asia includes: India, Pakistan, Iran, Afghanistan, Ceylon, Nepal, Bhutan, Sikkim and the Maldive Islands (Middle South Asia).

Indonesia, Vietnam, the Philippines, Thailand, Burma, Malaysia, Cambodia, Laos, Portuguese Timor, Brunei (SE. Asia).

Turkey, Iraq, Saudi Arabia, Syria, Yemen, Israel, Jordan, Lebanon, the Protectorate of Southern Arabia, Cyprus, Muscat and Oman, Palestine (Gaza Strip), Kuwait, Aden, Bahrain, Trucial Oman and Qatar (SW. Asia).

‡ East Asia includes: Mainland China, Hongkong, Mongolia, Macao, Japan, Korea, China, Taiwan and the Ryukyu Islands.

the reduction of the crude birth rate by about one-third in 10 years, and a reduction of growth rates by about 40 per cent. to 1·6 per cent. a year.

Recent projections prepared by the Population Branch of the Department of Economic and Social Affairs of the UN indicate that if recent trends of birth and death rates continue the world's population will grow from 2,990 million in 1960 to 7,410 million by the end of the century.[1] Should there be a very substantial reduction in fertility according to the schedule shown in Table 8, the population growth by A.D. 2000 would be reduced by 1,445 million, leaving a

[1] UN 1964. *Provisional Report on World Population Prospects, as Assessed in 1963*, Department of Economic and Social Affairs, New York.

total of 5,965 million. This is perhaps the most the world can expect from control between now and the end of the century; and whether the higher or lower figure is achieved, there will also be a considerable shift towards a higher proportion of the population living in today's 'developing' areas. Given the schedule of change implied in Table 8, the population of major regions would be as shown in Table 9.

TABLE 9. *Estimates of world population, in millions* (based on rates and trends illustrated in Table 8)*

	Numbers			*Increase per cent.*		
	1960	*1980*	*2000*	*1960–80*	*1980–2000*	*1960–2000*
WORLD	2,990	4,269	5,965	43	40	99
North America	199	262	354	32	35	78
Latin America	212	374	624	76	67	194
Europe and U.S.S.R.						
Europe	425	479	527	13	10	24
U.S.S.R.	214	278	353	30	27	65
Total	639	757	880	18	16	38
Asia						
South Asia†	858	1,366	2,023	59	48	136
East Asia‡	793	1,038	1,284	31	24	62
Total	1,651	2,404	3,307	46	37	100
Africa	273	449	768	64	75	181
Oceania	16	23	32	44	39	100

* Based on U.N. Department of Economic and Social Affairs, 1964, op. cit.
† As for note † in Table 8. ‡ As for note ‡ in Table 8.

The implications of these growth patterns are clear. Given the assumptions, only Europe has the prospect of relative stability, although historically considered this situation also represents a relatively rapid rate of increase. The total increase of the 'developed' countries will, however, continue to make major demands upon both agricultural and industrial resources—a fact too often overlooked in considering projections of populations. The most rapid population increases are likely to come from Latin America and Africa, both continents where future availability of resources will probably depend more upon political stability and trading outlets than upon any basic scarcity of supply. In the peripheral countries of Asia and in Oceania the pressure of numbers against resources appears to be most acute in Java and some of the small Pacific Islands (e.g. Fiji).

The relative change in the distribution of the world's population can be seen by comparing the numbers in the above projection per 100 of the actual and expected population in Europe (Table 10).

A conference of agricultural economists will naturally, and rightly, be concerned first just with the implications of these projected growth rates for food production both in terms of productivity of currently cultivated lands and of the stock of available land. But additional problems are also apparent. Whatever the future course of fertility and mortality, the 'developing' countries have already an enormous stock of young persons as a result of past trends (particularly falling

TABLE 10. *Populations per 100 inhabitants of Europe*

Year	*Europe*	*Africa*	*N. America*	*S. America*	*Asia*	*Oceania*
1960	100	46	45	25	286	3
2000	100	99	73	53	438	4

mortality) whose education and employment can only be achieved by diverting investments from agriculture. In most cases these young people, classified as persons aged 0–14 years, represent over 40, and at times up to 50 per cent. of the populations of 'developing' countries, and under the assumptions in the above projections, there will be little relief from this burden of young dependency until after 1980. The age distributions based on the projections of Table 9 are given in Table 11.

TABLE 11. *Age composition of populations implied in Table 9* (proportions per cent. in each age group)*

	Age 0–14			*Age 15–64*			*Age 65 and over*		
	1960	*1980*	*2000*	*1960*	*1980*	*2000*	*1960*	*1980*	*2000*
WORLD	36	35	32	59	59	61	5	6	7
North America	31	30	30	60	61	61	9	9	9
Latin America	42	42	38	53	54	58	3	4	4
Europe and U.S.S.R.	26	23	23	64	64	64	10	13	13
South Asia	41	40	33	56	56	62	3	4	5
East Asia	36	32	27	60	62	66	4	6	7
Africa	43	44	42	52	53	55	3	3	3
Oceania	32	31	32	60	61	59	8	8	9

* Adapted from UN, 1964, *Provisional Report . . .*, pp. 297–307.

Whatever the course of future fertility,[1] the numbers of young people coming of working age must double in many 'developing' countries over the next 15 years. Agricultural development, which provides the livelihoods of 70 or 80 per cent. of these in many

[1] For a thorough analysis of fertility trends see UN 1965, *Population Bulletin No. 7—1963*, Department of Economic and Social Affairs, New York.

countries, will remain crucial to their welfare; but increasing proportions must move into non-agricultural occupations. The economic take-off process associated with rising *per capita* incomes has never been achieved and sustained without the rapid transfer of populations to urban areas, even in the past when growth rates did not exceed 1·5, or even 1 per cent. a year. This urbanization process is already markedly in evidence in many areas of rapid growth. For example, major cities of India (such as Bombay, Delhi, Madras) have been growing at 5 and 6 per cent. a year compared with an all-India growth rate of 2·1 or 2·2 per cent. In Pakistan, Karachi is growing at about 4·5 per cent. compared with some 2 per cent. for the whole country. Bangkok has achieved almost 7 per cent. growth in recent years in a national average of 3·2 per cent. Kuala Lumpur and Singapore bear the same relationship to Malaysia; and Taipei with 4·5 to 5 per cent. is outstripping Taiwan's 3·4 per cent. growth.[1]

The shift from agriculture raises in turn the question of investment resources for education and occupational training. In this regard many of the rapidly growing small countries of southern and eastern Asia have made rapid progress, and again the most massive and complicated problems remain to be solved in the major mainland countries of Asia.[2] But education, training and re-location of labour lead directly to political implications, for success in these fields requires stable and efficient government. Finally, the development of a market economy for agricultural and industrial products and the training and use of skilled personnel imply trade *and* aid between governments, with the major responsibility on the 'developed' countries who have essentially solved both the demographic and economic issues now facing 'developing' countries.

Thus the demographic issues now facing 'developing' countries, unique in terms of the speed of growth as well as in the vast numbers involved, cannot be solved by a unilateral approach. Food production is of course crucial—and as the FAO Report for 1965–6 emphasizes,

[1] At its meeting in 1965 the UN Population Commission gave particular attention to the problem of urban growth in developing countries and resolved to recommend to the Economic and Social Council that a group of experts should be set up early in 1967 to examine, *inter alia*, research needs in developing countries and the contribution which the UN might make to further work in this field. See Population Commission, 1965, *Report of the Thirteenth Session*, Economic and Social Council, Thirty-ninth Session, Supplement No. 9, New York.

[2] For a discussion of these problems as they relate to the ECAFE region see UN 1964, *Report of the Asian Population Conference and Selected Papers* (held at New Delhi, India, 10–20 December 1963). Economic Commission for Asia and the Far East, New York.

the race between Malthus's hare of population growth and tortoise of food production is still far from won—but the pace of population growth is now too fast for the problems to be solved by investment in agriculture alone. Limited though the resources are for investment, the balance between food production, social investment and industrial investment has to be sustained in the long run. Thwarted by their failure to break the food barrier or to sustain social and industrial investments in face of ever expanding population growth rates, many of the 'developing' countries have now turned to a new line—in Malthusian terms how to persuade the hare to go to sleep. The lack of success so far should not be interpreted as inability to bring about curbs to growth. The experiments now being tried are at most a decade old. The demographic transition of today's 'developed' countries of western and northern Europe and Europe overseas took from 50 to 70 years to accomplish. Eastern Europe and Japan remind us that events can move faster in the twentieth century. The new element in the present situation of the 'developing' areas is the widespread determination of governments to act and to lead their people towards the goal of population control; but they need at least another decade to see if they can produce results. Whatever the success of the major efforts now being made, however, there seems little chance that the 6,000 million figure will not be reached by the end of the century. This must remain the minimum figure for determining agricultural production targets over the next 35 to 40 years.