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PREFACE

The *Population Bulletin of the United Nations* presents brief articles relating to population which, by their nature, do not require separate publication. Material for the *Bulletin* is selected in the light of the interests and needs of Governments, international organizations, research institutions and individuals engaged in social and economic research, as well as the public interested in population.

The first seven issues of the *Population Bulletin* were prepared by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat between 1951 and 1963. In accordance with the endorsement and recommendation of the Population Commission at its eighteenth session, the *Bulletin* was reinstated as a United Nations publication, beginning with the publication of *Bulletin* No. 8 in 1977. As in the past, the *Bulletin* is prepared by the Population Division.

Most of the articles published in the *Bulletin* are prepared by the United Nations Secretariat in pursuance of the programme of work recommended by the Economic and Social Council and the Population Commission. Studies by the consultants and reports of meetings organized by the United Nations, or excerpts from such studies and reports, may also be included. In addition, contributions are solicited from the specialized agencies of the United Nations, the secretariats of the regional commissions and scholars.

Explanatory notes

The following symbols have been used in the tables throughout the report:

Three dots (. . .) indicate that data are not available or are not separately reported.

A dash (—) indicates that the amount is nil or negligible.

A blank in a table indicates that the item is not applicable.

A minus sign (–) indicates a deficit or decrease, except as indicated.

A full stop (.) is used to indicate decimals.

A slash (/) indicates a crop year or financial year, e.g., 1970/71.

Use of a hyphen (-) between dates representing years, e.g., 1971-1973, signifies the full period involved, including the beginning and end years.

Reference to "tons" indicates metric tons, and to "dollars" ($) United States dollars, unless otherwise stated.

Annual rates of growth or change, unless otherwise stated, refer to annual compound rates.

Details and percentages in tables do not necessarily add to totals, because of rounding.

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IMPACT OF TRENDS IN RESOURCES, ENVIRONMENT AND DEVELOPMENT ON DEMOGRAPHIC PROSPECTS

*Nathan Keyfitz**

SUMMARY

In the present paper the author addresses the impact of trends in resources, environment and development on demographic prospects by investigating whether ecological considerations can improve the accuracy of population projections. However, the paper goes beyond projection or forecasting: rather, it tries to find to what degree population is resources-determined.

After initially presenting the classic relation of population to the resource base on which it depends, that is, resources determine population, while everything else, and most notably technology, remains unchanged, the author continues by showing that such a simple model has become less and less applicable as the level of technology rises and institutions are formed.

A major defect of relating population directly to land and/or the flow of energy is that it supposes that all other factors remain unchanged. However, if one supposes that the increase of population on a fixed land base itself pushes technology and that in turn makes it possible for a layer population to live on the same land, then any attempt to express population as a pure function of land is entirely frustrated.

The author points out that, given a challenge that is severe but not overwhelming, a natural environment that is difficult but not impossible, plus a culture that builds responsiveness into its children in each generation, the inert adjustment of population numbers to food supplies seems to give way to the active adjustment of food supplies to population. However, he adds that the present rule seems to be that better-off people, those whose environment permits them plenty of elbow room, have the greatest possibilities of innovation. Also, the unfortunate fact is that those people who most need advance because of their poverty are the ones from whom advance is withheld.

Besides the importance of technology as an intermediate between the environment and the population that it supports, there is another intermediate agent between the environment that would limit population and the population itself, namely, government, which acts as an agent of adaptation of population to land. Government and other institutions play an important role, on the one side by introducing better methods and so lifting the environmental constraints on population, and on the other side by limiting population to what the environment can support.

One institution that has lifted the resource constraint on population has been the emergence of the world grain market, which has detached individuals from dependence on their local ecological base and given everyone a common base. Although far from being the case, if all had the same access to that base, then with low transport costs everyone would now enjoy a sufficient diet. Particularly the territorial concentration of agricultural production in the world as a whole, with a spatial distribution of population very different from the spatial distribution of food output, presents difficulties of transport and especially of purchasing power.

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The author concludes by advancing a method that can improve the accuracy of population projections. This method is first to project the condition of resources and the environment, followed by the intermediate variables of technology and institutions and then proceed to the population that would be sustained. Once this is done for a given future time, the obtaining of populations from year to year between the present and some future date would be by straightforward interpolation rather than by the currently used extrapolation.

In order to arrange the large volume of material that falls under the title of the present paper, it will be useful to start with a simple model and then show how the model must be extended step by step to deal with the varied conditions that can be expected to prevail in the complex real world of the years 1980 to 2030. First we ask a methodological question on the usefulness of the environmental impact here discussed for population projection.

I. Resource-Determined or Extrapolated Population

The customary way of projecting population is to examine the series of births, deaths and migration separately, and use past time series to judge what future births, deaths and migration might be. Sometimes the projection is by fitting curves to past series, sometimes by using serial correlations, but most often it is the application of judgement to say what the long-term trends are likely to be. For example, the United States Bureau of the Census projects one of its current series by taking it that the long-term number of children born per couple will be 1.9.[1] If data other than the birth series enter, it is implicitly; one finds in the report describing the projection no reference to availability of jobs, to capital growth, to food resources, to technical innovation, or to other elements on which the population and birth numbers will plainly depend. A projection that takes no account of elements outside of the numbers of the same series in the past is a species of extrapolation, though we bear in mind that extrapolation can include some highly sophisticated procedures, and that in the mind of the person doing the extrapolating, and choosing among procedures, there may well be considerations far beyond population, even when they are not explicitly stated.

The opposite of extrapolation is projection based on a model that does take into account other variables than population, on which the population variable may be thought of as dependent. By a guess, or some more systematic procedure, one might assess the resources that seem to be available in a country, extractable at some assumed level of technology. If one thus found the population-sustaining capacity 50 years from now, and hence the population 50 years from now, one could simply interpolate the intermediate figures, the path through which the population gets from here to there. Some elements of this approach are to be found in Frejka.[2] In so far as the population is resource determined, a possibility that will be discussed at some length below, this could well give results superior to those of extrapolation. This might be called the population-capacity approach.

The extrapolatory and capacity approaches can of course be used together. A reasonable procedure would be to extrapolate, consider whether the numbers extrapolated for 2030 seem consistent with what one knows about carrying capacity, and modify the extrapolation, by choosing some other formula, to make the outcome consistent with the resources presumable available. Thus the World Bank, by a method that we can suppose extrapolatory, finds an ultimate population of 435 million for Nigeria, which would then be the third largest country in the world.[3] An assessment of the milieu might well lead to a downward adjustment of this figure.

The present paper goes far beyond projection or forecasting; it tries to find to what degree population (and its components of birth, death and migration) is resource determined. But here, as in many other parts of demography, the attempt to forecast is a stimulus to realistic thought about the way populations grow. Many a theory is proven false by the failure of predictions based on it. That way of testing takes too long for us to use here, but we can substitute thought-experiments, based on past experience, that will help illuminate the influence that environment and resources exercise on population.

II. The Basic, Primitive Model

The classic representation of the relation of population to the resource base on which it sits can be stated in three words: resources determine population. The primal resource is food, and another way of expressing the classic position is that population climbs up to the level permitted by its food base. Everything else—and in particular, technology—is implicitly, supposedly unchanging. This notion of carrying capacity goes back to early thinking about population, and many authors could be quoted. A modern biologist expresses the view, quoting some ancient sources:

> "In 1588, Giovanni Botero suggested that human populations did not grow, because the environmental resources were insufficient to support a larger population. Sir Walter Raleigh in 1650 noted that although Spain sent large numbers of men to war the size of the country's population remained stationary. This he attributed to the fact that Spain's population was adjusted to what the country could nourish."[4, 5]

Some of Malthus's early writing, especially the first essay, expressed this view, though later editions were much more nuanced.[6]

The only way that resources or any other variable can influence population is through the components of population growth: births, deaths and migration. On this

primitive model, if the population exceeds its resource base (including in an obvious extension non-food resources that it can exchange for food), death rates will rise, either directly through starvation, or else, and much more commonly, through malnutrition making people susceptible to disease. Both the direct and indirect effects of food shortage are likely to show most conspicuously in infants and young children. If people anticipate the shortage they can restrict births and so avert the larger damages of malnutrition for themselves and their children; in that sense births are more or less consciously adjusted to resources. Finally, if the shortage of resources is purely local, people can move to some other place where resources are more plentiful; thus, migration is a means of adjusting local populations to resources.

This kind of analysis conceives of man as essentially inert, responding to changes in resources, but initiating nothing. The best way to see the limitations of this viewpoint is to think of the species of beings to which it does apply.

With non-human creatures the notion of population responding demographically to resources is not unrealistic. One starves out the population of stray cats by seeing to it that there is no food lying about. Birds that have a territorial instinct keep their numbers proportional to the sustaining capacity of the terrain by preventing any that do not have a nesting place from breeding.[7] All species migrate shorter or longer distances in search of food and so tend to spread over the landscape in proportion to the availability of supplies. Explaining rates of death, birth and migration among animal species as it does, this model is useful in the study of animal and plant populations, and our quotation from Smith above is typical of standard biology textbooks.[8]

However, biology is much more sophisticated than this implies. It sees everywhere multiple trophic levels, at each of which subsist the number of creatures permitted by food supplies at the next lower level. At the bottom of the food pyramid are plants that directly convert the energy of the sun; just above them are herbivores that eat the grass or grain or fruit, and so on upwards. Because the energy loss at each level is great—two thirds for even the most efficient converters, and often as high as nine tenths—the number of levels is small. At least on land, more than three or four levels are rare. In the oceans the primary converters are microscopic creatures, and more intermediaries have a place between algae and whales than between the grass of the African plains and the lions who are ultimately dependent on it.

As Berrill puts it:

"Herbivores extract only 50 per cent of the calories present in plant protoplasm, and of this only 20 to 30 per cent is built into the animal protoplasm, representing a net efficiency of 10 to 15 per cent. And so with the secondary consumers, the carnivores. At the most, about 70 per cent of the flesh of the herbivore is consumed, yet of this no more than 30 per cent goes into tissue building, so that the maximum efficiency of turning meat into meat is about 20 per cent."[9, 10]

In the real world most creatures have alternatives to such a one-dimensional feeding system. Instead of each species living directly and solely on the one just below, there is an intricate web of life in which the numbers of each are controlled by the numbers at all other levels.[11] Man has greatly simplified the food chains on which he lives, so that he is limited to such circuits as grain-hogs-man, or grain-cows-man, or just grain-man. The last is what most of mankind depends on most of the time. The discovery of grains—millet, wheat, corn, rice—in various parts of the world, and the fact that they constitute a storable form of accessible energy, has probably been the most important single condition for human population growth.

III. Life and the Flow of Energy

In order to see how much room there is for the further expansion of the human population we need a quick survey of the energy flows of which people are a part. The question of more people (the United Nations medium projection gives 6.1 billion by the year 2000, 8.2 billion by 2025), as well as the welfare of the population, is in one aspect reducible to the question of how much more of the existent energy man can channel for his own use.[12]

An unobstructed square metre of the earth's surface facing the sun at 93 million miles distance collects 1,400 watts of power. Because the surface of a sphere of given radius r is four times the area of its diametrical cross section ($4\pi r^2$ against πr^2, where $\pi = 3.14159$), a fixed square metre collects one quarter of this amount on the average of its daily and annual cycle around the sun. This is at the top of the atmosphere; about one third (more or less, depending on cloud cover) of the radiant energy is lost in the atmosphere; the city of Boston gets 60 per cent of the energy it would have if the sky were always clear. The net result at ground level, in terms of the common measure of heat, is equivalent to about 3,000 kilocalories (Kcal) per square metre per day.

The visible part of sunlight synthesizes carbohydrates in the presence of chlorophyll, with an equation such as

$$6CO_2 + 6H_2O = C_6H_{12}O_6 + 6O_2,$$

read from left to right. When the plant burns the carbohydrate, as it must to keep alive while the sun is not shining, the balance shifts to respiration and the equation goes in the reverse direction; heat is produced rather than light absorbed. Photosynthesis creates oxygen, respiration restores the original carbon dioxide. When dead plant matter is buried and prevented from burning, the oxygen is not reclaimed. The fossil fuels under the ground, as well as the indispensable oxygen in the atmosphere, result from excess of photosynthesis over respiration, continuing over the last billion or more years.

Ordinary plants contain about 4.5 Kcal per gram of dry weight. An adult weighing 75 kg needs about 40 Kcal per day per kilogram of body weight, or about

3,000 Kcal per day, of which at least half goes for maintaining his metabolism. (A small animal or bird requires as much as 1,000 Kcal per kg—it has to burn more because it has more surface in relation to its mass.)

The human machine gets most of its energy from ingesting cereals. At 4.5 Kcal per gram, 3,000/4.5 = 670 grams of cereal, or two thirds of a kilogram, provide the required 3,000 Kcal. We saw that 3,000 Kcal is the energy that falls on a square metre of typical earth surface in a day, so one square metre ought to provide food for one adult. This in fact falls short of the land that we need by about three orders of magnitude.

The production of biomass includes leaves and straw that we cannot eat and seeds that we have to save. More important, the most efficient photosynthesis catches only a small fraction of the incident sunlight; plants have to reject the infra-red rays if they are to avoid being cooked to death. As little as 1/1,000 of incident sunlight is converted to usable biomass, although when conditions are especially favourable (as they are for raising sugar cane in Hawaii or for multiple cropping on well-irrigated lands elsewhere in the tropics) the fraction converted may be as high as 1/25. A fraction of 1/1,000 enables the average adult to live on 1,000 square metres, or one tenth of a hectare, and this is the practical limit in most parts of the world that depend on their own foodstuffs.

Variation in primary production is great. Deserts, with less than 10 cm of rain per year, cannot produce more than 2 Kcal of biomass per square metre per day, of which only a fraction is edible. With increasingly fertile lands, and with modern agriculture, the amount rises to 25 and even to 50 Kcal or more per square metre per day. This falls again as we leave dry land and is down to less than 3 Kcal in the deep oceans. We cannot exploit the oceans below trophic levels 3 or 4 because the creatures are too small. The energy cost of directly gathering plankton (or even, up to now, Antarctic krill) is so high that man can afford to do it only through the intermediation of larger fish.

The argument in terms of the energy flows on which humans depend is encouraging. If we are using only 1/1,000 of the incident sunlight, then we should be able to support 10 times present human numbers by discovering how to use 1/100 of the incident sunlight, still a small fraction. And even within present agricultural systems, the United States of America harvests 22.7 tons of potatoes per hectare, India 7.7 tons, and other crops are in about the same ratio; if India could adopt the agricultural techniques of the United States it could have nearly three times the present harvest. Every inefficiency in present agriculture means that there is room for more people to live better. The whole system seems slack enough to permit the argument that supporting more population requires only a little tightening here and there. Yet such an argument makes the support of population seem deceptively easy. We will later study the social constraints on the attainment of biological efficiency.

The relatively simple cycle of sun-grain-man, or sun-grain-cattle-man, displaces the many kinds of cycle that nature left to itself devises. Most are of little economic interest to man, and his activities eliminate them. Nature's richness (thousands of species of forest plants, hundreds of thousands of species of insects) is replaced by a few dozen species of grains, tubers, fruits, vegetables, and commercially usable trees. The advantage is great, yet pushed beyond a certain point it creates instability. To quote Odum:

> "When . . . man is a small part of the overall [ecological] scheme . . . he is protected by the great stability, complexity, and staying power of the natural system. For example, the pygmy population within the complex rain forest draws only a small volume from the many channels of fruit and animal products available."[13]

The southward extension of the Sahara is the prime instance of a rich and previously stable condition being altered to a new, and unfortunately much more stable, condition where humans cannot any longer draw subsistence. Similar changes threaten the delicate ecology of the Amazon.

Study of these elements of the ecology of the human species shows that

(*a*) People everywhere, rich or poor, urban or rural, are creatures of the natural environment and ultimately of the sun's energy;

(*b*) The low rate of utilization by man, the small fraction of total energy that is skimmed off for maintenance of the human population, suggests that more people could live and live better;

(*c*) The shorter the food chain the higher the proportion of incident sunlight available to man;

(*d*) Increased population increases ecological instability, and buffering against instability, for instance by the maintaining of costly reserves, becomes essential, a point to be further examined below.

IV. Effect of Population Growth on Technology

The major defect in the above attempts to relate population directly to land and to energy flow is that they suppose all other factors to remain unchanged. Such another factor is technology. But suppose that the increase of population on the fixed land itself pushes technology, and that in turn makes it possible for a larger population to live on the same land. Clifford Geertz shows how population pressure and irrigated rice agriculture are closely linked in Java. If a circular causal system is operative then the attempt to express population as a pure function of land is entirely frustrated.[14]

The view that this occurs was given a strong impetus by Emile Durkheim and the theme has been taken up in our time by Ester Boserup and other writers.[15, 16] The pressure of population could in principle constitute a challenge and so stimulate invention; after all, the notion of challenge and response was made into an engine of world history by Toynbee.

It is fairer to say that in some circumstances population density impoverishes, in other circumstances it inspires. The southward movement of the Sahara desert makes helpless refugees of the human population at its margins. The challenge of the desert is so overwhelming that no constructive response on the part of the peoples affected is possible. On the other hand, the response of the population in the Punjab to the tightness of food supplies has been adoption of the collection of agricultural practices known as the Green Revolution, and this has multiplied food supplies. Given a challenge that is severe but not overwhelming, a natural environment that is difficult but not impossible, plus a culture that builds responsiveness into its children in each generation, the inert adjustment of population numbers to food supplies seems to give way to the active adjustment of food supplies to population.

If the mechanism really is operative, so that greater need as such gives rise to improved technology, then we ought to be able to find more contemporary instances where this is occurring. In modern times inventiveness has hardly been most conspicuous in the parts of the world where populations have pressed hardest against subsistence. The better-off farmers of the Punjab have been the first to take up the new varieties and methods developed. The much poorer cattle-tenders of the Sahel have been the helpless victims of periodic drought. Whatever the conditions in the past, the present rule seems to be that better-off people, those whose environment permits them plenty of elbow-room, have the greatest possibilities of innovation. The unfortunate fact is that those people who most need advance because of their poverty are the ones from whom advance is withheld. Nature is like the banker who will lend money only to those who can prove they do not need it.

V. Contrasting Models

All our thinking, towards this or any other end, has to be in terms of models, and yet models by themselves give no answers. Nothing can demonstrate their hypothetical character more clearly than the contrast between the biological approach and the demographic transition. A family or a nation has a boost in resources, either of land or of income; will its population increase go up or down? Up, says the biological approach, since population presses against resources, and people have all the children their material condition will permit. Down, says the proponent of the demographic transition, in so far as the rise in income is accompanied by more education and higher aspirations. People realize that many children will hold back their social mobility; in the new kind of (salaried) work that they do to earn the increased income, children are not the help that they were in the days of poverty.

Only empirical observation can tell whether the biological or the transition effect occurs in the real world. Increased income may cause population to increase at first (by preventing some deaths that would otherwise occur, increasing births by removing traditional constraints, reducing disease-caused sterility), and that later the other effects of higher income (more education, increased security, other and varied personal interests) cause both births and deaths to fall.[17]

But no unambiguous statement comes out of the observations. Income distribution is clearly important, and sometimes it seems that equality of income is at least as important as income level for the fall in the birth rate; the examples of China and Sri Lanka, with low but well-distributed incomes, are often cited.[18] In the context of development—including higher and more equal incomes, universal education, women working outside the home and having their own careers—birth rates do clearly fall.

If at the very lowest levels of income and education the biological model holds, and at higher levels the transition model, then at a certain level there must come a flip. Below it a negative feedback (more income, more population, hence lower income etc.), and we have the familiar stable cycle of over-population and poverty. Above it a cumulative progress (more income, slower population growth, hence still more income etc.), and the age-old stability is broken. We cannot say that the flip from one relation to the other takes place exactly as $1,000 (or any other number) per person per year is reached, and we know much too little also about the accompanying circumstances.

VI. The World Grain Market

What has above been called the simple biological model is qualified in its application to man for many reasons, among them the emergence about the middle of the nineteenth century of a world grain market. The global exchange process that came into existence with steam transport has drastically altered the relation of populations to their ecological bases. The United Kingdom of Great Britain and Northern Ireland exchanged the products of its workshops for Argentinian and North American grain. Hong Kong's base is in part the wheat fields of the United States midwest. Agricultural specialization has accelerated in recent years. As the official *Outlook and Situation* of the United States Department of Agriculture puts it: "The developing country markets have been the major growth sector for U.S. agricultural exports over the past few years. Exports to these areas grew at an annual rate of 22 per cent from 1978 to 1981."[19]

No longer does a local famine mean local starvation. In classical Asia an oxcart, fuelled by the grain it carried, could go only a few hundred kilometres before the oxen had eaten all of the grain they started out with. One can imagine 10 carts transferring their contents to five when they had gone part way, then transferring to two, then later to one; the price would have risen tenfold. This is a problem in operations research, but however solved in theory, an inland crop failure of more than small radius meant starvation for the people at its centre—there was no practical way to bring relief. Local railways and roads, continuations of the ocean lanes, have changed all this. No one need starve merely because a local territory has suffered a crop failure.

The above reasoning implies a quick end to starvation and malnutrition on the planet. A world grain crop of 1.5 billion tons (1.495 billion for 1982-1983, adding wheat, rice and coarse grains), and 4.6 billion people can provide a more than adequate 325 kg per year, or 890 grams per day, for each man, woman and child, and few need more than this. The annual world grain supply has been going up faster than population by about 1 per cent per year, so supplies per person are not only adequate already, but increasing. (We will see how misleading such calculations can be.)

The world grain market has detached individuals from dependence on their local ecological base and given all of us a common base. If all had the same access to that base, then with low transport costs everyone would now be eating well. That is far from the case.

Access depends on having something to trade for the grain in the world pool. The Union of Soviet Socialist Republics has oil, gold, gas, furs, timber and other natural products; it was expected to buy 15 million tons of wheat in 1982-1983.[20] China seems likely to import 14.5 million tons, at the sacrifice of a considerable part of its total export earnings. Japan, which regularly imports over 5 million tons, at a cost that is only about 4 per cent of its total exports, becomes nervous at the thought of this (very small) dependence, and has gone to extremes to stimulate its own production of food on tiny plots.

The main point is that we are now in a condition where no one need depend on local food resources, but all can tap the common world supply—provided they have some other resources, natural or manufactured, with which to trade. If we were to continue the logic of the early part of the present article, the populations of the various parts of the globe ought to build up in accord with their local raw materials (either directly consumable as food or tradable for food) or else in accord with industrial power. In fact, populations are only loosely correlated with local wealth, natural or man-made.

VII. THE CONCENTRATION OF WORLD AGRICULTURE

The food we eat is only partly a product of current solar input. It is also a product of natural gas and oil formed millions of years ago, applied as fertilizer. Plants have been selected that make efficient use of fertilizers; through this man-directed evolution, productivity per agricultural worker in the United States of America increased by 94 per cent from 1967 to 1980 and multiplied fully threefold from 1950 to 1967.[21]

In the late 1940s wheat required 5.7 man-hours per acre; in the early 1970s it required only 2.9 man-hours per acre. The output per acre went up from 16.9 to 32.3 bushels. The man-hours per 100 bushels dropped from 34 to 9. (These almost unbelievable figures are due to the capacity of the American farmer to command a supply of fertilizer and other inputs, a command arising from the sheer technological efficiency of his operation.)

Commercial fertilizers applied in the United States of America more than doubled in amount from 1960 to 1980.[22] Considerable energy is used to transport the crops from the fields to the factory, from the factory to the store, from the store to the home. Efficient transport makes it cheaper to concentrate agricultural production on the broad, level fields of the midwest than to grow it closer to the point of use, whether New England or the Soviet Union. Adding transport from the supermarket to the kitchen, plus preparation for the table, we seem now to have reached the point where the input of fossil energy into the food on the table is greater than the output. Our bodies live more off fossil fuels than off current sunlight.

The command of outside energy sources has been such that the food-raising process is now a net energy loser in advanced countries. No pre-industrial agriculture could have afforded this; it had at least to produce enough net energy to fuel the agriculturalist and his family, even if no excess was required for non-farm activities.

Accompanying the relocation of agriculture to places where crops can be produced with the least labour has been a rapid increase in the size of farm holding. The farmer producing for his own subsistence has largely disappeared in the United States of America, and even the small farmer producing for a local market is of less and less importance. Family agriculture has been succeeded by agribusiness, with an increase in productivity similar to that when artisans were succeeded by factories.

By 1978 6.6 per cent of farms were over 1,000 acres, and these contained 58 per cent of the land in farms.[23]

The number of farms of all kinds went down from 5.4 million in 1950 to 2.7 million in 1969; commercial (that is, specialized) farms went down from 3.7 million in 1950 to 1.7 million in 1969; in particular, poultry farms went from 176,000 to 58,000; fruit farms from 82,000 to 54,000. Consolidation was rapid as farm population moved to the city.

The concentration is not only on larger and larger farms, but also in ownership. The conglomerate Tenneco is a leading citrus producer, and so is Coca Cola; Dow Chemical is one of the large lettuce growers. The small farmer who ploughs weeds under is no match for the corporation applying herbicides. The efficiency of the more dynamic corporations is unmatchable by small operators working for themselves, and leaves governmental agencies far behind.

The territorial concentration of agriculture causes no difficulty within the United States, since transport to carry the product to market is adequate, as is purchasing power to buy it. However, territorial concentration in the world as a whole, with a spatial distribution of population very different from the spatial distribution of food output, presents difficulties of transport and especially of purchasing power.

During the expansion of productivity in the United States and other advanced countries the balance of international grain movement shifted drastically. In the 1930s the less developed countries shipped a net of 12 million tons a year to the developed countries; by the

beginning of the 1970s the developed countries shipped 46 million tons net to the less developed countries. Where formerly the poor shipped food to the rich and were able to buy manufactured goods with the proceeds, now the rich ship food as well as manufactured goods to the poor, and a payment crisis results.

Our constant theme will be the intermediation of technology, needed to exploit nature, and that can on the one hand multiply the gifts of nature many times and on the other hand diminish, even destroy, the natural environment. We think of three levels: nature, technology and population. Yet, if natural resources do not predict population, neither do natural resources plus technology. Perhaps this means that the material environment is not the causal element in the resource-man relation. In any case, in probing the effect of environment one cannot overlook the possibility that a productive environment in our wide sense actually diminishes population, as the theory of the demographic transition in fact says.

VIII. Market Strength

In the system of exchange envisaged by the nineteenth century economists, advanced countries would trade their manufactures for the food and other raw materials of the then undeveloped world, including the United States. Each country would do what it did best, on the law of comparative advantage. Markets would never long be over-supplied, nor would they be short. There would be no hungry people because those who did not engage in manufacturing would raise food for themselves and for export.

But in the curious upside-down world that has now emerged, the most advanced manufacturing country—the United States of America—gains much of its external revenue by its sales of raw materials. Its total exports of $216 billion in 1980 included $30 billion of food, beverages and tobacco, $8 billion of fuels, $23 billion of other raw materials, such as soybeans, wood and wood products, and cotton. These add up to close to 30 per cent of all its exports. France also sells abroad both sophisticated manufactures and foodstuffs. Meanwhile, sales of agricultural products from what were the bread basket of Asia—Burma, Cambodia and Thailand—have fallen to the point where they make little contribution to world supplies.

The present condition, by which the United States can export nearly everything—raw materials and manufactured goods as well—to less developed country X, while X exports almost nothing to the United States, should not have come about. Even if the United States produces everything more cheaply, there should be balanced trade for each, and each should be selling what it produces most efficiently. The law of comparative advantage, due to Ricardo, is succinctly expressed by Samuelson:

> "One country may be *absolutely* more efficient in the production of *every* good than is the other country; and this means the other country has an *absolute* disadvantage in the production of every good. But so long as there are differences in the *relative* efficiencies of producing the different goods in the two countries, we can always be sure that even the poor country has a *comparative* advantage in the production of those commodities in which it is *relatively* most efficient; this same poor country will have a *comparative disadvantage* in those other commodities in which its inefficiency is more than average. Similarly, the rich, efficient country will find that it should specialize in those fields of production where it has a comparative advantage, planning to import those commodities in which it has a comparative disadvantage."[24]

The theory of comparative advantage is logically impeccable, but in application elements that it does not take into account must be operating. Current disequilibria have many causes, one of which is the increased populations of the less developed countries that have reduced exports of foodstuffs.

Those once vigorous exporters demonstrate what it means to climb up on food supplies. Burma with a population of 15 million as little as 40 years ago was able to export 3 to 4 million tons of rice each year. Now its population is over 35 million and its exports for 1981-1982 have diminished to 700,000 tons. Three million tons drop in exports at one fifth of a ton per person is most of what the additional 20 million people need to live on. In so far as those Asian countries that were major exporters of grain before the Second World War have since increased in population sufficiently to take up their surplus, areas that formerly were importers, for example, exchanging jute or tea for rice, cannot obtain their cereal supplies in the area, but must resort to the world market. That is often cheaper than local supplies, and contributes to a unification of the world market under a régime of very few exporters of foodstuffs, a condition that requires further attention in so far as animals compete successfully with humans for cereal supplies.

For 1982 world beef production is estimated at 40,475 thousand tons, pork at 36,355 thousand, and poultry at 22,112 thousand, or about 100 million tons in all.[25] This in effect subtracts some 500 million tons of grain from human consumption and is in a sense the reflection of income inequality.

IX. Inequality

On the one hand we have the peculiar circumstance, developing about the time of the Second World War, that the advanced countries—at least the United States of America and Japan—have high productivity in agriculture as well as industry and so do not typically buy food abroad with their manufactures. On the other hand the less developed countries have increased in population to the point where feeding their people is difficult, even in countries that formerly were exporters of food, with either domestic or foreign grain. The consequence is gross inequality in the bare access to foodstuffs that the world market does not seem able to cope with. Countries that need more food for their poor populations, and have no land on which to grow it and few other natural

resources, ought to engage in manufacturing. Yet it will be a long time before Senegal can compete with Japan in the manufacture of audio equipment.

One way in which the imbalance shows itself is in indebtedness. Between food, equipment and fuel purchases on credit, the third world's indebtedness is now up to $500 billion, most of it in short-term debt at current high rates of interest.[26]

Western banks have loaned Eastern Europe over $50 billion from 1972 to 1982, with much of current lending going to enable countries to pay interest on previously contracted debts. Mexico's $80 billion of indebtedness is the most spectacular case of all, and is in part due to food imports needed to provide for its rapidly increasing population. Its vast supplies of oil have been an insufficient protection in the face of fluctuating oil prices. Bressand provides a fine analysis of the possible financial crisis and other features of instability in the world economy.[27]

The concentration of world agriculture

Will the bumper crops in exporting countries bring immediate relief of the payments crisis? Storage is nearly impossible to find in the United States of America, which has enough grain in stock to feed the country for 12 years.[28]

Grain prices are down by 25 cents or more per bushel from the United States Department of Agriculture targets. The United States Department of Agriculture will want to dispose of its large quantities of grain without creating chaos in the domestic market, and one can expect concessional prices. Such sales are in the short-term interest of poor countries, especially those with large city populations. Unrest among urban dwellers is a more immediate threat than the depression of peasant agriculture. The coincidence of interest between a less developed country Government, determined to feed its urban residents and build industry, and the American need to dispose of surpluses is perfectly legitimate, but what if it holds back the agriculture of the poor country? And what if the urban populations are not in condition to produce exportable goods to pay for the grain, even at low prices?

A real dilemma exists here. In the short run cheap grain supports population, indeed it can avert starvation. In the long run it can build up large urban populations and then leave them defenseless against crop fluctuations and high interest rates. How can the rich country help? Better than grain at below-market prices would be to provide fertilizer; better yet to provide fertilizer factories, and best of all to provide the knowledge that would enable the factories to be locally built. The same sequence applies to all inputs: the farther back in the process the poor country can attain mastery, the less its degree of dependence, and the less danger that it will be left high and dry when conditions change in the benefactor country. Unfortunately, within the United States of America, France and other more developed countries the political pressure to export the finished grain is far stronger than the pressure to export knowledge that would produce grain.

The 1981-1982 crop year figures of the United States Department of Agriculture illustrate the degree of concentration in production and export to which the world grain trade has evolved. Net exports of the United States were 116 million metric tons, of Canada only one fifth of this, of Oceania and Argentina smaller quantities yet. South East Asia managed only 3 million tons.

X. SOURCES OF INSTABILITY

We saw that with world trade the relation of population to its food base is transformed into a relation of population to all resources. The Soviet Union can comfortably sustain population by selling off a variety of resources; Saudi Arabia can do equally well with one resource; Japan's requirements are met with a trifling fraction of the proceeds of its exports.

Clearly everyone lives better than they would if they were forced to depend on the produce of local lands. But the system is susceptible to many kinds of disturbance. Whole countries would go hungry if there were a crop failure in the United States of America that cut off their customary supplies. Others would go hungry if world market prices of their rubber, or palm oil, or cocoa, on which they have very little influence, were to decline sharply, or if bankers in New York and Frankfurt decided that they were no longer a good risk, even though their real prospects remained unchanged. People in the horn of Africa have been made miserable by political disorganization that cuts their supplies. Thus, concentration risks physical instability due to weather, as well as economic instability in markets and credit, and governmental disorganization in countries less developed politically.

Even technological advance can be a source of instability. A given advance that benefits some can hurt others. An inexpensive way of getting the nodules of magnesium or nickel from the mid-ocean sea-bottom would lower prices and drastically affect the livelihoods—and the population-sustaining capacities—of countries that export those metals.

The greater the population in any country, the more it is threatened by changes of many kinds. With 10 million people, a country growing its own produce on small farms has only one thing to fear for its nutritional base—a local crop failure due to climatic flucuation. Let its population grow to 20 million, half of them in cities and dependent on sales of raw materials or manufactures for their sustenance, so that they are participants in the world market for grain, and they are exposed to many potential hazards as they reap the benefits. The price of rubber in London becomes a matter of life and death for some. In turn, of course, their planting activities in South East Asia affect the London market, but in a degree far less fateful for London than for the growers. The growth of population in the third world, together with the concentration of internationally available food of which that growth is one of the causes, seems likely to

generate larger waves than could possibly exist with smaller populations subsisting on local agriculture.

A distant but extremely serious form of instability threatens in the shape of long-run climatic change. Possible drastic changes, partly induced by the burning of fossil fuels resulting in increased carbon dioxide in the atmosphere, are not to be disregarded with impunity, even though their bad effects are still decades ahead.[29] Such changes will have their most severe effect in altering the distribution of rainfall on the earth's surface; this is going to mean that one-time deserts will become arable, and on the other hand some arable lands will become desert. The more the population builds up in a given territory, the more it risks heavy mortality through the undercutting of the physical base on which it is supported.[30, 31, 32]

XI. Self-sufficiency

Under the pressures of development and the shortage of funds, and recognizing the elements of dependence described above, the less developed countries are striving for self-sufficiency in food. Such an effort in effect takes them back to the epoch that the nineteenth century brought to a close, when every community, not to mention every country, was largely self-sufficient. Now, self-sufficiency is sought as part of the struggle for development, which requires reserving the import capacity for purchase of capital goods—everything from lathes to steel mills. Any purchase of food abroad eats into the financial resources available for buying capital goods. When India was short 10 million tons of grain it had to spend a very large part of its total export income to buy it, so that the foreign capital part of its development programme was seriously affected. Self-sufficiency in foodstuffs resembles import substitution in manufactures; both are a retreat from a world market not seen as operating in the interest of the poor countries.

XII. Resources and politics

If the existence and distribution of natural resources is entirely unproblematical for the social scientist, who leaves such matters to geology, soil science and other specialties, the distribution of resources of skill, capital and power is an old theme of social science. In one form it is the classic historian's problem of the rise and fall of nations. The advent of world-wide markets has by no means eliminated politics and war among nations, as optimistic nineteenth-century writers like Comte were sure it would. Political strength on the one hand arises from concentration of (natural and created) resources, on the other hand it makes possible further concentration of resources. This interaction of the political and economic, the conversion of resources into power and power into resources is a positive feedback that increases inequality among nations. In one manifestation it was in the past expressed as imperial dominance. If classical imperialism has disappeared, the commercial dominance and subordination of nations has not. The rhythm of rise and fall has accelerated; Japan has come to the top and the United Kingdom of Great Britain and Northern Ireland has sunk in a few decades, whereas the cycle of the Roman Empire occupied centuries. (Aside from the difference in time scale, Rome's fall was in part due to depopulation, while Japan's rise is accompanied by a virtual cessation of population growth.)

The interaction of political and economic elements in the utilization of resources may be clearly perceived within individual countries. In parts of South East Asia land is far more productive when used for rubber than for rice. A country would do better to plant rubber, sell the produce abroad and buy rice with the export income so obtained, rather than produce the rice itself. Is it therefore irrational for peasants to take over rubber plantations in order to plant rice? Not if one considers the internal distribution aspects of the takeover. Rubber sold abroad produces income for the central Government; rice grown locally provides immediate consumption for the peasants who grew it. The peasant does not trust international markets, and even less is he sure that the receipts from rubber sales will be used to buy rice for him.

XIII. Risks of instability superimposed on diminishing returns

A small closed population with fixed technology in a large area growing against its food supplies will for a long time have a fixed level of welfare. There will be ample arable land for each new generation, and no subdivision of plots will be necessary. However, sooner or later a certain critical point will be reached where the limits of space affect the individual farmer; plots will be divided, and the standard of living will start to fall. This is a reality in Asia; the standard of living in many parts could well be lower than it was 200 years ago.

This pure effect of diminishing returns acts in several ways. While there is free land of equal quality to that in use, there need be no wage labour and certainly no slavery. But in so far as the best lands have been appropriated first, the lands that remain for new farms at any subsequent stage are less good, so average output will fall. Moreover, the technology of simple plough agriculture is such that the size of plot each peasant can use is limited, perhaps to 5 or so hectares. Until all suitable areas have been occupied and divided into 5-hectare plots, even with some heterogeneity of land, welfare is not likely to fall rapidly. All this is the classical theory of diminishing returns, expressed in its definitive form by John Stuart Mill.

In our century we need to superimpose on such static theory discontinuities and disturbances of many kinds. Even if land and its quality were fixed, agricultural output of a given territory varies with variations of rainfall, whether on the Great Plains of the United States of America or in the Siberian wheat fields. Water is a crucial element in the photosynthetic process by which grain or any other crop is produced.

In a given area the standard deviation of water supplies from year to year may be of the order of 25 per cent; the standard deviation of food output would be less than this because people would use the water more

carefully when there was less of it; the standard deviation of the number of people that could live at the same calorie intake would be less again, because people would husband the grain more carefully in years of scarcity. It may be that the effective intake would have a standard deviation of only 10 per cent. But that amount of variation can be a matter of life and death for people who are at the edge of subsistence. Sheer starvation is not unknown, for instance, in a strip running south of the Sahara and down Africa's east coast. Satellite television permits well-fed people in one part of the world to watch from their living-rooms people across the oceans dying of hunger.

The number of deaths directly from hunger is less than from malnutrition that leaves people susceptible to disease. There is no authoritative survey that tells just how many cases of malnutrition exist, though certain figures have been much repeated, but we can safely speak of hundreds of millions. Malnutrition raises death rates immediately in the years in which it occurs, and it leaves individuals weaker for the years ahead. Having supplies that are equal to need in the average year is not enough if good years alternate with bad.

How then to avoid the fluctuations that, more than average low supplies, are the scourge of certain areas, where they affect death rates catastrophically? There are only two methods of coping with fluctuations.

XIV. Meeting Fluctuations

One method is by reserves that act as a buffer to convert a fluctuating supply in the fields into a continuous supply on the dinner table. As far back as the 1930s the United States of America started to carry an unplanned, and for the most part unwanted, reserve incidental to its agricultural price supports. There is still some reserve that arises in this way; prices fell 5.1 per cent between September and October 1982; they would have fallen far more without the intervention of the United States Department of Agriculture. The present reserve, supported by Government financing, is enough to feed the United States for 12 years, and it helps restore a margin of safety for world prices and supplies that has been lacking for some years.

The Food and Agriculture Organization of the United Nations (FAO) has recommended that each nation should have its own immediately accessible reserve. Yet reserves are expensive. Between physical storage expense and interest charges on the money invested in the reserve stocks, costs are around 10, 15 or more per cent per year of the amount held, depending on how one calculates the real rate of interest. A way of spreading this cost so that it would be affordable, and shared in proportion to the benefits derived from the reserve, has never been arrived at. If each separate country were to be self-sufficient in the face of all contingencies, the cost of reserves would be formidable.

An alternative would avoid most of the cost of maintaining reserves: exchange. It happens that the record of the world grain crop shows little variation from year to year. Shortages on one continent have through the play of chance been offset by surpluses on other continents. All that is needed is the regular channels of trade to ensure that the surpluses flow to the places of deficit. But keeping the ports open in both directions is not always easy. Countries clearly in deficit want trade, and likewise so do those clearly in surplus. However, the intermediate condition is more problematic: a country is just comfortable this year; its neighbours are decidedly short. The temptation to close its ports and so prevent price rises is strong, and stronger in the degree in which there is effective political participation of its people. What is needed on one model is a self-denying ordinance by which countries will give up the right to close their frontiers in either direction, and so provide an effective sharing of world supplies. One can guess that if such a measure is ever approached it will be with some elaborate safeguards and exceptions.

One of the circumstances that make free trade difficult to accept is that purchasing power varies so much from country to country. Completely free trade means that rich countries can afford uses of grain that would be submarginal in poor countries. I refer to the fact, pointed out by Alfred Sauvy a generation ago, that under conditions of free exchange it may be possible for the rich man to feed his horse or his cow and deprive the poor man of the means to feed his family.[33] That applies within nations and between nations. Internal inequality plus free exchange can even mean that the Punjabi landholder could sell grain abroad for cattle feed while his neighbours go hungry.

Apparently free markets may support more population, and may support them better, than controlled ones, as certain countries are finding out. Beyond raising the average, free markets smooth out fluctuations over time. But they result in inequality. This underlies the drama of certain countries, where the Governments are seeking to attain the greatest measure of efficiency without excessively compromising equity. We cannot but note that limiting, even reducing, population is a crucial part of their strategy. For Ricardo, higher density increases inequality; he would have approved of population control in those countries.

XV. Technology

The inevitable main theme of any study of the effect of resources on population is the intermediation of technology. Technical advances that could increase carrying capacity are numerous. Better control of pests, whether weeds or rodents; new plants like guayule that make use of hitherto unusable environments; recombinant deoxyribonucleic acid (DNA) techniques to evolve bacteria that will fix nitrogen for grains, as they now do for pulses; better solar collectors for cooking and heating, that save wood and cow-dung for other uses; ability to arrange the timing and location of rainfall; these are a few of the man-made changes in the environment that will enable more people to live and to live better.

The interface of technology with social organization needs attention. That countries in which labour is expensive have been the main sources of new technol-

ogy has resulted in a bias towards devices that are labour-saving rather than capital-saving. Where invention takes place among relatively plentiful materials (either because of low density of population or ability to command materials from abroad), there will be less emphasis on techniques that are material-saving. Some redirection of technology is needed in an epoch when people are numerous and their living standards press against the carrying capacity of the planet.

That specialized knowledge and advanced capital are now needed for making capital items (or even consumer items like hand calculators or vacuum cleaners) prevents the simple conversion of labour into manufactured goods, the process described by Adam Smith and by Marx. Early economists thought of capital as locally made, and all that was needed to secure it was providing the subsistence of the labourer. Capital has now become an indispensable and separate factor of production, that poor countries can only acquire by purchase abroad. Innovations of a kind that will permit the poor country to create its own physical capital items with its own plentiful labour are a pressing need; what can be done to generate them?

Any technical innovation that makes the process of capital accumulation accomplishable by local labour using local materials will at one and the same time put the third world's unemployed to work and accelerate development. The kind of foreign aid that we spoke of in respect to agriculture (not food but fertilizer; not fertilizer but fertilizer factories etc.) has its clear analogue for industry in contributions that go back up the chain, from consumer goods to factories for making them, to new technologies that permit the less developed countries to make their own instruments of production. Whether the advanced countries can be persuaded to use their inventive capacities to aid in this way is not clear.

XVI. Synthetics Make Room for More Population?

The ability of the world's tillable lands to support population has always depended on technology. With slash-and-burn agriculture, as in pre-Columbian America or in parts of Asia far from the river valleys, about 15 people per square kilometre can be sustained. Once there is a change-over to irrigation this figure rises to several hundred. In recent years new ways of conserving land have come into widespread use; natural fibres and other commodities competing with foodstuffs are now replaced by factory products. From slash-and-burn agriculture up through synthetic fibres we have a sequence that enables ever more people to live on the planet.

Rapid technical progress in the direction of saving land is reflected in production statistics of the past few years. We see striking declines in cotton yarn, with the United States of America dropping from 2,005,700 metric tons in 1966, its high point of recent years, to 1,397,200 tons in 1973. Cotton fabrics produced declined from 8,083 million metres in 1966 to 4,650 million in 1973. A lesser product, natural silk, declined even more, from 16,205,000 metres to 5,645,000 metres. The same story applies to wool yarn and wool fabrics—the latter down from 242 million metres in 1966 to 97 million in 1973. The old synthetics, rayon and acetate, held about level; all of the decline and more was made up in non-cellulose fibres. Continuous non-cellulose filaments went from 528,000 metric tons in 1966 to 1,515,000 tons in 1973; discontinuous filaments rose from 416,000 to 1,347,000. This extraordinary substitution of synthetic for natural fibres appears in almost equal measure in other industrial countries and is evidently worldwide.[34]

It applies also to rubber, to butter (as margarine takes its place), to a prospective electronic newspaper that would be independent of newsprint. Existing television communication has already greatly reduced the use of newsprint and the number of newspapers compared to what they would have been without television.

One would think that such land-saving would help marginal populations, those who will go hungry unless more food is produced. Yet the advent of synthetics is in the short run damaging to the poor countries that produce the natural product. Indonesia and Malaysia can realize a larger return per acre on rubber than on rice at the market prices of both that have prevailed. Their immediate capacity to buy industrial equipment is adversely affected by the competition of synthetics. While the invention of synthetics is a long-run boon to population in the world as a whole, it sets back near-term national plans for economic growth. (We have seen how elites and peasantry differ on the utility of grain versus export crops.)

XVII. New Technology

No one can say to what degree the technology of the half-century ahead will be land-saving, but one can speculate on such of the advances mentioned above as the electronic newspaper. How much land would it save? Some 11 million tons of newsprint were consumed by publishers in the United States of America in 1980,[35] of which two thirds was imported from Canada and elsewhere. If the paper is made out of wood, and there is a salvage rate of 25 per cent (the United States rate is 21 per cent, Western Europe manages 29 per cent), then 7.5 million tons per year of wood fibre are needed, and at 2.5 tons per hectare this occupies 3 million hectares of land. But some land is not of use for any other purpose, and other land needs to be covered with forest for water conservation, or is used for recreation. Suppose the net saving of possible agricultural land would be one third; the electronic newspaper would save 1 million hectares that could provide food for 10 million people.

Electronic conferencing would not save agricultural land, but it would save air travel and hence fossil fuels that could be made into fertilizer, and so the equivalent of land. A high proportion of air travellers are going to or coming from meetings that could well be replaced by communication devices that achieve the results of face-to-face discussion and negotiation.

Many technical advances could be brought into existence to extend natural resources, create new resources, and otherwise increase the capacity of the planet to hold more people and permit them a degree of amenity. For instance, methane is widely present in the earth's crust and can be produced from biomass and from coal in virtually unlimited quantities. Conversion of present vehicles to methane use is not difficult, and the cost of methane is comparable with that of gasoline. Like other materials-gaining technologies, the widespread use of methane would diminish the demand for crude oil below what it would be in the absence of methane, and would establish a new equilibrium in world financial markets.[36]

The application of genetic engineering to produce new crop varieties and animal strains seems close at hand.[37] But we do not need to wait for new species. All over the world species are known that require only to be disseminated and exploited. Mexico has recently been putting guayule to use for the production of rubber.[38]

Every such development will harm someone in the short run (the newsprint industry, the airlines, oil producers, rubber growers) and increase both welfare and population-carrying capacity in the longer run.

XVIII. Shortages and Birth Control

The classic notion that every mouth that comes into the world brings with it a pair of hands is not very helpful, as Mill pointed out, if the additional pair of hands cannot find good land or capital on which to apply effort. Effort can indeed be intensified on existing land, but greater efficiency, including use of tractors, often permits higher output with fewer workers. Some land in many countries is over-used, becoming arid, over-irrigated or salinated. Some countries have plenty of land, but their people lack the incentive to work it; one effect of education is to make people dissatisfied with the petty subsistence agriculture of their ancestors.

The output of foodstuffs beyond the needs of the producers, that surplus that is needed in the cities, declines with the growth of population. At the same time people not finding suitable employment on the land move to the cities, whose populations grow at anything up to 5 per cent per year. The United Nations estimates a fivefold growth in cities of the less developed countries in the short period from 1960 to 2000.[39] Such effects of population growth have turned the thinking of initially pro-natalist Governments to birth control.

Governments of many poor countries are promoting birth control today, where as recently as the 1960s they were indifferent to population growth or even actively encouraged it. The disappearance of the agricultural surplus deprives peasants of their traditional function, to sell foodstuffs in order to pay taxes and buy consumer goods, and so enable the cities to subsist. Worse still, the peasants themselves come to the cities: Cairo has grown from 3 to 9 million in two decades; Mexico City is said now to contain over 12 million people. Often jobless, the newcomers demand not only food but a variety of services. The foreign exchange cost of an unemployed population that depends on the Government for its sustenance is disastrous for development plans that need foreign equipment, and fatal to hopes of financial independence from foreign bankers and grain sellers.

We have spoken of technology as intermediate between the environment and the population that it supports. But also between the environment that would limit population and the population itself comes government as an intermediate agent, an agent of adaptation of population to land. Government evidently plays a role, on the one side in introducing better methods and so lifting the environmental constraints on population, and on the other side in limiting population to what the environment can stand.

Acting to some extent independently of government are a host of institutions that are also intermediate between the environment and the population it is called on to support. Some have already been referred to, but others deserve mention.

XIX. Institutions and the Birth Motive

It is easy to rationalize away the population problem. If the poorest countries would show as high rates of economic advance as Japan and the Republic of Korea have done, they would quickly approach their demographic transition. If there were no national restrictions on trade, and buying power sufficed, then even at the present time food would be adequate for all. If the Javanese would only eat corn rather than rice, they could get enough carbohydrate per acre; if they could attain the yields of Japan or Iowa, they could eat plenty of whatever they wanted.

The population-food problem consists in the fact that those things are not easily done. Nationalism, cultural preferences in food, inefficient agriculture, and urban-centred development are real and persistent. So is the large-family culture in many parts of Latin America, Asia and especially Africa. To wish those things away is as unrealistic as to ignore shortages of physical resources. The control of oil supplies by a dozen countries, to promote their national interests, is as much a part of the energy problem as the ultimate exhaustion of the oil fields. We have to insist that social institutions may be as hard to change as the constraints of the physical world.

That demographic variables depend on the milieu, the productive capacity of the area in which the population is located, but depend on it through the intermediate variable of institutions, is seen in respect of old-age security. We will show how in one set of circumstances the need of people to provide for their old age causes them to have many children, and in other circumstances causes them to refrain from having more than one or two.

Think of a limited territory with privately owned land, in which each peasant owns about the amount that he can cultivate with the aid of his wife and some modest equipment, perhaps 10 hectares. There is no other land readily available, and to divide the family plot among half a dozen children when the original peasant can no

longer work it would be disastrous. The old-age security of the peasant depends clearly on his having one capable son, or a daughter who can attract a son-in-law, to work the farm. This may well have been the condition of France about the time of the Revolution; its peasants were preoccupied with their private landholdings and rural birth rates were the lowest in Europe.

Consider in contrast to this another way in which population is sustained: by artisanal manufactures—using the word in its literal meaning of articles made by hand labour. Europe showed the incipient forms of modern industry in the eighteenth century: plenty of wage jobs, with long hours and low pay. In the areas of such industry birth rates tended to be higher than in the parts of Europe that were purely agricultural. In a régime of wage labour the peasant who has many children and can send them out to work will draw a small income from each. He needs many to live comfortably in his old age. This is the opposite of the case where freehold landed property provides the incentive to have few children.

In one sense all cases can be assimilated together under the notion of accumulation of capital during working life that is to be drawn on when working life is past. The accumulation may take the form of buying or developing a farm; it may take the form of cash savings, as long as these are not subject to the risk of theft or inflation; it may take the form of bearing and raising children who would be sent out to wage jobs, provided the culture is such that the children will devote their wages to the care of their parents. Where land is plentiful, either in the virgin forest or in the hands of others willing to sell, as in French Canada during much of the nineteenth century, one can have the benefit of seeing one's patrimony extended in each generation. At the same time in French Canada there was plentiful employment to be had at low wages, and so it was worthwhile to raise children, both for working the additional farmland that one bought or reclaimed from the wilderness, and for sending to the textile mills, perhaps with a son for the priesthood. Except for the priesthood, the configuration was not very different from that in New England up to the time of the Civil War, and on both sides of the border the birth rates were nearly as high as have ever been recorded.

The conclusion from this quick survey, partly derived from Tilly,[40] is that the motive of old-age security can lead people to have many or few children, depending on the means available for providing an income after one has ceased to work.

Can such institutions be fashioned as policy instruments? In populations that are already dense the room for manoeuvring is limited. It would be good to provide every Indian family with three hectares of good land, say, in private ownership, and so an incentive to keep the patrimony intact by having only one or two children. That is hardly feasible; the land is not there. An alternative would be to encourage saving for old age by providing a stable repository of value other than land; let the peasant save for his old age, but in something more solid than inflating paper money.

The saving could be forced: the state would collect taxes to provide an income to those past a certain age. This, essentially the old-age security system of the welfare state of Europe and the United States of America, has undoubtedly had an effect on birth rates in the more developed countries and has been seriously suggested for India; but when we see to what intolerable cost it has led in the wealthy countries that devised it, and the consequent disillusionment with the welfare state now current in Europe and the United States it seems hardly a means for a poor country to control its fertility.

If family discipline weakens so that children cannot be expected to support their aged parents, then the incentive to have children weakens. Such slackening of family discipline is associated with education, but disloyalty to parents is hardly to be promoted by Governments, even though that may be part of what has lowered birth rates in the West. Many important institutional variables are not readily subject to policy manipulation.

If no one of this series of considerations can by itself constitute an effective policy, what policy does emerge? A combination of all seems to be the answer. A one-time division of land among the peasantry, so that as many as possible have an area sufficient for one family to live on; means by which people can effectively save, if not a stable currency, then indexed bonds; permitting older people to continue working at wage jobs as long as possible, with modifications of the work to accommodate their weakening powers; extension of education that not only teaches substance, but orients children in the direction of their own personalities and careers.

XX. Effect of Urbanization

For long ages it was possible to say that urbanization as such was a way of bringing down the rate of natural increase. During the European Middle Ages and after, cities did not replace themselves; their death rates were higher than those of the countryside and their birth rates lower, so that without a flow of in-migrants a city would disappear. Given the unhealthful conditions and the difficulty of making a living in them, people came to the cities reluctantly, and only in proportion as jobs in industry opened up, a process described by Adam Smith for the Scotland of his time. Often migration was in stages, first to smaller cities, then from these to larger cities.

None of those statements is true today. Cities have high rates of birth, and their death rates are no higher than those of the countryside, so much of their growth is simply natural increase. The in-migrants to the cities do not wait for the evolution of industry; they come with or without the prospect of jobs. Moreover, the greatest movement is to the biggest cities, to national capitals in particular. The cities of today are building up in a context of rapid population growth in the countryside, whose natural increase is far larger than that of rural nineteenth-century Europe.

This contrast between the urbanization of the nineteenth century and that of the late twentieth is suggested by a recent United Nations report.[41] While the cities of the more developed countries double in population between 1955 and 2000, those of the less developed countries multiply by more than 6. About 1970 the total urban population of the less developed countries became greater than that of the more developed countries, and by 2000, within the next 20 years, the cities of the less developed countries will contain fully double the population of the cities of the more developed countries, according to the United Nations medium projection.

A further contrast: when the currently developed countries were industrialized it seemed as though the countryside was being emptied by the move to the cities; English nineteenth-century writing includes many complaints about abandoned farms in half-deserted communities. United States cities grew with the mechanization of farming that released manpower from the countryside. Up to about 1970 half of the rural counties of the United States were actually falling in population—though that is no longer true. However, in the present less developed countries the rural areas on the whole continue to gain—at a rate of 1.75 per cent per year estimated from 1960 to 2000. Overall population growth is so great that the cities can multiply by 6 and the countryside still add 80 per cent between 1960 and 2000.

XXI. THE IMPACT OF DEVELOPMENT ON POPULATION

The immediate effect of development and modernization has often been to accelerate the growth of population. At least, Great Britain went from 9 million in the census of 1801 to 36 million in 1901, a quadrupling during the course of one century that combined unprecedented population growth with unprecedented development. Other countries of Europe also increased during the course of their development. The United States of America grew rapidly up to about 1870, a period that somewhat preceded its industrialization; after industrialization got under way about the time of the Civil War, births slowed. In the present less developed countries, as in the United States, the growth of population has preceded that of industry—the expansion being due essentially to the decline of mortality, though in some instances fertility also rises in the first stages of modernization.

Thus, one cannot generalize on the immediate effect of modernization—either that it always accelerates population growth or that it reduces it. However, the proposition that full development ultimately lowers the birth rate sufficiently to more than offset any decline in mortality does seem to be universally valid.

The proportion of world population constituted by the present more developed countries went from 26 per cent in 1800 to 35 per cent by 1900, and is projected to be down again to 21 per cent by the year 2000. Thus, it seems that after a quarter of a millennium the distribution of population between the more and the less developed countries as they are now defined ends up where it was at the start of the world-wide process of development. The case of Africa is special; it had about 10 per cent of the world's population, dropped to less than 5 per cent by the end of the nineteenth century, has now recovered to 10 per cent, and could well get to more than 20 per cent before it becomes stationary.

It is foolish to think in terms of an intergroup competition for who can multiply to the largest extent. That view is obsolete in an age when the welfare of the masses, not their numbers, is the prime objective. Two groups in competition, whether families, tribes or nations, can both reduce themselves to misery by making the locus of their competition not development and welfare, but numbers. The People's Republic of China expresses this clearly in the influential, if not unanimous, wish for 700 million prosperous Chinese rather than double that number in poverty.

Once welfare is recognized as the goal, a divergence still exists on the means. Should family planning be instituted as a pre-condition for development, or should a country proceed directly to development with the confidence that once a degree of economic advance is attained family planning will follow by itself? The issue goes back a long time, and was given particular salience at Bucharest and in the period which followed.[42]

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TYPES OF INTERVENTION AVAILABLE TO A DEMOGRAPHIC POLICY: A THEORETICAL APPROACH

*Hubert Gérard**

SUMMARY

In the domain of population policy, the knowledge at the disposal of researchers and policy-makers appears to many as insufficient or, at best, ambivalent. However, the knowledge at our disposal is not trivial and indeed is sufficient to attempt a consolidation of our knowledge and experience in this area. To this end, it seems that some priority should be given to theorization and systematic verification, a shift from past and present emphasis on the utilization aspects of population policy issues. This consolidation represents a necessary step towards improving in the long run the control of society over its demographic movements.

In the first part of the present paper an analytical framework is presented to analyse the determinants of population trends. This framework widely utilizes the concept of "risk", to procreate, to die and to migrate, in order to explore in which ways the determinants of fertility, mortality and migration influence those variables. In the second part, the various types of interventions, both at the individual and at the collective level, are explored, emphasizing their respective potentials and limits.

INTRODUCTION

In organizing the relationships between the evolution of the population and that of society, an initial choice must be made between intervention and non-intervention. For various reasons, the authorities may decline to intervene or may not even consider doing so, and thus opt more or less explicitly for a policy of *laissez-faire* or, in certain instances, of *laissez-aller*.

If, on the other hand, they wish to intervene, they may try to influence one or both of the terms of the relationship: they may try to adapt the evolution of society to that of the population, or conversely, try to harmonize the evolution of the population with that of society. The latter option is the one chosen in what we generally describe as "demographic" or "population" policies. This is also the option considered in the present paper.

In the first part of the paper, the areas in which a policy can intervene are specified: first, the constituent elements of the demographic process which are to be influenced and, secondly, the mechanisms determining those elements, where a possible intervention could take place. In the second part, the various types of intervention possible are identified, their underlying assumptions are described and various problems which arise in that connection are discussed.

I. AREAS OF INTERVENTION

Constituent elements of the demographic processes

Whatever the problem posed—whether, for example, it is a problem of demographic growth considered to be too large or too small, a problem of spatial distribution or of age structure of the population—intervention affecting the evolution of the population necessarily affects its components: natality, mortality and internal and external spatial mobility.

Each of those components is the result of two elements: the related risk (risk of reproduction, death or migration) and the size of the population exposed to that risk. For example, natality in a given population will depend on the risk of reproduction, measured by fertility, and on the number of women subjected to that risk.

The total number exposed to a risk of any kind is a datum which can be altered in the short term only by action influencing the risks of death or of migration. In the case of fertility, however, the total number at risk also depends on another phenomenon: nuptiality.** This is because fertility is primarily, if not exclusively, the prerogative of individuals who have experienced a vital event permitting fertility: marriage, here used in the

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** Nuptiality here is not limited to the formation or dissolution of legal marriage but includes any union in which fertility is socially expected.

broadest sense of the word. Consequently, the risks of formation and dissolution of a union could also be an area for action designed to alter fertility, and hence natality.

Intervention in demographic processes therefore necessarily implies action to influence risks—of death, migration, reproduction, formation and dissolution of a union—in order to alter their intensity and/or timing. (It will be recalled that intensity may be measured, for example, by the average number of vital events per individual and that the timing may be measured by the average interval between a specific originating event, birth, marriage etc., and the occurrence of the event in question, or by the average interval between such events when they are repeatable. It should also be noted that the intensity of mortality cannot be altered, since it is necessarily equal to unity.)

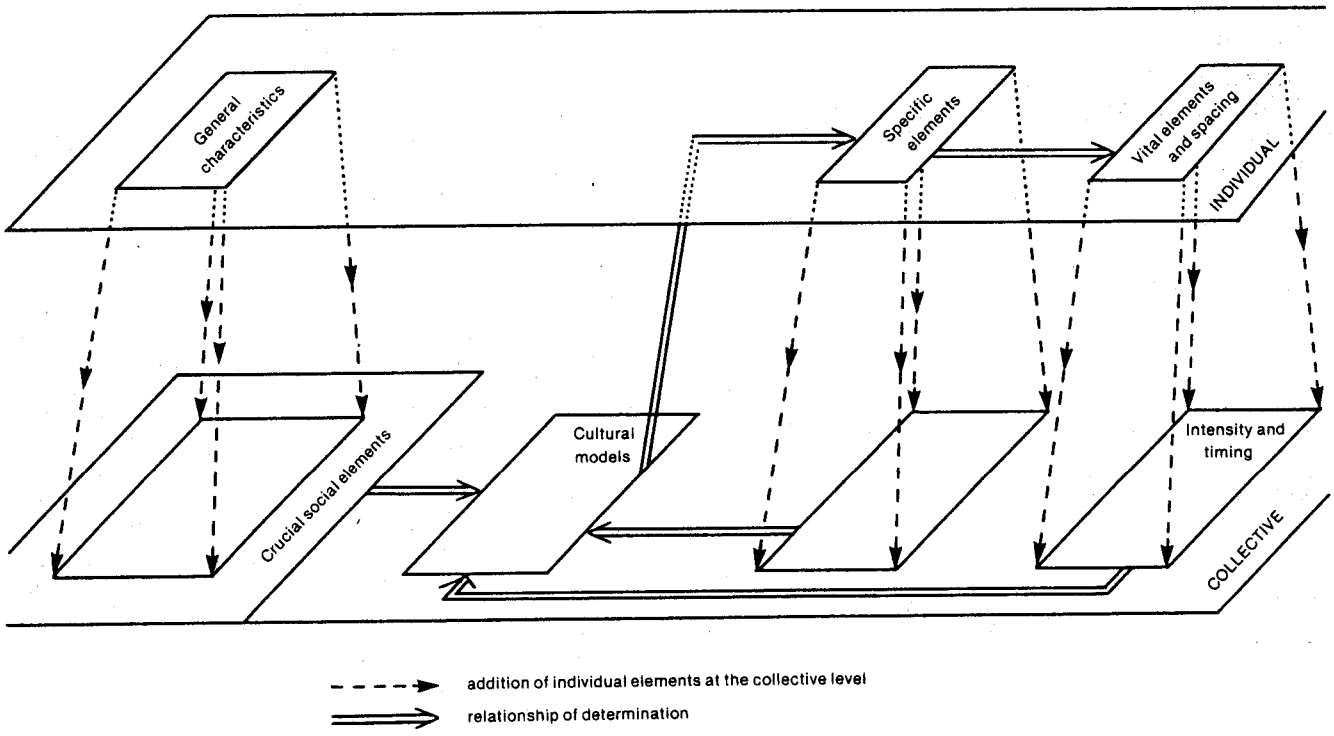
1. *Mechanisms determining those elements*

The intensity and timing of risks are the result of complex mechanisms, which must be identified before any action can be attempted to influence them. Personalized at the level of the individual, the risks therefore depend to a certain extent on the initiative and characteristics of that individual. They are also largely dependent on socio-cultural determinants, which set the limits of the socially permitted individual variations and which also influence the actual impact of the individual's initiative and characteristics.

The determinants of the risks with which we are concerned here therefore exist at two levels of reality: the individual level and the collective level. This distinction is particularly basic because there is between those two levels a far-reaching interdependence which is difficult to decode but which must nevertheless be taken into account in any attempt to explain or to intervene.

There is not space enough in the present paper to give details of the various individual and collective elements involved in the mechanisms determining the intensity and timing of each of the risks. Indeed, they are not all identified to the same degree and little is known yet about the relationship between the elements. It will suffice therefore to recall and briefly discuss a general analytical diagram based on the fundamental dichotomy between the individual and the collective level of reality, which are represented by two horizontal planes. (I developed this diagram in the course entitled "Sociology of population" which I teach as part of the demographic training programme at the Université catholique de Louvain.) Given the present state of research, this diagram is not uniformly applicable to the various risks studied (except, of course, to external immigration, for which the individual and collective determinants are mostly related to the migrants' society of origin, which is outside the scope of the specific analysis of the country of arrival). It will, however, reveal possible areas of intervention, while suggesting a number of limitations; moreover, viewed in a dynamic context, it will help us to take into account delayed effects and feedback effects, because it is in no way linked to the recursivity hypothesis which characterizes many causality models. (This is not a causality model but a diagram into which various hypotheses or various causality models may be fitted. It will be recalled that the recursivity hypothesis means that one variable cannot be both the cause and the consequence of another.)

Analytical diagram of the risk of . . . (reproduction, death, migration)



2. *Determining mechanisms at the individual level*

At this level, two categories of elements may be distinguished:* first, those which are specifically involved in the occurrence of the risk studied; secondly, the individual's characteristics, which, while not specific to any particular risk, are presumed to be related to risks.

The specific elements may be usefully divided into three subcategories. The first concerns physiology: it is more immediately linked to the occurrence of the risk and is particularly relevant to mortality (diseases, malformations, causes of death) and to fertility (fecundability, non-susceptible period, intra-uterine mortality). The second subcategory concerns the individual's behaviour as regards the occurrence of the risk: for example, diet and preventive or curative behaviour in the case of mortality and, in the case of fertility, behaviour designed to reduce or increase, as appropriate, fecundability, non-susceptible period, or risks of intra-uterine mortality. The last subcategory comprises elements of a mental nature specific to the individual and directly concerning the risk studied: for example, expatriation plans, extrovert attitudes and permeability to other cultures in the case of migration; attitudes towards the body, definition of disease and of suffering, in the case of mortality; and, in the case of fertility, the importance attached to children and to motherhood, fertility plans and the awareness of social pressures and measures in this connection.

While the identification of the elements in those three subcategories presents no insurmountable difficulties, the same is not true when one attempts to specify the complex and changing relationships between them. These are relationships within the subcategories (opinions influence attitudes but also depend on them; use of contraception may influence the frequency of sexual relations, but the frequency may determine the choice of method; non-use of contraception may result in abortions etc.), and relationships between different subcategories, which often go beyond the simple order which it would be tempting to establish and in which mental elements would determine behaviour, which would influence physiological elements (sterility or non-fecundity may necessitate very limited fertility plans, the practice of contraception or abortion may result in changed attitudes towards them etc.).

Lastly, the point must be made that the weighing of the various elements and of the categories which they constitute is far from uniform or constant; it varies in time and in space and this variation is very probably linked to the level of the risks themselves.

The second category of elements comprises the individual's more general characteristics, which are presumed to be related to the risk studied but to an extent necessarily mediated by specific elements in the first category. Generally those characteristics are sex, age, education, profession, religion, income etc. The study of those relationships usually constitutes the essential part, if not the entirety of the analysis of the sociological determinants of the risks studied. Numerous characteristics have been identified and this identification is regularly verified by research, although this has not led to a better understanding of the mechanism of those relationships. In the present state of our knowledge, while it may be admitted that some of those characteristics do have an influence on one element or another (mental, behavioural or physiological) specific to one of the risks involved, it would seem that the principal role of those characteristics is to link the individual to a social entity having a special cultural model in regard to this risk. This brings us to the second level of the diagram—the collective level of reality.

3. *Determining mechanisms at the collective level*

At the collective level of reality, the focal point—and in a way the pivotal point of the entire diagram—is the cultural models peculiar to each risk and relating both to the vital events resulting from the risk (birth, death, marriage etc.) and to the specific individual elements mentioned above: mental, behavioural and physiological. Cultural models to some extent define the materialization of those elements, the limits for their socially acceptable variations, and give them their own cultural meaning.

Those cultural models are not reduced to social norms, which are only one expression of them; they are more pervasive and much more difficult to grasp. They constitute in a way the social logic surrounding the phenomenon concerned, which is the result of the whole dynamism of society: its value system and social structure, and also very specifically the practice of individuals in this connection. (It should be noted, however, that a considerable body of research has indicated that a different hypothesis could be advanced: that specific elements at the individual level are influenced by sociocultural factors, but in a relatively independent manner, without those influences being integrated in the elaboration of cultural models.)

Since they are the product of the collective consciousness—and perhaps, still more, of the collective unconscious—they cannot be observed directly and are approached only very partially through inference based on the views which individuals can express about them and on individuals' behaviour, and through deduction as to the possible consequences of a particular element of social life for the cultural significance of the phenomenon studied.

Undoubtedly every society has several cultural models for one and the same phenomenon, which differ to varying degrees and are sometimes even irreconcilable, depending on the degree of cultural heterogeneity of that society. Nevertheless, by generalizing and simplifying, we may admit the reality of a dominant cultural model with which particular models should be more or less compatible, since the latter generally seem to be much more precise and rigid than the former. In addi-

* In addition, of course, to the elements which are themselves determined and which enable us to measure, for each individual, both the intensity and the timing of the risk in question, such as number of live births and their spacing in the case of fertility, age at death in the case of mortality, and number of timing of changes of residence in the case of spatial mobility.

tion, there may also exist one or more models which depart radically from the dominant model: the deviant models. Although their impact may be minimal and temporary, in many cases those models play a prophetic role and are then of crucial importance for developments in this regard.

Despite the difficulty of observing them and defining their content, those models provide the key to the process determining the risks studied here, and thus also to any action designed to influence them.

While cultural models are created by the whole dynamism of society, certain elements play a greater part in their formulation, continuation or evolution; they may then be considered crucial elements. For example, the organization of the family or the role of women in society may constitute crucial elements for the cultural models for fertility. The same is true of certain characteristics of society, corresponding to the sum of individual characteristics, such as the proportion of women gainfully employed, the distribution of the population by religion, education etc.

At first sight, the identification of the crucial elements involved in cultural models may seem to have reached a much more advanced stage than the study of the models themselves. There are numerous studies illustrating the relationship between the risks studied and education, gainful employment of women, residence, income, religion, ethnic origin etc. Despite the fact that those studies do not necessarily fit into the context described here, they have without any doubt assembled a great deal of information which will be extremely useful. One must, however, beware of jumping to conclusions. While the traditionally studied characteristics often make it possible to evolve categories which are significant from the point of view of risks, they are not necessarily the ones which are crucial, or the most crucial, in the context we are considering. Moreover, there still remains the problem of the interrelationship between the socio-cultural elements which may prove to be crucial. This problem must be resolved, at least in an approximate fashion, if we are to consider as determinant or causal an element which is related to the models concerned.

Created by the social system as a whole and mitigating the influence of that system on risks, cultural models also depend on the practices and achievements of individuals. This is why it may be useful to distinguish, on the collective plane of reality, two other categories of elements obtained by addition of individual elements: first, measures at the collective levels expressing the risk itself, such as measures of intensity and timing; secondly, the addition of the specific individual elements relating to physiological, behavioural and mental areas. This is, so to speak, the collective echo of individual acts, measured by adding them together, which has an impact on cultural models.

Lastly, it should be noted that those models possess a certain inertia enabling them to subsist despite considerable changes in society, and that in certain respects they also seem, to some extent, to occur spontaneously.

These are, in brief, the elements and processes underlying the occurrence of the risks which a demographic policy might attempt to influence. The individual refers to particular cultural models which the characteristics of his social background impose on him through processes of socialization and social control. Consequently, he thinks and behaves in the light of those models, and it is in that context and also with their assistance that he may, if appropriate, exercise his freedom. The social or collective basis of the process is thus of vital importance and can apparently rightly be regarded as the main stumbling block in any attempt to alter risks. Paradoxically, as we shall see later, this social basis has so far rarely constituted the main target of implementation policies, which prefer to concentrate on the individual.

II. POSSIBLE TYPES OF INTERVENTION

Since the risks depend both on individuals and on collective factors, a policy regarding such risks will be focused on the former or the latter. Without trying to make an exhaustive inventory, the main types of possible intervention are described and, placing them in the framework of the analytical scheme just presented, the hypotheses which underlie them are given.

A. *At the individual level*

The action may relate to elements which, in an individual, are directly involved in the realization of the risk studied and which belong to the physiological, behavioural and mental domain. It may also be designed merely to modify certain general characteristics of individuals which are thought to be associated with different levels of risk.

1. *On individual characteristics*

This type of intervention is far less completely documented than the kind aimed at the elements specific to the risk itself; none the less, it is frequently recommended, especially if, for non-scientific reasons, an intervention at the level of the behaviour on attitudes of individuals is not desired.

Suggestions in this connection are based most often in a rather simplistic fashion on observations of association—at the individual level, or even, although more debatably, at the aggregate level—between the risk studied and certain individual characteristics, such as education, residence and income. The meaning of those relationships and the explanatory justifications are then added, on the basis of common sense, or at least of very Western-centred speculations; in any case, they are never empirically verified and, as a result, some surprises are occasionally encountered.*

Even if one admits the reality and direction of the relationships thus proposed, the mechanism machinery of their possible impact on the risks studied is not

* This was the case a few years ago when researchers observed a positive relationship between level of education and fertility in certain African towns, even though that finding was contrary to all classical theories.

known, which makes it highly dubious that they would be used as part of a policy. At this stage it appears that two hypotheses may be advanced in connection with the machinery of their impact.

First of all, it could be assumed in certain cases that there is a direct relationship between the modifications of characteristics and the changes in behaviours, projects of other elements specific to the risk studied. Thus, for example, it has been claimed that in Western countries an increase in the income of certain social categories would induce the couples belonging to that category to accept, if not in fact to desire, more children. If such direct relationships exist—and there is no reason to reject them *a priori*—the resulting change (an increase in fertility in the example cited) could take place only within the limits prescribed by the cultural model. One may therefore expect that such measures will be totally inoperative when a radical change is sought.

Another possible mechanism, and probably a more effective one, for the modification of characteristics would consist in inducing the individual to pattern himself after a cultural model more compatible with the objectives being sought. Thus, for an example, significantly raising the level of education in an African country would cause individuals to take a different view of family structure, the role of women, the role of the father etc.—in short, to opt for a cultural model of reduced fertility. But such a relationship does not automatically hold and may not be found in the case of every culture or every increase in the level of education.

This type of intervention is not, of course, to be discarded, but before resorting to it, it is essential to be able to answer a three-fold question: What characteristics should be modified? Under what conditions should this be done? What effect can be expected of it?

2. *Elements specific to the risk*

Interventions on individual elements specific to the risk studied are undoubtedly the ones most thoroughly documented and the ones most frequently recommended and used. We may usefully distinguish three types of such intervention: (*a*) the offer of information and services, (*b*) persuasion and (*c*) coercion.

(a) *Offer of information and services*

The first type of intervention consists in making available to individuals—to all individuals or only to a selected group—the means of information, and possibly the necessary technical means as well, for realizing the desired behaviour. For example, this could include the provision of information on contraception and the establishment of services for the distribution of contraceptives or the provision of information on the desirability of being vaccinated against particular diseases and the setting up of vaccination services.

Hypothesis: This type of intervention presupposes that the individual's adoption of the desired behaviour is not obstructed by any difficulties other than a lack of knowledge or lack of technical means; consequently, if the case arises, it would be perfectly compatible with existing cultural models.

Such a hypothesis is often disproved in preventive, or even curative, health programmes both in third world countries and in developed countries. It is soon found necessary to resort to health education programmes that include persuasion techniques or to some types of incentive, and therefore to adopt an intervention of the second type.

And yet it is in this category, according to the principal proponents,[1] that we should classify family planning programmes, which are by far the most widely used programmes in the world today. It is therefore interesting to consider these at some length.

Family planning programmes

The primary objective of these programmes is to provide couples with the information and the technical means necessary to enable them to control their fertility. This implies, first of all, informing them about the physiological processes of reproduction, about the various methods of contraception, about sterilization and about abortion. It also implies making contraceptives available and organizing services which are capable of carrying out sterilization procedures and abortions and are even capable, in principle, of treating cases of sterility or undesired subfecundity.

However, the definition of those programmes as antinatalist policies implies several hypotheses which have by no means been verified.[2] They relate, first of all, to the number of children desired. It is assumed (*a*) that couples desire a determined number of children, (*b*) that this number is lower than the number that they would have or that they have already, (*c*) that this number would bring about a rate of demographic growth much lower than the present rate and probably compatible with the objectives of society. Secondly, some of the other hypotheses relate to the way in which couples react to the situation: (*a*) that couples desire to control their births but (*b*) that they do not know how to control their fertility and that if they knew, they would wish to do so, and (*c*) that if they were informed, they would control their fertility in such a way as not to exceed the desired number of children, or at least to exceed that number by as little as possible.[3]

Underlying those hypotheses there is an even more fundamental one which regards procreative behaviour as rational and subject to rationally justified modifications.[4]

Those different hypotheses are, for the most part, based on an almost intuitive knowledge of Western experience and on the results of surveys of the KAP type* which seem to have been read in part through the Western cultural prism.

Even if one can suppose that some procreative behaviour is rational, there is reason to doubt that most

* These are highly standardized surveys on knowledge, attitudes and practices in matters of fertility, which were advocated during the 1960s by both the Population Council and other family planning bodies.

of it is and to fear that its seeming rationality is mostly a rationalization *a posteriori*. Furthermore, rationality may vary from one culture to another, and it would be foolhardy to believe that in this domain the rationality of the various cultures would be largely identical with that of Western culture.

The first two hypotheses concerning the number of children desired, as well as the fourth and fifth hypotheses, are generally supported by the results of KAP surveys. However, what people regard as projects or attitudes powerful enough to make couples resort to new types of behaviour are in reality only replies given by one of the spouses, usually the wife, in a thoroughly structured interview situation in which the replies are often pre-coded. Consequently, one may legitimately doubt the justification for those hypotheses, whether concluding the validity of applying to the couple a reply given by one spouse alone, or the conclusion that the reply given relates to a family planning project, or even that a project actually exists.[5]

The last three hypotheses basically link the absence of birth control among couples to a lack of knowledge of birth-control methods. However, this seems to be contradicted by the facts. In the past, it is true, the spread of birth control, first in France and then in other Western countries, occurred spontaneously and was opposed by the established religious and civil powers; the utilization of methods well known at the time was a response to a new need. Japan and Taiwan Province are other examples in which the practice of birth control preceded any organized programme for that purpose. One may also mention certain African populations which maintain a birth spacing of two years or even longer. Hence, a fertility rate not voluntarily limited might better be explained by a real absence of motivation than by a lack of knowledge. Having said this, one can agree with R. Freedman[6] that the social legitimization of birth control and the availability of effective contraceptives will promote the realization of motivations.

Even where those hypotheses were verified, a family planning programme can, at best, do no more than eliminate some of the undesired births in the fertility rate of couples.[7] However, such a success, despite its improbability in the majority of cases, would be insufficient to reduce fertility to a desirable level. Moreover, the contrary would imply a hypothesis which K. Davis rightly challenges,[8] namely, that the sum of the decisions taken by individuals in their own interests (in the relatively short term) necessarily results in fertility control which is adequate for the (longer-term) objectives pursued by society—objectives of which the individuals, for the most part, are not even aware.

While in general they are far from meeting the needs of an anti-natalist policy, family planning programmes nevertheless remain necessary and very useful from this point of view, but they constitute only one of the means to which a demographic policy can resort. It must, in fact, be emphasized that those programmes have a demographic "vocation" only by accident; it does not constitute their essential objective, which is to make procreation conscious and intentional. The relationship apparently existing between this type of procreation and a lower fertility rate has led to a school of thought which regards those programmes as the ideal means of action for reducing fertility; it is all the more satisfactory because it corresponds to realities very highly valued in Western culture and especially because, in view of the principle of individual freedom claimed for it, it should appear admissible to many ideologies. However, if those programmes are invaded by demographic concerns, there is a danger that they will no longer meet their primary objective and yet be inadequate for the anti-natalist objectives.

(b) *Persuasion*

A second type of intervention relating to the individual elements specific to the risk studied is designed to persuade individuals to adopt the behaviour which it is designed to promote, or, conversely, to desist from behaviour which it is designed to prevent; this could apply, for example, to a preference for breast-feeding over artificial feeding, or to remaining in the village rather than leaving for the town, or to settling in a region recommended by the Government rather than in the metropolis, or to using preventive-medicine services, pre-natal counselling and the like.

Hypothesis: This type of intervention presupposes that the desired modification ultimately depends only on the good will of the individual. Thus, efforts must be made to steer this good will in the desired direction.

But what do we mean by this good will? Does it mean the attitude of the individual in relation to the objective of the behaviour concerned, or even his general view of things with regard to the phenomenon in question, or does it instead mean his intention in connection with a very immediate type of behaviour?

In a study of this type of intervention, T. J. Crawford[9] observes that psychologists have challenged the causal relationship between attitudes and behaviour which would make it appear that a change in behaviour should necessarily arise out of a change in attitude. In fact, investigations seem to show that in many cases attitudes change as a result of behaviour and that it is easier and faster to modify the latter than the former.[10] It would therefore be preferable to focus the persuasion programme not on the individual's attitudes but on his intentions with regard to behaviour in the short term.[11]

J. Cooper believes that certain conditions are necessary to make it possible for deviant behaviour to bring about a change in attitude. In connection with birth control, he writes: "*If* the inducements are just sufficient to obtain the attitude discrepant behaviour of family planning and *if* the behaviour is perceived as freely chosen and *if* people understand that their decision to participate in family planning will result in the consequence of smaller families than they had originally desired, then the conditions for dissonance arousal will have been satisfied. The ensuing behaviour should result in a new attitude toward family planning which is consistent with the behaviour."[12]

Thus, identification of the individual's good will, which should be the objective of this type of intervention, gives rise to problems; this question will not be discussed here. However, I believe that in addition to the conditions mentioned by J. Cooper, one must consider the compatibility, or at least the neutrality, of the new behaviour with regard to established cultural models. Otherwise, resistance would inevitably be much stronger and would prevent, if not the adoption of the behaviour, at least the attitude modification it is intended to bring. We need merely recall, for example, the experiences of missionaries or colonizers in their attempts to suppress polygamy in certain African populations before independence; most of the time the conversion of polygamists to monogamists was of very short duration and had to be constantly renewed.[13]

The possible techniques of persuasion are many and vary in the intensity of the pressure they exert on the individual's free choice; they range from publicity through the mass communications media—newspapers, radio, television, posters etc.—to pure and simple conditioning, passing through the stages of oriented information disseminated in a general way or a particular way as a part of school programmes, personal contacts by propagandists and the establishment of various honorary or material incentives, or even of repressive measures.

The studies relate mainly to the identification of the specific measures, their classification according to various criteria, a description of new experiments—new either with regard to the measures applied or with regard to the population concerned—on the technical aspects of the application and economic or administrative conditions required, as well as on the effectiveness expected or already achieved. Actually, most of those works relate to fertility,[14] and many of them give preference to the study of incentives and coercive measures.[15]

Even though there are quite a few of these studies, they do not provide a solution for certain problems which might discourage any use of such measures as a part of a demographic policy.

Furthermore, their effectiveness is, in general, very little known. While most authors recognize this gap and emphasize the difficulties involved in making such an appraisal, this does not seem to be enough reason to give up the idea. The situation leaves everyone's imagination free to form a "conviction" on the basis of very superficial observations or lines of reasoning which depend more or less closely on a given culture or subculture, or else a "conviction" based solely on common sense and obviousness.

It is probably convictions of this kind which often provide the basis for numerous measures adopted as a part of demographic policy, such as family allowances, birth grants and special allowances for mothers who stay at home, as incentives for promoting births, or, conversely, the various financial advantages, immediate or deferred, or the beginnings of a social security or old-age insurance system established as anti-natalist incentives.

Another unsolved and in fact little-studied problem concerns the cultural compatibility and suitability of the recommended measures. Are those measures not too often regarded as fundamentally independent of the culture to which they are to be applied and of the culture from which they arose, in most cases Western culture? We must agree with B. Berelson[16] in rejecting the assertion that countries no longer have the means or the time to pay attention to this criterion. The urgency of the problems can only reinforce the importance of this criterion, to the extent it proves to be necessary for the success of the policy in question.

In addition, and more profoundly,[17] persuasion implies more than the establishment of advantages or disadvantages which individuals would be free to use or not to use. It carries an explicit message aimed at motivating individuals and furnishing them with the justifications necessary for behaving in the desired manner. The modification of social support, which is indispensable to the motivation of individuals, is carried out by promoting, or on the contrary opposing, certain pre-existing elements and by introducing new elements. Such an operation is not without danger even if, by hypothesis, it does not apply directly to the cultural models themselves. It may, in fact, arouse cultural conflicts in the individual, conflicts which are all the more unsolvable because the new social support is further removed from the old one and, in certain respects, is even contrary to it. Therefore it would be useful to ask ourselves how far those possible conflicts might go and what means can be used to reduce their scope and channel them towards the desired solution.

In this same perspective, the justifications proposed to individuals should remain within the limits of what is actually feasible, and their general orientation should be compatible with that of society's other objectives.[18]

Thus, the proposed justifications may arise out of the social advancement of women, or of the couple, from the consumption of material goods such as food, shelter etc., or of cultural goods such as education. The introduction of such objectives as a basis for motivation would require society to be able, both economically and socially, to meet the aspirations of the individuals who adopt the recommended behaviour in order that they might attain those objectives. If that were not so, reactions of frustration and discouragement might develop and actually endanger the success of the policy.

Not only must the objectives proposed for the motivations be feasible, but, what is more, they must fit into the general direction followed by society—for example, economic and social development. In some cases, that development may mean favouring the collective more than the individual, production more than consumption, the future more than the present etc.; it would be wrong, for example, to promote the first choice in the general direction followed by society and the second in demographic policy.

After considering persuasion as a possible type of intervention, we find nothing to justify the faith placed in it by policies in general—neither the hypothesis it is

based on, nor the conditions for its application, nor the results that can be attributed to it[19]—irrespective of the demographic phenomenon concerned. Subject to certain conditions, this type of intervention seems indicated, although without too much assurance, to sustain or accentuate a tendency which is already being manifested; on the other hand, it would be inoperative in any effort aimed at radically overturning tendencies which are a part of the social and cultural reality. Can it be that the faith placed in persuasion is due to its intermediate position between outright coercion and respect for individual freedom? If that were the case, it would be regarded as capable of the effectiveness attributed to the former and the ideological seemliness attributed to the latter.

(c) *Coercion*

The third type of direct intervention at the individual level is the most radical, if not the most effective. Its aim is to compel the individual to behave in a certain way, either by prohibiting other types of behaviour or by forcing him to adopt specific types of behaviour. Such procedures are based either on legislation and coercive measures explicitly instituted by the authorities (for example, the minimum legal age at marriage, prohibition of abortion, compulsory inoculation, forced migration) or on the force of customary laws, which are not always given explicit expression but which are an integral enough part of life among the group to be operative (for example, in certain African communities, the obligation to have a two-year interval between successive births but to procreate fairly soon after that interval).

Hypothesis: As in earlier cases, the desired modification is assumed to depend, in the final analysis, solely on the good will of the individual; moreover, it is assumed that this good will can be influenced by legislation.

Even when it has been admitted that the desired modification hinges on individual good will, coercion cannot be effective unless three conditions are met.[20] First, the right claimed by the authority in question to coerce individuals to that end must be recognized and accepted by society or, at the very least, grudgingly acknowledged. Secondly, the extent to which that right can be exercised will depend on the degree of social visibility of the prohibited or compulsory action, and thirdly, it will also depend on the existence of a system of control which is permanent and effective or, at least, perceived as such by individuals.

Let us take the example of age at marriage. It is generally accepted in Western countries that legislators have the right to set the minimum age at marriage. Furthermore, this is a highly visible fact of life, at least from the administrative standpoint, given the existence of civil registers. Also, the system of control is such that breaches seem impossible. Accordingly, a change in the minimum age at marriage appears *a priori* quite feasible. The situation is quite different in most of the developing countries where, as a rule, most people have only a very rough idea, if any, of their age, registers of births are virtually non-existent and marriages need not be sanctioned by the administrative authorities. In such cases, any raising of the minimum legal age at marriage, as an anti-natalist measure, for example, has every chance of remaining a dead letter, except where legislators command such a degree of moral authority among the population that it voluntarily lives up to their expectations.

There are a number of examples to illustrate the limits of this type of intervention. They include the spread of birth control since the middle of the eighteenth century in France, and later in the rest of Western Europe, despite opposition of the Church (which was able to use confession as an effective instrument of control) and the State, the falling into abeyance of prohibitions on abortion in many Western countries, and the failure of Romania's pro-natalist policy based partly on the prohibition of abortion and contraception. No doubt other examples may be used to illustrate the effectiveness of coercion; one need only think of the compulsory deportations *en masse* ordered in several countries, restrictions associated with changes of residence in some countries[21] and legislation governing marriage and divorce.

In any event, the effectiveness of such coercive measures still hinges on the aforementioned conditions. Hence, this type of intervention can no longer be justifiably presented as a last resort which is bound to be effective, or indeed brandished as a threat, unless a dictatorial political régime is first set up to impose the right of coercion and develop an effective system of control. That system, however, would still be limited by the degree of social visibility of the compulsory action.

B. *At the collective level*

At this level, the focus is on cultural models, which are the corner-stone of the entire process of risks. It is those very models which, by their existence, limit the opportunities for intervention at the individual level.

In this case the modification of cultural models in the desired direction obliges the individual to adapt his usual behaviour, which he finds increasingly incompatible with the new structure, or rather with the new vision of the world that he has developed almost unconsciously. In simpler terms, paradoxically, the individual is forced to decide freely to do what others want to make him do.

Since the hypotheses that impinge on intervention at the individual level do not apply to intervention at the collective level, the latter type appears very promising. Provided it is perfectly controlled, intervention at the collective level would make it possible to direct demographic processes at will and, what is more, to do so while formally maintaining full respect for individual freedom.

However, we are far from having perfect control, if indeed we have control at all. Since cultural models themselves are not directly vulnerable, intervention must be aimed at the elements from which they arise. In this connection, what we know is so incomplete and spotty that all the potential scenarios first suggested, which also

gave hints of the possible dangers of such manipulations, quickly vanish, leaving in the final analysis a patchwork of hypotheses, guesses or even beliefs which are seldom sufficiently well founded to permit the proper formulation of intervention strategies. (We would have to identify which elements are crucial to the modification of cultural models and be able to estimate what changes have to be made in them in order to have as the end product after some period of time (which itself has to be estimated) the desired modification in the trend of the risk concerned: fertility, mortality or migration.)

All the same, even if perfect control is never achieved, this type of intervention must be the approach of any policy which aims to do more than maintain existing trends; but it may have to be accompanied by supportive intervention at the level of individuals in order to facilitate their adaptation to the resulting social changes.

Accordingly, an attempt must be made to identify the major conceivable channels for intervention aimed at cultural models. On the basis of the scheme described at the beginning of the present paper, two channels for intervention may be identified: feedback and the manipulation of crucial determinants.

1. *Feedback*

While cultural models determine mental and behavioural elements, they are in turn vulnerable to the aggregate weight of those elements, and hence also to the aggregate weight of the modifications achieved at the individual level. This is referred to as feedback. It may appear that cultural models are partly governed by the way in which they are actualized in practice. In the longer term, therefore, the range of permitted variations may extend further in the direction favoured by specific actualizations.

Nevertheless, such transformations of the cultural model, where the sole determinant is the actualization of the models, can only be long-term and almost imperceptible processes. It therefore hardly seems likely that new trends will be initiated through feedback, unless there emerges a social implant, as it were, which is independent of cultural models and the very presence of which could modify them. That would be the case, for instance, if a group of families steeped in Western culture moved into a traditional community and if their very presence led to an imperceptible modification of the cultural models determining certain practices, without any change in other respects.

While this type of intervention by social implant is conceivable at the theoretical level, it still poses a number of problems, and it is hard to see how and under what conditions it can be accomplished to good purpose.

2. *Manipulation of crucial determinants*

The problems in identifying the crucial determinants of cultural models and of decoding the interrelations of which they are a part were referred to earlier. In addition to the fact that such research is difficult (though "difficult" does not mean "impossible"), it has to be admitted that such an approach is rarely visible in the papers published so far and that it is therefore very hard to document this type of intervention.

To be sure, the literature contains quite a few suggestions which may be included in the framework outlined here. For example, some of the ways that many writers have advocated for reducing the reproduction rate are the promotion of education, particularly the education of women, the improvement of the status of women with a view to establishing equality between sexes, the development of women's capacity to engage in work outside the home, the abolition of child labour, the institution of compulsory education up to a certain age and, more generally, preparation for the process of socio-economic development. More often than not, such suggestions are based on the observation of social or regional differentiations between risks and on hasty and seldom verified interpretations.

It must be admitted that the known elements in this area are still so spotty and unreliable that it is not possible to formulate intervention proposals that are sound enough from the scientific standpoint. For the past few years, however, there have been various theoretical formulations[22] which suggest that this approach may have real potential, provided that research is conducted according to strict standards and does not become too badly diluted by individualistic peculiarities.

III. Conclusion

On the basis of all the findings in the study, scepticism with regard to the claims of those advocating demographic policies seems to be desirable. It would appear more realistic not to attempt any action in this area. But in that case, should there not be similar scepticism with regard to policies in such other areas as economics and international relations? Surely to indulge in such scepticism would be to forget that human understanding and action usually progress by trial and error, the starting-point being more or less confirmed hypotheses, followed by attempts to act on the basis of such hypotheses, even if they have to be reviewed in the event of failure.

In the field which concerns us, the fact that we have pin-pointed the gaps in our understanding and questioned the experiments conducted does not mean that we are faced with a *tabula rasa*. There is a great deal of high quality research in demography; there have been many experiments with the monitoring of demographic phenomena. It seems that the time has come to attempt a critical consolidation of our knowledge and experience in demographic policy and to accord greater importance to theorization and systematic verification than to directly utilitarian aspects. This consolidation would make it possible to overcome the limits and marshal the potential of our knowledge and to identify the relevant issues for a genuine improvement in the control society can hope to have over the dynamics of demography.

Would this be taking too circuitous a route to dubious results? If we fail to take that route, we are likely to find ourselves struggling with delusions of success and ultimately drawn this way and that by all kinds of events

and political measures. Can a scientist afford this kind of travelling?

NOTES

[1] We may cite, for example, B. Berelson, who declared in 1967 that national family-planning programmes "bring family planning information services and supplies to mass populations in the developing world in order to promote effective family planning practices, for the welfare of the individual family and/or the national community", in "National family planning programs, where we stand", *Studies in Family Planning*, No. 39 (Supplement), March 1969, p. 341. Similarly, in an article published in 1977 ("Paths to fertility reduction: the 'policy cube'", *Family Planning Perspectives*, vol. 9, No. 5 (1977), p. 216), he lists them among the strategies designed "to improve access of more people to modern means of fertility control and provide better services" (table 1).

[2] Along the same lines, cf. R. H. Weller, "Non-failing planning approaches to achieving population change targets", *Seminar on Demographic Research in Relation to Population Growth Targets*, St. Augustine, Trinidad and Tobago, 3-9 April 1973 (Paris, Committee for International Co-operation of National Research in Demography, 1973), pp. 79-89.

[3] Hypotheses of this kind are seldom expressed; however, J. Bailey mentions them in "An evaluative look at a family planning radio campaign in Latin America", *Studies in Family Planning*, vol. 4, No. 10 (1973), pp. 275-278. "The rationale behind the radio campaign was that a substantial number of women in Colombia did not want any more children but did not know where they could receive family planning services." The results of that information campaign are, moreover, considered conclusive by the author and therefore strengthen the probability of this hypothesis.

[4] This hypothesis has been criticized by, among others, P. M. Hauser, "Population policies affecting fertility: a sociological perspective on family planning programs", IUSSP, *International Population Conference*, Liège, 1973, vol. 3, pp. 303-318.

[5] Cf. H. Gerard and L. Lohle-Tart, *"La dimension familiale: pour une remise en question de concepts"*, *Population et Famille*, vol. 2, No. 29 (1973), pp. 63-77; R. G. Ridker, "Desired family size and the efficacy of current family planning programmes", *Population Studies*, vol. 23, No. 2 (1969), pp. 279-284.

[6] R. Freedman, "Theories of fertility decline: a reappraisal", *Social Forces*, vol. 58, No. 1 (North Carolina, United States of America, 1979), pp. 1-17.

[7] K. Davis, "Population policy: will current programs succeed?", *Science*, vol. 158 (Washington, D.C., 1967), pp. 227-258.

[8] *Ibid.*, p. 732.

[9] T. J. Crawford, "Theories of attitude change and the 'beyond family planning' debate: the case for the persuasion approach in population policy", *The Journal of Social Issues*, vol. 30, No. 4 (1974), pp. 211-233.

[10] "Today many, perhaps most, social psychologists believe that programs that concentrate upon changing behavior directly will ultimately prove to be more effective than programs that indirectly attempt to change behavior by the intermediate step of communication-produced intrapsychic realignment", *ibid.*, p. 219.

[11] "The implication of this line of argument is that communication and persuasion programs that attempt to alter behavior should be aimed not at changing global evaluations of 'birth control' or 'large families' but at changing intentions to engage in specific family planning behaviors within a given period of time", *ibid.*, p. 224.

[12] J. Cooper, "Population control and the psychology of forced compliance", *The Journal of Social Issues*, vol. 30, No. 4 (1974), p. 271.

[13] In this connection, see Ngondo A. Pitshandenge, *De la nuptialité et de fécondité des polygames. Le cas des Yaka de Popokabaka (Zaïre)* (Brussels, Annales du Musée royal de l'Afrique centrale, Tervuren, No. 109 (1982), pp. 7-13.

[14] In this connection, see, for example, *Measures, Policies and Programmes Affecting Fertility, with Particular Reference to National Family Planning Programmes* (United Nations publication, Sales No. E.72.XIII.2), particularly pp. 17-35; B. Berelson, "Paths to fertility reduction . . .", *op. cit.*, pp. 213-219; T. King, ed., *Population Policies and Economic Development, A World Bank Staff Report* (Baltimore, London, The Johns Hopkins University Press, 1974); with regard to migrations, cf. R. J. Fuchs and G. J. Demko, "Population distribution policies in developed socialist and Western nations", *Population and Development Review*, vol. 5, No. 3 (New York, 1979), pp. 439-467.

[15] For example, C. B. Park, "Incentives and disincentives in population programmes", in *The Role of Incentives in Family Planning Programmes*, Policy Development Studies, No. 4 (New York, UNFPA, 1980), pp. 10-39; see also several studies published in *Studies in Family Planning*.

[16] B. Berelson, "Paths to fertility reduction . . .", *op. cit.*, p. 216; the author speaks of the criterion of "acceptability".

[17] Cf. H. Gerard, *"Quelques orientations de recherches à propos des politiques anti natalistes"*, *Recherches économiques de Louvain*, September 1967, pp. 478-481.

[18] In this connection, cf. R. P. Worrall, "Communications, population and family planning", *Population Bulletin*, vol. 31, No. 5 (1977), p. 9.

[19] The least one can say is that its effectiveness is highly debatable. For example, with regard to pro-natalistic, cf. C. Calot and J. Hecht, "The control of fertility trends", in Council of Europe, *Population Decline in Europe: Implications of a Declining or Stationary Population* (London, Edward Arnold, 1978), pp. 178-196; C. F. Hohn, "An international analysis of the effects of family allowance programs in fertility levels", *International Journal of Sociology of the Family*, vol. 6, No. 1 (1976), pp. 45-56; M. A. Salo, "Difficulties in assessing pro-natalist population policy programs", *Yearbook of Population research in Finland*, XVIII (1980), pp. 48-59; C. B. Park's diagnosis in connection with incentives and disincentives used in an anti-natalist approach may be generalized without major changes to the totality of measures involved in this type of intervention: "Incentive and disincentive schemes have developed through trial and error. Research assessing the effects of such schemes on fertility and their cost-effectiveness has been scarce." He adds (a remark in which I do not agree with him): "Nevertheless, experience uniformly indicates that incentive schemes do play an important role in increasing acceptance of family planning methods, but more research is needed to determine its long-term effect on fertility", "Incentives and disincentives in population programmes", *op. cit.*, p. 28; a similar opinion in connection with migrations is found in R. J. Fuchs and G. J. Demko, "Population distribution policies in developed socialist and Western nations", *op. cit.*, pp. 451-457.

[20] Cf. in this connection H. Gerard, "Place de la répression dans la solution des problèmes démographiques", *Revue de l'Université de Bruxelles*, 2-3 (1975), pp. 251-252.

[21] Such restrictions call for a system of control that is beyond the means of most third world countries. Cf. in this connection A. B. Simmons, "Slowing metropolitan city growth in Asia. Policies, programs and results", *Population and Development Review*, vol. 5, No. 1 (1979), pp. 87-101.

[22] Cf. for example, the proceedings of the IUSSP Seminar held at Bad Homburg, Federal Republic of Germany, from 14 to 17 April 1980, C. Höhn and R. Mackensen, eds., *Determinants of Fertility Trends: Theories Re-examined* (Liège Ordina Editions, 1982), particularly the papers by G. Gonzales-Cortes, "Styles of development and fertility decline: some theoretical guidelines" (pp. 225-247), J. C. Caldwell, "The wealth flows theory of fertility decline" (pp. 169-188), G. McNicoll, "Institutional determinants of fertility change" (pp. 147-168).

POPULATION DISTRIBUTION, MIGRATION AND DEVELOPMENT: MAIN ISSUES FOR THE 1980s

*United Nations Secretariat**

SUMMARY

Building upon the foundations set by the World Population Plan of Action, in the areas of population distribution, internal and international migration, the paper followed very closely the agenda of the meeting. The first part reviews conceptual approaches developed in the past 10 years by scholars and planners to analyse the urbanization process and internal and international migration. A quick review of migration patterns is then presented, privileging the spatial (rural, urban and metropolitan) and temporal dimensions. The second part examines the determinants and consequences of rural migration at the micro and macro levels for developing countries. Part three first describes the characteristics of the urbanization process in developing and developed countries and secondly discusses the consequences of migration for the growth of large cities in developing countries, mainly at the macro level. The usual rapid urbanization and high rates of urban population growth of developing countries are then contrasted with the relative and sometimes even absolute decline of large agglomerations and the levelling off of urbanization in several developed countries: the so-called urban turn-around. Part four is devoted to the goals, alternative distribution strategies, instruments, implementation and evaluation of population distribution policies in developing countries. Finally, part five reviews patterns and policies of different types of international migrations and their consequences: "settler" migration, temporary labour migration, illegal or undocumented migration and refugees.

INTRODUCTION

Population distribution and migration have emerged as major demographic and development issues in many countries. Inquiries by the United Nations have found that population distribution was viewed more frequently as an important source of development problems of national Governments than was population growth in and of itself. During the past 10 years, the increased understanding of the interrelations between population distribution and development, and the growing evidence substantiating the heterogeneity of migration flows and the complexity of their costs and benefits permit a more differentiated evaluation of migration and urbanization in relation to development than was possible at the time of the World Population Conference at Bucharest in 1974. Thus, while the World Population Plan of Action[1] has set forth the major issues relating to the interrelations between population distribution, migration and development, the knowledge gained since its formulation has contributed to the deepening of the understanding of those complex issues and may result in a change of emphasis in the Plan of Action.

Building upon the foundation set by the Plan of Action in those areas, the present paper summarizes the evidence regarding five major topics. First, it shows that variety is the main characteristic of both internal and international migration in terms of function, composition, direction of flow and temporal dimension. Second, it examines the causes of rural out-migration and its consequences for rural development. Third, the consequences of migration for the evolution of large cities in developing countries are discussed, and this process is contrasted with the urban turn-around emerging in developed countries. The fourth section is devoted to the goals, strategies and effectiveness of alternative population distribution policies. Lastly, the consequences of international migration flows and the policies adopted to shape, control or cope with them are reviewed.

In discussing those topics, reference is frequently made to points about which our knowledge, though much improved, is still insufficient. The need to enhance this knowledge is obvious, but it is less clear what mechanisms may lead most efficiently to this enhance-

* Population Division, Department of International Economic and Social Affairs. The present paper was prepared for the Expert Group on Population Distribution, Migration and Development, held at Hammamet, Tunisia, from 21 to 25 March 1983, organized by the United Nations in preparation of the International Conference on Population to be held in Mexico in 1984. The paper is based to a large extent on papers commissioned to experts invited to the meeting. Contributions by regional commissions, United Nations agencies, non-governmental and intergovernmental organizations are acknowledged as an additional source of information for the paper.

ment. The further development of national and regional research capabilities seems of particular importance. Also essential is support for the collection and exploitation of data gathered in accordance with research needs. In this respect the efforts made by the United Nations to promote technical co-operation in areas such as demographic data collection and training deserve recognition. With regard to internal migration, the need to use flexible data-gathering mechanisms, designed to capture the many facets of this very complex process, will require ample technical and financial support; in the field of international migration, much remains to be done in promoting the co-operation of sending and receiving countries both in designing better data-gathering mechanisms and in sharing the information emanating from them, as has been recommended by the United Nations Statistical Commission.[2] Although the limited space available in the present paper has not permitted more frequent reference to specific data needs, it is hoped that this issue will be addressed by the Expert Group during its meeting.[3]

I. INTERNAL AND INTERNATIONAL MIGRATION: CONCEPTUAL APPROACHES AND PATTERNS

A. *Recent conceptual approaches*

In the World Population Plan of Action much emphasis was given to rural-urban migration and its adverse consequences (para. 44) and to several types of international movements of population (paras. 51-62). Many factors concur to make population distribution, internal and international migration one of today's most salient population issues: the large dimensions reached by certain territorial movements of the population, the existence of new kinds of geographical mobility, the rapid growth of large cities in the less developed countries and the growing concern about international migration in the context of a slowing world economy are among them. Scholars, on the other hand, by adopting new theoretical approaches and emphasizing empirical research, have contributed to the emergence of a more realistic view of the migration process which has not yet been reflected in documents meant to guide the international community, such as the World Population Plan of Action or the International Development Strategy for the Third United Nations Development Decade. Those documents do not give appropriate recognition to the variety of internal and international migration patterns identified to date and still reflect the view (prevalent during the early 1970s) that the consequences of rural-urban migration are mostly negative for the receiving communities. As a consequence of those negative assessments, many Governments, facing the problems of fast city growth, have adopted policies aimed at reducing or even stopping the inflow of migrants to the cities.

In more recent years analyses of both internal and international migration processes have tended to emphasize the hierarchical nature of societies, the existence of conflicts between social groups in a country and the relations of dependency between unequally developed areas within a given country or between the developing and the advanced market economies. Although individual motivations are considered, the existence of constraints on individual behaviour imposed by the social and economic system are recognized and accorded particular relevance. The historical, cultural, political and economic specificity of the societies involved in the migration process and their relative position in the international economic system are also considered. Migration is thus perceived as an important component of social and economic change, and the problems facing both sending and receiving areas tend to be viewed as an integral part of the development process.

Thus, efforts are made to assess the costs and benefits of migration not only in terms of the migrants themselves, but also from the societal perspective, although to date no satisfactory solution has been found to the problem of linking analytically social processes with individual behaviour.

A recognition of the limitations of the traditional concept of migration and an assessment of the data sources most commonly used to measure it have closely paralleled the adoption of new conceptual approaches to study migration. The realization that many territorial movements of the population which do not involve either a permanent or a long-term change of residence are relevant from a socio-economic perspective has led social scientists to devise new measurement mechanisms and to expand the list of population movements covered by migration research. In the area of data collection, those changes have implied that, albeit slowly, data are beginning to be gathered in accordance with conceptual requirements and not the other way round. It is of the utmost importance to take all the necessary measures for the maintenance and acceleration of that trend, including the active participation of migration scholars in the design of more flexible data-gathering mechanisms (perhaps through technical co-operation schemes promoted at the international level), the dissemination of information among Governments interested in improving their data-collection systems or in adopting new ones and the call for compliance with international guidelines (such as those recommended by the United Nations Statistical Commission) intended to promote the homogeneity and comparability of international migration statistics.

B. *Patterns of internal and international migration*

Even a partial review of the literature concerning internal and international migration published during the past 10 years yields a complex picture filled with many different kinds of territorial movements of the population. Since the kinds of movements vary not only with the nature of societies and their place in the international economic system, but also receive different emphases, depending upon the theoretical framework used and the goals pursued by the analyst, an exhaustive inventory of types of movements identified is not only too presumptuous a task, but would lack cohesive-

ness in terms of objectives. For this reason, it was decided to highlight here only certain types of internal and international movements. The classification of those movements will be carried out along certain dimensions considered relevant for the purpose at hand. Of course, those dimensions have been selected with the sole purpose of facilitating exposition. Full recognition is given to the complexities of social phenomena, and to the fact that several dimensions interact, giving rise to different patterns of population distribution and territorial movements.

1. *Rural and urban dimensions*

It can be asserted that urbanization is a universal process and rural-urban migration a very widespread phenomenon. Yet, this assertion must be followed by several qualifications. First, the level and the tempo of urbanization vary greatly from region to region and even from country to country. Latin America is the most urbanized of the less developed regions, and thus its urban population is growing at a slower rate than that of Africa or that of South Asia. The urbanization of the oil-producing Arab countries of Western Asia is occurring at a notably rapid pace. In contrast, in many of the other developing countries of Asia the pace of urbanization is fairly slow. Also, while primacy is the prevalent pattern of urbanization in less developed countries, in many of the more developed regions a new phenomenon appears to be taking place: the growth of the largest agglomerations is slowing down or even declining (urban turn-around).

Second, rural-urban migration does not necessarily take place within the boundaries of a country. In the literature examples abound of rural-urban movements across international borders (for example, from rural Bolivia to urban Argentina or from rural Yemen to urban Saudi Arabia).

Third, the destination of rural-urban migrants may be either a metropolitan or non-metropolitan area. When the urbanization process is occurring mainly by the very rapid growth of the largest urban agglomeration, such as in the oil-producing countries of Western Asia, the place of destination of most migrants, internal as well as international, is the large cities. In contrast, the attraction of large metropolitan areas is no longer so powerful in many Latin American countries, where intermediate cities are becoming increasingly attractive (as in Argentina, Brazil, Chile, Cuba, Mexico, Peru and Venezuela). In many countries, international movements are playing an important role in the process of urban concentration or deconcentration, in some countries because the largest cities gain population through international movements (as in the cases in Western Asia mentioned above), in others because many emigrants originate in large cities (as in the cases of the Syrian Arab Republic and Cuba) and sometimes because large cities stop receiving the streams of international migrants which predominated in the past, as in the case of Argentina.

Not all movements are from rural to urban areas. Many of the movements to metropolitan areas originate in other urban areas, and urban-urban migration is likely to be the prevalent kind of movement in countries where a small proportion of the population lives in rural areas.

Another important type of movement is rural-rural migration, which accounts for the majority of the flows in many parts of Africa. It is also common in other regions, for instance, in Malaysia, Indonesia and the Philippines in Asia and in Bolivia and Ecuador in Latin America. The rural destinations of those flows may be new agricultural frontiers and colonization areas.

Lastly, as noted eariler, large agglomerations in more developed countries are losing population through net out-migration, probably in favour of small towns or rural areas. In those countries, a significant part of overall migration thus consists of urban-rural migration.

2. *Temporal dimension*

The existence of migration movements of a temporary nature was implicitly recognized in the World Population Plan of Action in the international migration section, where mention is made of the "problems of refugees and displaced persons . . . including their right of return to homes and properties" (para. 53), or to "returning workers" (para. 54). No mention of the temporal dimension was made in the section on internal migration. The existence of new migration patterns and recent trends in internal and international migration research, with the increasing use of more flexible data-gathering mechanisms and the growing understanding of the structure of modern societies, has led to the realization that migration movements are much more complex in terms of their temporal dimension than was previously thought. The necessity has therefore arisen to consider not only the long-term movements of persons from one place to another, but also movements such as the temporary relocation of persons for the purpose of working in the place of destination (as in the case of international migrant workers), the repetitive change of residence of the so-called "circulatory" migrants or the regular movement of commuters, sometimes even across international boundaries.

Many typologies of migration movements have been proposed in which the temporal dimension is taken into account either explicitly or implicitly. The consideration of this dimension is of importance because different temporal patterns frequently arise from different causes and have a variety of consequences. In addition, the temporal dimension of a territorial movement is likely to be associated with the development modality of the society in question or to be dependent on very specific circumstances.

The temporal dimension is of special importance in international migration. Many of today's international migrant workers, who move either individually or collectively for the purpose of working abroad for a limited period of time, contrast sharply with the traditional type of "settler migrant" who is implicitly or explicitly admitted as a presumed future citizen. The difference is probably sharpest between that type of migrant and undocumented or "illegal" migrants who, even if intending to

settle permanently in the country of immigration, must constantly bear the consequences of the precariousness of their status. Lastly, it is worth pointing out that seasonal migration across international boundaries is also common in many parts of the world.

3. *Other dimensions*

Several other dimensions can be used as bases for the classification of migration movements. For example, typologies can be established by considering the individual's motivation to migrate, the economic, social or demographic characteristics of the migrant, the function of the movement (for example, target migration, life-cycle-stage migration) or, in the realm of international migration, the legal status of migrants in the country of immigration. As stated above, the selection of specific dimension or combination of them depends on the objectives pursued and, unfortunately, it is not often the case that the categories established from one point of view correspond neatly with those identified from another. For instance, when international migrants are classified according to their motivation to migrate (which is closely related to the underlying causes of their movement), types such as the following are likely to be distinguished: economic migrants (those who move in search of work), refugees (those who move to escape persecution) and dependants (those who move to be reunited with their family members abroad). Yet, several of these types may be present among each one of those identified from the legal perspective, which is inextricably linked to the formulation of policy. Therefore, one is faced with a situation in which the types which are relevant from a policy perspective are not always the best suited for the analysis of the causes or of the consequences of migration. No satisfactory solution has been found to this quandary, but because the policy perspective is of special importance to the task at hand, it will be given priority, at least in the area of international migration.

These brief comments serve to underscore the fact that contemporaneous migration movements are characterized by their diversity and that, in order to avoid superficial generalizations, some attention must be given at least to the most prevalent forms of migration. Without attempting to be exhaustive, the following sections deal with the main issues related to these migratory flows.

II. MIGRATION AND RURAL DEVELOPMENT IN DEVELOPING COUNTRIES

The World Population Plan of Action reiterates the importance of integrated plans and programmes of overall social and economic development which take into account "the distribution of the benefits of development among all groups and regions" (paras. 45 and 46 (*c*)). In the context of the Plan of Action, "intensive programmes of economic and social improvement should be carried out in the rural areas . . ." (para. 46 (*e*)), "new employment opportunities, including industries and public works programmes, should be created, systems of land tenure should be improved and social services and amenities provided" (para. 48).

The adoption of rural development strategies is increasingly viewed as a high-priority action, after many years of relative neglect in favour of urban-based industrialization policies. There are several reasons for this reorientation: rural-urban migration, while imposing pressures on already strained urban resources, does not necessarily provide relief for rural areas, and often increases regional income inequalities. In addition, many developing countries are facing severe food shortages requiring the allocation of scarce foreign exchange for imports, although they could well be self-sufficient in terms of food supply, or at least meet a large part of their food needs, if domestic production were promoted. Given those considerations, rural development strategies are viewed as means to increase food production, to improve living conditions in rural areas, and to alleviate the negative consequences of the rapid growth of large cities by reducing rural-urban migration. But little is known about the interrelation between rural development and migration, and the available evidence suggests that the direction of this relation may not be the same at all times and in all places. For instance, rural development has been found to reduce migration in some rural areas, while it seems to have little effect on migration in other areas. It sometimes even increases the volume of out-migration from rural areas, either by lowering the demand for rural labour or by sufficiently raising rural income above the subsistence level so as to afford families the ability to allocate some resources for the support of migrating family members.

A. *Determinants of rural migration*

There is little certainty about the structural determinants of rural migration, and several reasons contribute to this situation. One reason is that migration occurs in a variety of development contexts which differ, *inter alia*, in terms of urbanization, city systems, industrial structures and modes of production. Thus, the effects of such factors as the existence of agricultural frontiers or a relative surplus of rural labour on migration depend on the specific development context in which those interrelations take place. Moreover, it remains unclear whether the heterogeneity of migration flows in terms of type, composition and direction implies the existence of different determinants or of differential effects of similar determinants. For example, rural out-migration in Latin America is mostly directed at urban areas, whereas in Africa and parts of Asia the prevalent form of rural out-migration is towards other rural areas. While the difference is undoubtedly related to the different level of urbanization in those regions, little is known about other factors contributing to this differential. Finally, it has been recognized that the effects of structural determinants on migration are mediated by such factors as household structure, an individual's motivation and other elements of the decision-making process. Thus, aside from the generally accepted observation that regional disparities in socio-

economic opportunities are the major determinant of rural migration (see para. 46 (*b*) of the Plan of Action), much more needs to be learned about the specific structural determinants of the process.

The situation is more clearly defined in terms of the immediate determinants of migration at the household and individual level. There is little disagreement in the literature about the importance of cost-benefit decisions made by rural residents in regard to their decision to migrate. Although many of those cost-benefit analyses are economic in nature, other factors play important roles as well, such as education, family ties and marriage formations.

While the importance of those factors for migration is clear, they have received different interpretations that imply different development strategies. If rural out-migration is largely seen as a process that restores the equilibrium between labour supply and demand, job-creating rural programmes in place of migratory flows would restore the balance and thus reduce rural-urban migration. If, on the other hand, rural migration is viewed as part of a household strategy related to the precarious economic situation of many rural families at the subsistence level, additional employment without structural rearrangements might not provide an alternative to migration, as families would still need to send some of their members to urban areas in order to diversify income sources and to be able to meet the cash requirements that arise during the transformation of agriculture from subsistence farming to modern agriculture oriented to a market economy production.

B. *Consequences of rural migration*

As in the case of determinants, the consequences of migration have to be examined on two levels: (*a*) the micro level in terms of individuals and households and (*b*) the structural level in terms of labour supply, employment, technology and income in rural areas.

The score on the micro level is mostly positive. Migrants and their families are generally better off than if migration had not taken place. But there are also substantial costs incurred by those families when, for example, the absence of males for extended periods may increase the work burden of women and children in rural areas and also leave the family more vulnerable to unexpected crises. Furthermore, the economic conditions of rural families who, for whichever reasons, do not participate in migration can deteriorate as a result of out-migration from their community, although those effects depend on many factors, such as the volume of migration, its age-sex composition and the existing land-tenure pattern. It has also been reported that male rural-rural migrants sometimes replace female workers, who are then restricted to domestic labour. Where this situation arises, it is a serious obstacle to the full participation of women in the social and economic opportunities available in their communities.

The evidence regarding the effects of migration on the rural structure, however, is even more tentative. In terms of labour force, migration, especially in its circulatory form, facilitates the formation of rural and urban wage employment, for it loosens the ties of migrants to their land. On the other hand, the age selectivity of migrants tends to reduce the labour force in rural areas to a greater extent than the total rural population. The age selectivity can also alter the division of labour among generations, for the remaining rural population is generally older. A possible consequence of this change is a reduction in the innovative potential of rural areas. Since migrants also tend to be the better educated members of a community, their absence diminishes the availability of more skilled labour. But in many countries, rural out-migration also includes many lesser educated and landless persons: in most regions those migrants usually go to rural areas, but in Latin America, they tend to go to cities.

Although few countries experience a reduction at the national level of the rural population as a result of out-migration, there is much more variation at the regional level within a country, where some rural areas may become depopulated, and much remains to be learned about migration and its possible effect on labour shortages.

The consequences of out-migration for rural employment and production, again, are quite varied, depending on the development context and the time perspective of the consequences. Many authors emphasize that the negative effects of rural out-migration for the development of rural areas are discernible mostly in the long term. One reason that out-migration may not change production substantially is because of a shift in activity from the migrants to other family members. But this shift will be lessened to the extent that out-migration occurs in the form of circulatory migration where migrants return for certain periods.

However, even where overall levels of employment and production are not negatively affected by out-migration because of the increased productivity of those remaining behind, negative consequences can still arise if this increase in productivity is due to a shift from national food production for domestic use to crops for export. Although those export crops may yield a higher profit, they can severely affect the food supply in the entire country.

It is generally assumed that remittances made by migrants to their remaining family members increase rural income. But this increase depends on the volume of migration, its family composition, its destination and the social standing of migrants. In cases of circulatory migration, where the ties between migrants and the community of origin remain high, remittances are generally higher than where out-migration is permanent. Remittances from international migrants also tend to be higher than those from internal migrants. But in the cases of better-off migrant families, the support received by migrants from the family members staying behind tends to be greater than possible remittances.

Attention has also been drawn to the possible contribution that returning migrants can make through the skills they acquired while away, but the empirical evi-

dence generally does not show many positive results. One reason for this outcome is the fact that the new skills are often not applicable to rural production.

In sum, studies of migration and rural development reflect a wide variety of determinants and consequences. On the individual level, most migrants and their families seem to benefit from their decision to move. The social and economic situation of rural families without migrants, on the other hand, frequently deteriorates in those communities that experience a large volume of out-migration, and the results are extremely diverse in terms of rural development. Perhaps the most important lesson learned from those studies is a recognition that migration is an integral part of development, and that the specific form of this development determines not only the pattern of migration but also its consequences.

III. MIGRATION, URBANIZATION, AND THE GROWTH OF LARGE CITIES

It is generally assumed that the pattern of urbanization, notwithstanding its variation between countries, resembles an S-shaped curve: once sustained urbanization has begun, its tempo initially is very rapid and often accelerating; it then decreases as the level continues to rise; and it finally tapers off, or even changes direction, when a high level of urbanization is reached. Besides this general shape of the relationship between level and tempo of urbanization, however, little is known about the specific points at which the tempo of urbanization changes. It may well be that these turning points are country-specific, thus precluding any generalizations.

The urbanization pattern of the developed countries has largely followed the S-shaped curve. The level of urbanization in those countries passed 70 per cent in 1980 and is projected to reach nearly 80 per cent by the year 2000. During the past 30 years the tempo of urbanization in those regions has steadily decreased, and it is likely to slow down further during the next 20 years. Given their generally low rate of total population growth, developed countries do not perceive urban population growth as a particular problem. Instead, for some of them, the recent emergence of an urban turnaround may pose new and, as yet, little-understood problems.

Many developing countries, in contrast, continue to be characterized by rapid urbanization, high rates of urban population growth and an unbalanced urban structure. The level of urbanization in those countries, on average, is less than one half that of developed countries; it was approaching 30 per cent in 1980 and is projected to reach 42 per cent at the end of this century. But the tempo of urbanization is much faster in developing than in developed countries, and it is unlikely to slow down significantly during the next two decades.

The increasing level of urbanization and its continuing rapid tempo generally do not imply that rural populations are decreasing in absolute numbers, for the rural rates of natural increase are sufficiently high that rural populations continue to grow even in the presence of substantial net rural-urban migration. This migration, on the other hand, when added to the generally high rates of natural increase in the urban areas of most developing countries, results in very high rates of urban population growth that average 3.6 per cent annually.

The problems related to these high rates of urban growth are often further accentuated by its concentration in the largest metropolitan area of a developing country. To the extent that those cities are the focus of development, they act as a magnet for migrants from both rural and other urban areas. Although those metropolitan areas themselves may have substantial rates of unemployment, the employment situation is often equally bad elsewhere, or even worse, and the capital cities are therefore viewed by migrants as still offering better opportunities. The result of this process is a high concentration of the urban population in one large metropolitan area to form what has been termed a primate urban pattern, which is found in most Latin American countries, but also exists in Africa and Asia (for example, Algeria, Ethiopia, the Islamic Republic of Iran, the Philippines, Senegal, Thailand). There are conflicting views about the effects of a primate urban structure on economic growth, but it is generally agreed that the existence of primacy creates inequalities in income and social services among regions of a country.

It is sometimes assumed that primate cities are very large, and this assumption has led to the conclusion that very large cities (over 2 million inhabitants) in developing countries tend to grow most rapidly. Evidence shows, however, that while many large cities in developing countries are primate cities, only a minority of the primate cities are very large. Moreover, a comparison of growth rates among cities by initial city size shows that small and medium-sized cities tend to grow most rapidly.

A. *Migration and the growth of large cities in developing countries*

The growth of large cities and the prospects of their continued expansion rank among the most pressing urban problems in developing countries. As noted in the World Population Plan of Action (para. 44), in most countries, urban areas are facing severe employment problems, "contamination of the environment, inadequate housing and services and social and psychological stress". However, even if migration is related to those problems, it must be emphasized that they, as well as migration, are the result of the general mode of development. As is pointed out in the same paragraph of the Plan of Action, "in many developing countries, adverse consequences are due in large part to the economic structures resulting from the dependent situation of those countries in the international economic system . . .". The size of the large cities, in addition, magnifies the problems of income and development discrepancies usually inherent in primate urban patterns. Moreover, those discrepancies are an important determinant of the volume of migration into the primate city, thus further directing the attention of policy-makers to large cities.

In order to evaluate the consequences of migration for city growth and the socio-economic conditions within the city, it is important to distinguish between different development contexts and levels of analysis. First, problems associated with unbalanced urban growth should be separated from those related to the absolute size of a city. Second, it is important to weigh the advantages and disadvantages for the largest city from migration with the costs and benefits of migration in the areas of origin. And third, the net results of migration for the city should be viewed in relation to the net benefits for individual migrants and their families.

The relative importance of the components of urban and metropolitan population growth continues to be debated, in part because of the unavailability of adequate and comparable data and the use of different methodologies. Evidence for recent periods points to the relatively greater importance of urban natural increase in developing countries, although there continues to be a substantial variation among developing countries on this score. While one could expect a negative relationship between the relative contribution of net migration to urban growth and the level of urbanization, no such association is observed empirically, possibly due to the fact that, as urbanization takes place, natural increase tends to diminish. It is therefore possible that, since natural increase is projected to diminish in developing countries, net migration will again become the major source of urban population growth. It is also very important to point out that the natural increase of migrants is usually not identified as a component of growth, but subsumed under general natural increase. Such procedure reduces the importance of migration for urban growth. Moreover, to the extent that net migration includes substantial amounts of international migration, it may continue to contribute large proportions of urban growth even at high levels of urbanization. Finally, the relationship between the components of population growth is very different for a large city than for urban areas in general, since internal migration to the former originates not only in rural areas but also in smaller cities and towns.

Just as important as the relative size of the components of growth are the actual rates of growth from either component. Findings show that urban growth from migration is substantial in many developing countries, even where it is smaller than growth from natural increase. It also appears that migration is often a more important factor for the growth of the largest city in a country than for urban growth of the remaining areas. And it should be noted that certain types of migration are not fully reflected in most measures of net migration, particularly in those based on census data. This is the case, for example, with circulatory migrants, some of whom may be in the city only during parts of the intercensal period and thus do not appear in the census statistics; yet they undoubtedly contribute to increased demand for services in cities. For all those reasons, net migration rates are likely to reveal only part of the real impact of migration on urban areas. Urban in-migrants, moreover, have different characteristics than urban out-migrants.

It is very important for policy planning to understand the components of urban growth, since the appropriate set of policies to slow down urban growth will depend on the actual composition of that growth in a given country.

The concentration of migrants in the young-adult ages is one of the few universal characteristics of migration flows. Migration thus has a much greater impact on the growth of these age groups in the city than on total city growth. The predominance of young migrants is often viewed in negative terms by emphasizing their needs for employment, housing, education and health services. However, others have viewed this age selectivity more positively by pointing to the fact that persons in those ages tend to be the healthiest and in the most productive stage of their lives. Also, the city benefits from the labour force of migrants without having to bear the costs of its reproduction.

The prevalence of migrants in the age groups during which many of them form a family contributes substantially to the natural increase of the city. Little is still known, however, about the timing of fertility among migrant families, and further studies on this issue would improve our understanding of the components of urban growth in developing countries. Moreover, where temporary migration prevails, little is known about its impact on city growth.

Many studies of migration have also observed a sex selectivity of migration. Numerous factors contribute to the determination of the sex composition of migration, including the kind of economic opportunities available in cities and the role of women in rural areas. While the precise influence of those factors is still uncertain, it appears that urban areas, and large cities in particular, offer many employment opportunities to young females, especially as service workers, but also as labourers in such industries as textiles and electronics. In some cases, on the other hand, adverse economic conditions force women of rural families to augment their household income through menial work in the cities, which may subject them to exploitation.

The age and sex selectivity of migration can thus have profound effects on the social division of labour, for example, by transferring work roles from the young to the old, by increasing the work burden of women and children in rural areas where male out-migration prevails, or by incorporating women into the urban labour market.

Concerning the interrelations between migration and the urban labour market, assessments of industrial growth in developing countries used to emphasize their over-urbanization, according to which the proportion of the population in urban areas surpassed the level warranted by the demand for industrial employment. In this view, over-urbanization results in excessive tertiarization of the economy, which is characterized by low productivity, underemployment and marginalization. More recent evaluations of development, however, have arrived at a more differentiated view, pointing out, for example, that rural-urban migration might raise overall

productivity, especially when rural migrants are able to obtain better employment in the city. Migration, moreover, tends to facilitate the formation of wage labour, which is an essential requirement for the formation of a market economy and its development. In addition, a growing number of studies have documented the functional interdependency between the informal and the formal sectors, thus rejecting the "myth of marginality". Most important, the message given by those studies is that the relationship between migration and the urban labour market is complex and depends on numerous factors, such as the type of migration and the structure of the urban economy.

Two crucial issues in this respect concern (*a*) unemployment and (*b*) social mobility, and a few empirical generalizations are beginning to emerge.

(*a*) There is no agreement on whether or not migrants have higher or lower unemployment than urban natives. The level of unemployment among migrants depends, *inter alia*, on the duration of residence in the city, on the sex and education of the migrant, and on the characteristics of the urban labour market. There is also no consistent evidence that would point to increased unemployment in large cities as a result of migration. The relatively low rate of unemployment among migrants has come as a surprise to many researchers, and explanations for this finding include lower wage aspirations, which make migrants more willing to accept low-paid work that urban natives might avoid. But much more needs to be learned about this important issue.

(*b*) It is not so much unemployment which distinguishes migrants from urban natives, but rather occupational status. Migrants tend to be over-represented in precarious positions or as labourers and service workers, and relatively few of them are found in white-collar jobs. However, exceptions arise in the case of large cities that function mostly as capitals and administrative centres, where migrants have greater opportunities to obtain white-collar employment. Despite the generally low status of migrants in urban labour markets, migrants (especially males) are nevertheless found in all occupational categories, thus revealing the complexity of migrant flows to large cities.

It also deserves mention that in certain regions a large part of migration is circulatory and thus migrants stay only temporarily in the city, albeit with what may be strong regularity. Circulatory migration frequently functions as a reserve labour force from which the urban economy can draw in times of demand without having to pay the costs for its maintenance when it is not needed.

A relatively recent approach to the study of migration is the family perspective. Since decisions to migrate are very often part of economic strategies by households, even when the actual migratory movement involves individuals, the costs and benefits of migration therefore do not apply only to places of origin and destination and to individual migrants, but also to the economy of the household. Individual migrants, moreover, are seldom on their own and are usually integrated into a social network of family and friends. Given those ties, it is extremely important that migration studies address the family and household composition of migration. Such an approach would yield essential information about the linkages between urban and rural areas provided through the various forms of migration. It would also permit greater insight into variations in the linkages between various types of migration, as well as help elucidate the process by which the integration of migrants into the city takes place through subsequent generations.

An issue of great relevance to city administrators concerns the limits of growth for very large cities in developing countries. Will a megalopolis such as Mexico City or Shanghai really reach 30 million people at the beginning of the next century, or will there be some demographic or socio-economic factors arresting, and possibly reversing, the growth of those cities?

B. *The urban turn-around in developed countries*

The counterpart of massive rural-urban migration, rapid urbanization and high rates of urban population growth in many developing countries is the relative, and sometimes even absolute, decline of large agglomerations and the levelling off of urbanization in several developed countries. No attention is drawn in the Plan of Action to those changes.

Although the new developments have not yet been widely studied, it appears that, while urbanization seems to taper off in many developed countries, there is very little evidence yet substantiating a reduction in the level of urbanization. It is also unlikely that this level could decrease by any substantial amount in most countries, for such reversal would require major net migration flows from urban localities to non-urban localities and to rural areas which, in turn, would become new urban places.

However, there is evidence substantiating the relative and even absolute reduction of large metropolitan areas, resulting from net migration out of agglomerations in the upper part of the urban hierarchy to those at a lower level of the hierarchy and even to non-metropolitan localities. It appears that, at least in some countries, the traditionally positive association between urban hierarchy level and rate of population growth which prevailed up to the early 1970s is now shifting direction. Those trends thus represent a reversal in the polarization of the population distribution that characterized previous decades.

In contrast to the emerging empirical evidence regarding those new urban trends in developed countries, the complexity of socio-economic and demographic interrelations has made it difficult, so far, to explain these trends in a theoretically consistent manner. It thus remains unclear whether they represent a "natural" process or whether they are the result of deconcentration policies, and uncertainty surrounds their possible continuation in the future.

In order to comprehend more fully those new urban dynamics and to identify their determinants, it will be

particularly important to examine the various components of those trends. For example, urban-urban migration and its interaction with agglomeration and economies of scale apparently play an important role. Other crucial determinants include modern organizational structures and technological improvements which, together with advances in information linkages, have made it possible to decentralize production while maintaining many advantages in terms of economies of scale. Related to that change is the shift of production from traditional manufacturing industries to high-technology industries and services.

With respect to demographic factors, the move of families to the peripheral areas of large urban agglomerations or to smaller urban localities, and the inflow of single individuals to the core of the cities, may be contributing to the general deconcentration picture. The net migration effect of those types of flows may be producing a decrease in the levels of net mobility to larger urban areas. Directly related to that decrease, there may also exist a reduction of fertility levels in the large agglomerations owing to the predominance of single persons and young couples in the core areas.

Even though the socio-economic and financial problems of less developed regions are much more severe than the problems facing the more developed regions, the situation in the latter will nevertheless require close attention. Reversals in population concentration can leave older metropolitan areas with a shrinking fiscal basis at times when the demand for public services actually increases, for net migrants in many cases include young members of the labour force and, frequently, socially advantaged population groups. New growth patterns in previously declining or stable areas will require careful planning in order to diminish the problems often associated with urban growth.

IV. POPULATION DISTRIBUTION POLICIES

Although many countries, whether developed, developing or centrally planned, pursue population distribution policies, they are more critical in developing countries with modest levels of urbanization combined with high rates of aggregate population growth. The settlement pattern in such countries is going to change dramatically in any event, and it is arguable that the changes should be guided rather than left to the outcome of market forces. According to paragraph 45 of the Plan of Action, population distribution policies "should be integrated into plans and programmes dealing with over-all social and economic development". They may thus help to promote societal goals, such as equity, political integration and stability, improvements in environmental quality and long-run economic efficiency. There is little agreement, however, on the components of a successful population distribution policy, and there have been few, if any, clear-cut successes.

One of the problems is that countries differ widely in pattern of population distribution, level of urbanization, degree of primacy, rate of urban growth, urban settlement pattern and growth rate of rural population. They also vary in their level of development and in their economic and political systems. Hence, it is hardly surprising that there are major differences in the content and design of the population distribution policies implemented by the particular countries. One dimension of differentiation in population distribution policies is the distinction between market and centrally planned economies. Moreover, within the latter economies the population distribution policies adopted by the industrializing countries of Eastern Europe are very different from the rural-oriented distribution policies of China and Cuba. Geography may be the basis for other differences. The city-State countries (for example, Singapore and Bahrain) face unique population distribution problems. Island countries have an entirely different core-periphery geography from land-locked countries. Archipelagos (the Philippines and Indonesia) have unusual population distribution problems in that, although their port cities are linked by efficient sea lanes, the hinterlands of those cities are often underdeveloped. Large geographical size (Brazil, Canada, China, India, Mexico, the United States of America, the Union of Soviet Socialist Republics) creates similarities in distribution problems that transcend differences in levels of development and politico-economic systems. Clearly, country specificity makes generalizations difficult.

A. *Policy goals*

Population distribution goals can be expressed in precise, quantative terms (for example, limits to population growth or targets for individual cities and regions). However, this approach can be dangerous because such goals are means to broader policy goals rather than ends in themselves and because choosing unfeasible targets may discredit population distribution policies as a whole. Also, lags in data collection and analysis and in policy-makers' perceptions may result in persistence with outdated population distribution goals. The most sensible population distribution goal, though it is very difficult to operationalize, is to aim for a settlement pattern that maximizes prospective real incomes for all people, regardless of where they live and regardless of whether they are migrants or non-migrants.

The evidence suggests that, in most cases, net private returns to migration from rural areas to the primate city are positive. Most rural migrants are better off in the primate city even if they do not obtain formal sector employment. However, there is no consensus on the measurement of the externalities associated with this migration, namely, the social costs and benefits in both sending and receiving areas. Since, in practice, the effects are likely to be mixed, and some of them cannot be measured and aggregated, the widespread assumption that rural-metropolitan migration is excessive seems to be based on value judgements rather than on hard analysis.

Since the scope for spatially discriminatory fertility and mortality policies is limited, migration policy is a major focus of population distribution policies. Those

may be direct (measures to influence migration behaviour directly, such as migration relocation allowances, transport subsidies and the provision of information) or indirect (measures that influence the determinants of migration, such as the spatial distribution of jobs). Also, migration policies may attempt either to promote migration or to deter it. Measures to promote migration do not necessarily imply an endorsement of rapid metropolitan growth. Steps to induce rural-rural migration may be helpful in increasing rural incomes. Within an urbanization strategy, more attention might be given to policies to promote migration to small towns and intermediate cities. This objective might require a strategy of public service provision, destination-specific relocation allowances to rural migrants (particularly to groups rather than to individuals), and intraregional improvements in transportation. Policies to deter migration are based on an assessment of social versus private costs and benefits.

B. *Alternative distribution strategies*

The World Population Plan of Action (para. 46 (*d*)) notes that: "Population distribution patterns should not be restricted to a choice between metropolitan and rural life: efforts should be made to establish and strengthen networks of small and medium-size cities . . .". Three alternative strategies (controlling primate city growth, rural development planning and the promotion of small towns and intermediate cities) have been suggested to tackle population distribution problems. However, in a comprehensive strategy, those are not alternatives but are complementary approaches. Slowing down primate city growth is more likely to be achieved not by direct controls, but by modifying implicit spatial policies that reinforce primacy, eliminating price distortions (such as the underpricing of urban services), steps to discourage primate city job growth, higher taxes on metropolitan living, regional planning within the core region, and redistributing more of the national urban infrastructure investment pool to other cities.

A successful small-town and intermediate-cities strategy might emphasize the smaller towns in some countries and the larger intermediate cities in others. In most countries, resource constraints make it necessary to be very selective in the urban centres chosen for priority development. The selection of areas of high economic potential will ease future investment constraints. But, if the strategy is to be politically acceptable, other urban areas will need to be given some prospect of priority in the future. Hence, such strategies should contain several phases, with new selections in each phase. Policies should be focused on those sectors where these strategies have demonstrated strength, such as agro-processing activities, small-scale industry and the informal sector. Attracting large-scale industry from the primate city is feasible only in the largest secondary cities. There is scope for new initiatives, such as designing migration incentives to induce rural migrants to move to small towns and intermediate cities rather than to the primate city and in restricting industrial development incentives to certain urban-size classes. Other components of a small-town and intermediate-cities strategy include measures to strengthen rural-urban linkages (for example, investment in intraregional transportation), an increase in their urban infrastructure allocation combined with cost-recovery schemes, decentralization of public facilities and administrative functions, and increasing the degree of local fiscal autonomy.

The World Population Plan of Action recommends that "intensive programmes of economic and social improvement should be carried out in the rural areas..." (para. 46 (*e*)) and that "programmes should be promoted to make accessible to scattered populations the basic social services and the support necessary for increased productivity..." (para. 46 (*f*)). Rural development programmes may be designed in parallel to small-town and intermediate-cities strategy promotion efforts in the broader context of a regional development strategy. Those programmes might aim at boosting rural incomes and welfare rather than maximizing the rural population. The elements of a successful strategy could include effective land reform, adoption of efficient labour-intensive technologies and modes of organization, technical assistance to small towns, investment in public services at locations accessible to the rural population, improvements in agricultural marketing and services, and replication of successful integrated rural development efforts. Since many of these measures are implemented in the small urban centres rather than in the countryside, rural development strategies blur into a lower-order small-town and intermediate-cities strategy. Circulatory migration between rural areas and small towns is yet another illustration of rural-urban complementarities.

Partial population distribution strategies, such as the relocation of the national capital, countermagnets, new towns, policies to develop lagging regions, border-region strategies, land-colonization schemes and ethnic population distribution policies, have been adopted in some countries. However, most of them have an insignificant impact on the population distribution and they are often very costly approaches in terms of public investment absorbed.

C. *Policy instruments*

Whatever the strategies are, there is a wide range of population distribution policy instruments available, and many of these are used in all types of country. Some of them are directed at firms and public enterprises, while others are aimed at individuals. Examples of the former include infrastructure provisions, grants, loans and tax incentives, direct controls on industrial location, labour subsidies, direct state investment, transport rate adjustments and growth centre strategies. Examples of individual-oriented measures include migration subsidies and worker-relocation assistance, housing and social services provision, education and job training, residential controls, rural development programmes and land colonization schemes.

D. *Implementation and evaluation of policies*

Experience with population distribution policies suggests severe implementation problems. These include the gap between the long-run time horizon for implementing a viable strategy and the short-run preoccupations of Governments and policy-makers; neglect of the powerful spatial distribution impacts of macro and sectoral policies (implicit spatial policies); lack of societal consensus because of regional, inter-urban, political class and ethnic conflicts that exist in most countries; and public investment resource constraints. It is important that, as pointed out in the Plan of Action (para. 46 (*c*)), the short-term effects of population distribution policies be weighed against their long-term consequences, and that the differential impact of those measures on social groups be evaluated.

There are several evaluation methodologies for assessing the impacts of population distribution policies, but none is wholly satisfactory. Those methodologies include *ad hoc* use of whatever policy performance indicators happen to be available; measurement of the policy impact as the difference between actual changes in the population distribution and expected changes in a no-policy scenario; social cost-benefit analysis; goal achievement criteria; and international comparisons. Clearly, the dangers involved in transforming policy instruments from one political, social and institutional environment to another cannot be overstressed.

In summary, the scope for population distribution policies is usually greater in developing than in developed or centrally planned economies, largely as a result of the pace of demographic change. One possible approach would be based on combining strategies to control the growth of the primate city, to promote small towns and intermediate cities and to strengthen the rural economy rather than on pursuing one of those components at the expense of the others. There is a wide range of policy instruments available, but these have to be designed very carefully to suit the conditions prevailing in individual countries. Although experience with population distribution policies does not point to obvious successes, perseverance is justifiable, since improvements in the distribution of population can improve both efficiency and equity, as well as contribute to achieving other societal goods from environmental quality to national security.

E. *Human rights*

It is of utmost importance, however, to evaluate all selected population distribution policies in terms of their effects on the human rights of individual citizens, as clearly stated in paragraph 46 (*a*) of the Plan of Action. Closing a city to potential migrants and reserving certain areas of a country for selected population groups violates the right of individuals to free movement and choice of residence. Where the public interest requires the selection of specific policies that conflict with individual rights, it should be assured that the costs of those policies are equally shared by all.

V. INTERNATIONAL MIGRATION: TRENDS AND POLICIES

In the discussion of internal migration, emphasis has been put on the difference in terms of costs and benefits existing at different levels (such as sending and receiving areas, and the migrants themselves). Because many of the observations made with respect to internal migration are also pertinent for international migration, they will not, in general, be repeated here. Just as internal migration is shaped by regional disparities in social and economic well-being, however, international migration flows result from the even wider disparities existent among nations and, as mentioned in paragraph 51 of the Plan of Action, their significance "varies widely among countries . . .". In this respect, the consideration of international migration in terms of the international division of labour is important, but unfortunately it is complicated by the diversity of the flows observed. In particular, an explicit formulation of the linkages between international migrations and the international division of labour within the framework of the new international economic order remains a challenge to be met.

In spite of the increasing importance of other types of migration, permanent or "settler" immigration (that occurring when migrants are granted permission to stay permanently in the country of immigration if they so desire) is still relevant, particularly because it is in this context that the migrants' rights are best safeguarded. At present only a few countries still admit sizeable numbers of immigrants as potential settlers, but, during the past 10 years, several of them have adopted policies that are likely to reduce those numbers. The new policies also tend to give greater importance to economic criteria in the selection of immigrants, so that, next to kinship, those criteria are strong determinants of the migrants' characteristics, in a manner not unlike that prevalent in the case of migrant workers. In addition, during recent years, the necessity to resettle large numbers of refugees has often been met by granting those migrants the settler slots usually allocated to non-refugees. Thus, the legal category of permanent immigrant includes, in fact, persons whose migration is better understood (in terms of causes and consequences) by reference to other migration types. For this reason it is not treated here in greater depth. Before proceeding, however, it must be noted that *de jure* permanence has also been achieved by some migrant types whose change of residence was expected to be only temporary. More specific reference to such cases will be made below.

A. *The temporary migration of labour*

The World Population Plan of Action places great emphasis on issues related to the migration of labour. Most of the paragraphs devoted to international migration (paras. 54-62) make either direct or indirect reference to migrant workers, often highlighting issues related to the migration of skilled and professional personnel (paras. 57-59 and 61). The past three decades have witnessed at least two important flows of so-called

"migrant workers": those directed to the industrialized countries of Western Europe prior to the early 1970s, and, since then, those directed to the oil-producing countries of the Middle East. These flows are distinguished by two characteristics: first, they have occurred not only with the full sanction of the receiving countries, but even with their active participation in supporting or facilitating recruitment activities, and second, the temporary nature of the workers' stay in the receiving country has always been stressed, although, in practice, it has been difficult to achieve.

The existence of labour migration flows from poorer to richer countries is mostly due to a combination of two factors: the existence of labour surpluses in many of the capital-poor countries and the concomitant excess demand for labour in the capital-rich countries. Because the legal migration of labour cannot happen without the existence of a demand for such labour in the receiving country, the latter is the determinant agent of the labour migration process.

Demand-determined labour migration is judged to have several positive or potentially positive consequences: migrants earn far better salaries abroad than they would at home and may improve their skills; capital does not remain idle in the receiving country and production increases thanks to the participation of a foreign labour force whose reproduction costs are not fully borne by the receiving country; unemployment is eased in the sending country and foreign exchange is accumulated through the remittances of workers abroad. Unfortunately, owing to a variety of constraints, the full benefits of those potentially positive consequences are not always realized. Thus, because migrant workers are usually not selected from the ranks of the unemployed and because they are likely to be among the better educated and skilled members of the sending labour force, they may not be easy to replace at a sufficiently rapid pace, so that their departure may have negative effects on the employment and production levels of the sending country. In the area of remittances, their use for the acquisition of real estate or of scarce consumer goods may fuel inflation in the sending country. In addition, the uncertainties surrounding the level and timing of remittances make it difficult for sending countries to plan their use. A similar assertion holds true for the return of the migrants themselves. Because the sending country has very little control over those processes, it is seldom able to minimize their negative effects.

In the receiving countries, the negative effects of labour migration have become more evident since the breakdown of the rotation model on which the temporary importation of foreign labour has been predicated. When the temporary migrant becomes a long-term resident who may not be continuously employed and who will require social services and equitable legal rights, the receiving society tends to disregard his positive contributions to its general well-being. Hence, it is important to stress that the receiving countries enjoy most of the benefits of labour migration without bearing nearly enough of its costs. Priority should be given to the search for mechanisms to make the process more equitable.

It is worth noting that the search for such mechanisms began in the 1960s because of growing concern about the consequences of the "brain drain" (the emigration of highly skilled personnel). This issue has gained so much relevance that it is the only one mentioned in relation to international migration in the International Development Strategy for the Third United Nations Development Decade. Recommendations about how to deal with it abound, but tangible changes are less evident, although progress has been made in the transfer of skilled personnel from developed to developing countries, an area of international co-operation recommended in the Plan of Action (para. 61).

Calls for more effective action may be pertinent, but it is perhaps of greater importance to combat the fairly pervasive view that the "brain drain" occurs only from developing to developed countries. Like any other type of labour migration, it is now taking place also from "capital-poor" to "capital-rich" countries, and the latter are not necessarily developed. In addition, it is important to stress that not only the loss of skilled personnel may hinder development. For some countries, the loss of the younger, most dynamic members of the agricultural labour force, for example, may be of equal importance. In this respect one must add that, in spite of the advances made during the past decade, the interactions between migration and development are still poorly understood. The co-operation of both sending and receiving countries in increasing the knowledge on this topic is sorely needed.

Prior to 1970 the policies of several European countries promoted the temporary employment of foreign workers but, by the early 1970s, those countries had abandoned their active recruitment policies and were adopting measures to encourage return migration. Today, in spite of those measures, a sizeable stock of foreign workers still remains in the former labour-importing countries, and Governments, accepting their *de facto* permanence, are progressively adopting policies designed to safeguard the rights of migrants and to promote their integration and well-being. Thus, restrictions on family reunification have been gradually liberalized, regulations restricting the access of family members to the labour market have been relaxed or abolished, and a number of countries have granted trade union rights and certain political rights at the local and municipal level to foreign workers. In addition, cultural and social programmes aimed at enhancing the social and professional mobility of migrants have been implemented. However, in spite of those measures, migrants still face dim prospects concerning the attainment of full citizenship in the receiving countries and, in many instances, continue to be unduly isolated. Their successful integration is still a challenge to be met.

On the other hand, the Libyan Arab Jamahiriya and the capital-rich countries of the Middle East are still at the stage of regulating the inflow of migrants. Prior to the oil boom of 1973-1974, they maintained a *laissez-*

faire position with respect to labour migration, allowing workers from nearby Arab countries to enter with a minimum of control. More recently, they have progressively resorted to workers from other Asian countries, often hired and repatriated *en masse*. Given that migrant workers contribute a very large proportion of the local labour force in some of those countries, concern about the social costs of immigration has prompted them to restrict family immigration and to make naturalization very difficult, thus effectively preventing the integration of the expatriate population. In addition, the oil-producing countries of the Middle East have pioneered the use of "turn-key projects" as mechanisms to satisfy their needs, in terms both of technology and of skilled labour. Those projects, by which a foreign Government or, more generally, a foreign private-sector enterprise, is contracted to provide all the inputs necessary to perform a given task (including the workers), are still a rather recent phenomenon, so that their relative contribution to the development of both sending and receiving societies still requires careful evaluation.

Lastly, the sending countries have, for the most part, played a passive role. In general, they have focused their attention on the regulation of recruitment activities and on the productive use of remittances, the latter with not much success. They have consistently defended the rights of their citizens abroad, but they have not always given enough attention to the problem migrants face upon their return.

B. *Illegal or undocumented migration*

The World Population Plan of Action mentions illegal migration (para. 56), which calls for measures aimed at safeguarding the human rights of those migrants. Such calls are of particular importance because, with the discontinuation of the labour-importing policies of Western Europe and the tendency to limit legal migration flows in other parts of the world, the flows of illegal or undocumented migrants have probably increased. Unfortunately, because of their very nature, reliable quantification of their magnitude is not possible.

Meaningful analysis of those flows is further complicated by the fact that not all of them are equal: in some cases, undocumented migrants prevail because of *laissez-faire* policies, in others because, in spite of restrictive immigration policies, there is an unsatisfied demand for labour, at least in certain sectors of the receiving country's economy, and yet in others because, in spite of restrictive immigration policies and of the lack of unsatisfied demand for labour, poor economic conditions in sending societies compel the population to emigrate.

The causes and consequences of undocumented migration vary according to the modality it adopts. Thus, an economically active migrant whose status would be regularized if *laissez-faire* policies did not prevail or if there were no bureaucratic inefficiency, may be equated to a legal migrant worker, and the consequences of his movement would be very similar to those associated with the migration of labour. Similarly, when the presence of undocumented migrants in a country is determined by unsatisfied demand for labour, the economic consequences of their migration will correspond closely with those of labour migration. Some differences do arise, however, especially at the level of the migrants themselves, who, because of their illegal status, are more likely to be exploited or mistreated. In addition, social problems related to the presence of a foreign population in a country's territory (such as its competition for jobs and services with other social groups) may be exacerbated when that presence is not legally sanctioned. Yet, because the receiving country has only a limited responsibility to promote the well-being of undocumented migrants, it benefits from their labour without having to bear the full social and economic costs of their presence in its territory. One may therefore argue that all consequences of undocumented migration will be negative for the receiving country only when there is no unsatisfied demand for labour.

Policies adopted to deal with illegal or undocumented migration reflect the belief that this type of migration has undesired economic, political or social effects. In addition, because accurate information on illegal flows is totally lacking, policies are often formulated merely on the basis of vague perceptions or beliefs. It is in this area that research is most needed and where every international co-operative effort should be made to promote it.

Expulsion and deportation are common policy responses, being often implemented without due regard to the legal and human rights of migrants. Penalties for employers who knowingly hire an undocumented migrant have also been tried, usually in conjunction with a work-permit system. Stricter border controls and more stringent requirements for granting visas have also been mechanisms used to reduce illegal flows. In general, however, none of those policies has succeeded in stopping these flows.

On the other hand, some Governments have resorted to amnesties and to the regularization of the status of undocumented migrants. Their success has been fairly uneven, either because the amnesty attracts even more migrants or because migrants avoid it for fear of deportation.

C. *Refugees*

According to the 1951 United Nations Convention relating to the Status of Refugees, a "refugee is a person leaving his/her country because of a well-founded fear of persecution by reasons of race, religion, nationality, political association and social grouping".[4] The Plan of Action recommends that those refugee problems be settled according to the principles of the Charter of the United Nations and the Universal Declaration of Human Rights (para. 53).

Refugee movements are larger at present than at any time since 1950. In addition, a greater proportion of refugees both originates and is likely to remain in developing countries. Africa, in particular, has been

experiencing massive refugee flows which have been mostly resettled within the region. In future, refugee movements originating and ending in developing countries are likely to be the rule.

It is to be noted that the definition of refugee cited above does not cover the cases of persons moving from one country to another because of war, famine or natural disasters. Movements caused by those events have often been included in refugee counts, and are certainly of sufficient importance to warrant a revision of the definition of refugee according to United Nations instruments. Also excluded from the definition are the cases of those persons who are compelled to leave their country of origin because of intolerable conditions which may not be explicitly political in nature (some of those cases have been loosely denominated "economic refugees" and are generally counted among illegal migrants).

Because of their unpredictable and massive nature, the consequences of refugee movements are often negative, especially when the countries of asylum are poor and underdeveloped. However, one must recognize that for the refugees themselves the mere preservation of life is an important gain, even though assistance is often required to make this a productive and useful life. The role played by the Office of the United Nations High Commissioner for Refugees in this area is essential and requires ample support by the international community.

Traditionally, developed countries, mainly those characterized by programmes of permanent immigration, have had policies favouring the resettlement of refugees within their borders. However, in recent years they have provided permanent asylum to only a very small fraction of the world's refugees. Moreover, the refugees who have been resettled in developed countries have often competed with other types of migrant for increasingly scarce immigration slots and have been highly selected in terms of skills, assets or family ties.

Of special interest are the policies pursued by the African countries of asylum, which have had to resettle considerable numbers of refugees. Whenever possible, those countries have planned and implemented refugee programmes within the context of national and regional development strategies and have sought to integrate refugees into the economic structures of the host countries. Such an approach is commendable, particularly because it is likely to lead to long-term stability. Its achievements, and the factors leading to them, should be closely monitored so that, if at all possible, they may be replicated in other regions.

A contrasting approach is followed in Asia, where the majority of refugees from Indo-China have been confined to camps while awaiting permanent asylum in third countries of resettlement. With the exception of China, Hong Kong and Malaysia, most of the asylum countries or areas of the region have not considered refugees as a potential source of labour.

Lastly, in Latin America, where refugee movements are beginning to have the character of massive flows (owing to the instability in Central America), clear policy responses have not yet been formulated by the receiving countries. Refugees are initially confined to camps, but efforts are being made by some host countries to incorporate them into the local economy.

D. *Human rights*

The Plan of Action makes several recommendations aimed at safeguarding the human rights of international migrants (paras. 53, 55, 56, 60 and 62). Of special importance is the call for the humanitarian treatment of illegal immigrants and for the non-discriminatory treatment of migrant workers, especially when the latter have become long-term residents in the receiving country. Progress in this area is slow, particularly when the explicit legal recognition of the migrants' rights seems to be detrimental to the national interest. However, the advances made so far, particularly in Western Europe, are encouraging.

NOTES

[1] *Report of the United Nations World Population Conference, Bucharest, 19-30 August 1974* (United Nations publication, Sales No. E.75.XIII.3), chap. I.

[2] *Recommendations on Statistics of International Migration* (United Nations publication, Sales No. E.79.XVII.18) and "Strategy for implementation of recommendations on international migration statistics: report of the Secretary-General" (E/CN.3/549), July 1980.

[3] A. E. Lattes, "Territorial mobility and redistribution of the population" (IESA/P/ICP.1984/EG.II/4); O. de Oliveira and B. García, "Urbanization, migration and the growth of large cities: trends and implications in some developing countries" (IESA/P/ICP.1984/EG.II/5); P. Korcelly, "The turnaround of urbanization in developed countries" (IESA/P/ICP.1984/EG.II/6); H. Richardson, "Population distribution policies" (IESA/P/ICP.1984/EG.II/7); W. R. Böhning, "International migration: implications for development and policies" (IESA/P/ICP.1984/EG.II/8); A. Simmons, "Migration and rural development: conceptual approaches, research findings and policy issues" (IESA/P/ICP.1984/EG.II/9).

[4] United Nations, *Treaty Series*, vol. 189, No. 2545.

MORTALITY AND HEALTH POLICY: MAIN ISSUES FOR THE 1980s

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SUMMARY

The first part of the present paper reviews the progress and prospects for mortality reduction in the major regions of the world. The goals for mortality reduction as expressed in the World Population Plan of Action[1] and other official international documents are presented, and progress made towards the attainment of those goals at the regional level is appraised. A quick review of trends in life expectancy at birth is then presented and major causes of death for developing and developed countries are summarized.

The second part considers the interrelationships between mortality and health levels and differentials and development. In analysing the effects of development on mortality and health for developing countries, a review is made of different aspects that can lead to a sustained high mortality level or contribute to its decrease. Gross national product (GNP), structure of economic growth, dependency on foreign economies, recession, development strategies, education and agricultural development are some of the factors reviewed. For developed countries, attention is focused on per capita GNP, life-styles associated with development and industrial pollution. Demographic, economic and social consequences of mortality and health improvement are then examined and main findings on differentials in mortality by sex, socio-economic characteristics and geographic location are presented for both developing and developed countries.

Part three considers the effects of selective health programmes in such areas as immunization, nutrition, maternal and child health, sanitation, environmental control and life-style interventions, and discusses the basic elements of primary health care strategy. Finally, section four considers obstacles for the implementation of health policies. Recognizing the interdependence of the health system and the overall social system, a general review of several characteristics of the social system are examined, such as the power structure, political system, ideology and socialization process of the medical profession. A closer look is taken at specific characteristics of the health system, such as health care management, planning and financing, including international technical co-operation.

INTRODUCTION

A long and healthy life is striven for by all people; the provision of such a life is a goal of all societies. As no society has attained an average life expectancy at birth near the maximum human life span, it is not surprising that two thirds of the Governments responding to the Fourth Population Inquiry among Governments were unsatisfied with the level of life expectancy their countries had reached. In most countries, if not all, the question remains how to incorporate health practices and health technology fully into the everyday life of all segments of society.

Part four of the paper examines issues related to progress towards achieving a long and healthy life and policies for the provision of the basic goods necessary for such an achievement, as discussed at the 1974 World Population Conference at Bucharest. The World Population Plan of Action mobilized Governments and the international community to attack the problems of low standards of living and earlier-than-necessary death. The mobilization took place on two fronts—action and research. On the action front, the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) organized in 1978 the Alma-Ata Conference on Primary Health Care, which prepared the ground for national government efforts to establish community-

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based primary health care programmes in many developing countries. Health issues now have a conspicuous place in many national development plans, although actual resource commitment often remains small. On the research front, work programmes on determinants and consequences of mortality conditions are being undertaken by many national and international organizations, including the co-operative programme at the United Nations and WHO. Numerous international meetings to consider mortality and health issues have been organized by those two organizations, by the Committee for International Co-operation of National Research in Demography (CICRED) and by the International Union for the Scientific Study of Population, and other international, intergovernmental and non-governmental organizations. Those activities have continued to be hampered by inadequate funds for the collection of data and the analysis of health and mortality issues.

I. PROGRESS AND PROSPECTS FOR MORTALITY REDUCTION

A. *Goals expressed in the World Population Plan of Action and other official documents*

The reduction of mortality to low levels and the attainment of good health by all the world's peoples is regarded as a pressing goal by Governments and international organizations. The World Population Plan of Action states that "it is a goal of this Plan of Action to reduce mortality levels, particularly infant and maternal mortality levels, to the maximum extent possible in all regions of the world . . ." (para. 22), and that "many developing countries consider reduction of mortality, and particularly reduction of infant mortality, to be one of the most important and urgent goals" (para. 5). The attainment of this goal is viewed as both an individual and a collective good. As stated in the Declaration of the Alma-Ata Conference on Primary Health Care, held in 1978, ". . . health, which is a state of complete physical, mental and social wellbeing, and not merely the absence of disease or infirmity, is a fundamental human right and . . . the attainment of the highest possible level of health is a most important world-wide social goal . . .".[2] The right to the enjoyment of good health as a basic human right has also been affirmed by the two United Nations Symposia on Population and Human Rights.[3]

The World Population Plan of Action, adopted in 1974, gave quantitative targets for achieving certain minimum mortality goals by a fixed date. It recommended that "countries with the highest mortality levels should aim by 1985 to have an expectation of life at birth of at least 50 years and an infant mortality rate of less than 120 per thousand live births" (para. 23). The Plan of Action also implied that specified average values of life expectancy should be attained by the world and its major less developed regions, stating that "the attainment of an average expectation of life of 62 years by 1985 and 74 years by the year 2000 for the world as a whole would require by the end of the century an increase of 11 years for Latin America, 17 years for Asia and 28 years for Africa" (para. 22).

A review of mortality levels during the period 1980 to 1985, based on United Nations estimates and projections, reveals the progress made towards achieving those goals. Because the values for less developed countries are often based on incomplete or faulty data, they should be viewed with caution.

The world mortality situation during the period 1980 to 1985 is characterized by continued wide gaps between the more developed and the less developed regions, as well as among subregions.* Life expectancy at birth during the period 1980 to 1985[4] for both sexes is estimated at 73 years in the developed regions and 57 years in the developing regions, a gap of 16 years. Life expectancy at birth is lowest in Africa—50 years—followed by 54 years in South Asia and 58 years in the developing regions of Oceania. Latin America is next, with an overall figure of 64 years. The 1980-1985 life expectancy for East Asia, 68 years, reflects the value of 77 years for Japan and 67 years for China and other East Asian countries. In the more developed regions, life expectancy is estimated at 71 years in the Union of Soviet Socialists Republics, 73 years in Europe, 74 years in Northern America and Australia-New Zealand and, as mentioned, 77 years in Japan.

There is some cause for satisfaction in those figures, particularly that relating to the high level of life expectancy attained by China, which contains about 22 per cent of the world population and nearly 30 per cent of the population of the less developed regions. Owing in large measure to the recent rapid mortality improvement in China, world life expectancy in 1985 is expected to be only about two years below the value of 62 years mentioned in the World Population Plan of Action. However, life expectancy is still unacceptably low in many countries. When the World Population Plan of Action was adopted in 1974, 56 countries were estimated to have a life expectancy at birth below 50 years. Of these, only half are likely to attain the goal of a life expectancy of at least 50 years by 1985 or soon afterwards. The countries that are not likely to achieve this target are all in sub-Saharan Africa or South Asia. A total of 67 countries (47 in Africa, 16 in Asia, 3 in Latin America and 1 in Oceania), with a combined population 1.9 billion, are not likely to achieve a life expectancy of 62 years by 1985 or soon after. An average life expectancy of 74 years in the year 2000 will have been attained in the more developed regions. In the less developed regions, however, China is expected to fall short of the mark by only two or three years, Latin America by five years, South Asia by 13 years and Africa by 17 years.[5]

Mortality disparities among regions are very large during the first year of life, a vulnerable period during which unsanitary conditions and poor nutritional status are reflected in very high infant death rates in large parts

* According to the classification used by the Population Division of the United Nations Secretariat, the more developed regions include Northern America, Japan, Europe, the Union of Soviet Socialist Republics, and Australia-New Zealand in Oceania. The remaining regions are classified as less developed.

of the less developed world. At present (1980-1985), infant mortality is estimated to be more than five times as high in the developing as compared with the developed regions (91 and 17, respectively, per 1,000 live births). The infant mortality rates are highest in Africa (114) and South Asia (109). The estimated rates in the remaining regions are: the developing regions of Oceania, 78; Latin America, 63; East Asia, 36; the Union of Soviet Socialist Republics, 25; Europe, 16; Northern America, 12; and Australia-New Zealand, 11.[6] The rate is below 10 in Japan and a number of other developed countries. It is estimated that 27 countries—all in Africa or South Asia—are not likely to achieve infant mortality rates below 120 per 1,000 births by 1985, as recommended in the World Population Plan of Action (para. 23).

Mortality goals have been formulated more recently in connection with the Global Strategy for Health for All by the Year 2000 and the International Development Strategy for the Third United Nations Development Decade. In accordance with the Global Strategy, which was adopted by the World Health Assembly in 1981[7] and endorsed by the United Nations General Assembly in the same year (resolution 36/43), countries should strive to attain the "highest possible" level of health "in keeping with their social and economic capacities".[8] However, ". . . a minimum life expectancy of 60 years or more at birth, and a maximum infant mortality rate of 50 per 1,000 live births, are suggested as indicating that the health status of the population is becoming a decreasing burden on individual, family and community development".[9]

The mortality targets of the International Development Strategy are expressed as follows:

> "The reduction of mortality rates will be a major objective. In the poorest countries, infant mortality should be reduced to less than 120 per 1,000 live births [by 1990]. Life expectancy in all countries should reach 60 years as a minimum, and infant mortality rates should reach 50 per 1,000 live births, as a maximum, by the year 2000."[10]

The mortality goals and prospects described in the preceding paragraphs do not, of course, take into account the possibility of catastrophic mortality from large-scale wars, which have the potential to cause enormous loss of lives. The stockpiles of nuclear weapons already on hand were estimated in 1980 to be equivalent to one million Hiroshima bombs—sufficient to destroy every man, woman and child on earth many times over, and to poison the planet for future generations. A United Nations expert report which estimates some of the likely morbidity and mortality effects of employing nuclear weapons of different types and sizes makes chilling reading. According to the report, "with long-range nuclear weapons it has become possible to wreak near-complete eradication of a nation's population and devastation of its economy in less than a day's time and on less than an hour's notice".[11] Limited wars in which conventional weapons are employed would also have serious direct health consequences for the countries involved in terms of persons killed or wounded, and indirect consequences in terms of the diversion of scarce resources needed for health and development programmes to military purposes. There is also an ever-present danger of escalation of such wars into global and nuclear conflicts.

B. *Recent mortality trends*[12]

The question whether mortality decline has been slowing in the less developed regions has recently been addressed in several reports.[13] It is not possible to discuss this issue without emphasizing the serious data problems that exist. For many developing countries, data which can be used for estimating mortality trends are scanty, defective or out of date, so that recent trends are in doubt. This is particularly true for sub-Saharan Africa, where, on the one hand, death registration is very incomplete for most countries, and, on the other, few countries have a series of censuses or sample surveys for three points in time from which changing trends may be established. On the basis of fragmentary data for years in the 1970s, infant and overall mortality were still high in that region,[14] implying only a slow pace of decline. Non-demographic evidence which suggests stagnating, or even deteriorating, environmental, economic, social and political conditions in many of those countries[15] supports the plausibility of these trends.

Data for many Asian countries are also inadequate for measuring changing mortality trends. However, there is evidence of a general decline in mortality levels in most countries of that region.[16] The evidence for rapid mortality decline in China after about 1950 is convincing[17] and, as mentioned earlier, current life expectancy is estimated to be close to that of the more developed regions. In contrast, mortality decline on the Indian sub-continent, where life expectancy is estimated to be still relatively low (in the range of about 47 to 53 years), is proceeding at a slow pace. Recent estimates of mortality trends in India based on intercensal analysis and sample registration scheme data showed a gain of about 2.5 years in life expectancy at birth from 1966 to 1971, but a virtual cessation of improvement between 1971 and 1977.[18]

Several analyses of mortality trends in Latin American countries have found, for most countries for which the requisite data were available, a deceleration in the pace of mortality decline in the 1960s compared with the generally rapid pace in the 1950s. The decelerations have occurred at levels of life expectancy below the maximum levels observed in more developed countries.[19] The determination of trends for the 1970s for most countries, based on levels of life expectancy, must await the availability of data from the 1980 round of censuses. However, infant mortality rates for the 1970s are available for 12 Latin American countries with relatively complete death registration, and in eight of them, average annual rates of infant mortality decline were greater in the 1970s than in the 1960s. It was possible to calculate a measure of adult mortality (based on age-specific death rates) for the 1970s for only four of those countries, and in three cases the average annual mortal-

ity decline was more rapid in the 1970s than in the 1960s.[20] Those countries with relatively complete death registration cannot be considered typical, however, as they generally have lower than average mortality for their region.

Recent trends in life expectancy in developed countries have varied markedly among regions. Mortality decline was much more rapid in the 1970s than in the 1960s in Northern America, Western Europe and Australia-New Zealand, which experienced increases of from two to three years in life expectancy for each sex between 1970 and the late 1970s. (In a number of countries in those regions and in Northern Europe, male life expectancy had stagnated, or even declined slightly, in the 1960s.) Recent mortality trends in countries of Eastern Europe, on the other hand, have been unfavourable, particularly among males. In most of those countries, male life expectancy stagnated or declined between 1975 and 1980, and female life expectancy was virtually unchanged. As in some of the less developed countries, the recent slow-downs have occurred at less than optimum mortality levels. The factors underlying the changing pace of mortality decline in the different subregions are not clear, despite the detailed mortality data available for those countries.

C. *Principal causes of death*

While the cause-of-death patterns are known in a general way for the less developed regions, precise quantitative data by causes of death are often scarce, particularly for the countries with the highest mortality levels. In general, the higher the level of mortality in a population, the greater the proportion of deaths from disease caused by organisms—the infectious, parasitic, acute respiratory and diarrhoeal diseases—and the lower the fraction caused by the chronic degenerative diseases. As mortality declines, the first-mentioned groups diminish in importance, and a "modern" pattern emerges in which cardio-vascular diseases and neoplasms account for most deaths. The latter pattern characterizes the more developed countries and a number of less developed countries which have achieved relatively low mortality.[21] Those patterns are illustrated in the table below, which is based on data for the more developed countries and for a group of five less developed countries with life expectancy at birth (e_0) ranging from about 55 to 65 years.

PERCENTAGE DISTRIBUTIONS OF DEATHS BY CAUSE IN THE LATE 1970S

	Five developing countries with e_0 about 55 to 65 years	*Developed countries representing 85 per cent of all deaths in developed countries (e_0 more than 70 years)*
Infectious and parasitic diseases	17	1
Respiratory diseases (acute or chronic)	18	8
Accidents and violence	7	7
Cardio-vascular diseases	18	48
Neoplasms	8	21
All other causes	32	15
	100	100

Source: Based on data from the World Health Organization data bank.

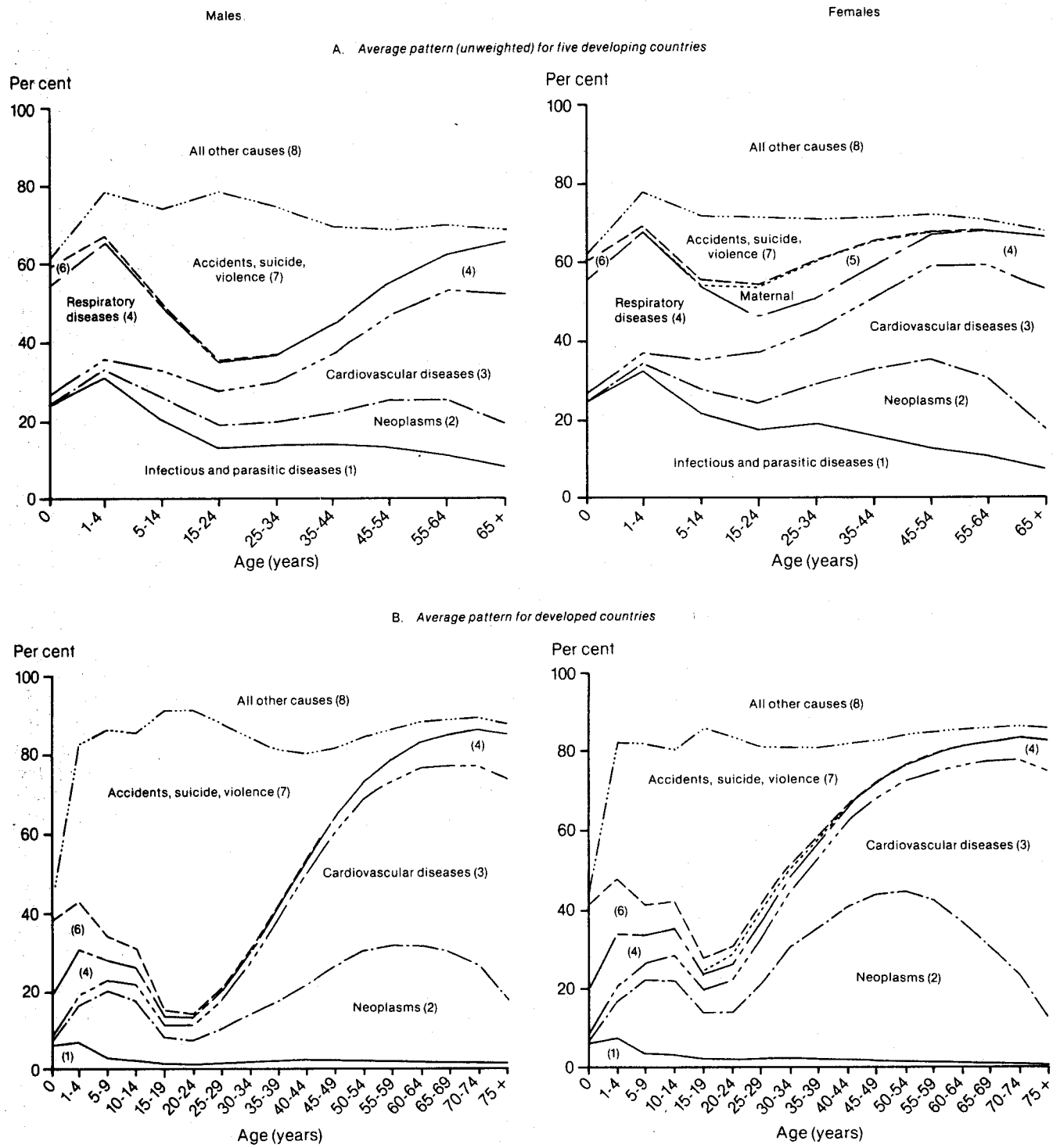
These data show large differences between the two groups of countries in relative importance of the major categories of causes of death. Had comparable data been available for countries with a life expectancy of less than 55 years, the differences would have been even sharper. Because of the relatively young age structures of many less developed countries, and the relatively high mortality among children under five years, the overall distributions of deaths by cause are heavily weighted by the diseases prevalent among the young (infectious, parasitic, diarrhoeal), while in the more developed countries the distributions are weighted by the diseases that afflict older adults. Even within age groups, however, the less developed countries have relatively more deaths from the infectious diseases and relatively fewer from the degenerative diseases (figures A and B).

The World Population Plan of Action has recommended "particularly vigorous efforts" to reduce mortality and morbidity in population groups with special health problems, namely, infants, young children and women in the reproductive ages (para. 24 (*a*)). During the reproductive years, women in high-mortality countries experience mortality related directly or indirectly to frequent pregnancies and childbirth, resulting in some countries in a reversal of the usual pattern of excess male mortality at those ages. In populations with the highest mortality, deaths of children under five years of age can amount to 50 per cent or more of all deaths.[22] In addition to deaths caused by infectious organisms, nutritional deficiency is very important as both an underlying and a contributing cause of childhood mortality in those countries, although it is only infrequently recorded as such. Much of this childhood mortality could be prevented through simple and effective technologies that already exist.

The Plan of Action does not specifically mention the degenerative diseases, despite their prominence in more developed countries and their growing importance in less developed countries (although the need to adopt measures for reducing mortality caused by social and environmental factors is mentioned in paragraph 24 (*f*)). Any further substantial gains in life expectancy in the more developed countries, where 7 out of 10 deaths occur after age 65, must come from mortality reductions from those diseases. Between ages 1 and 65 years in the more developed countries, violence causes the greatest loss of potential years of life. An estimate of the potential years of life lost at those ages in the United States of America in 1980 revealed that 41 per cent was due to violent causes (accidents, 27 per cent; suicide and homicide, 14 per cent), compared with 18 per cent caused by malignant neoplasms and 16 per cent by heart disease.[23] This type of analysis identifies priority health problems which may be most amenable to control by preventive measures.

Cause-of-death patterns in developed countries and selected developing countries by sex and age group, late 1970s

(Percentage distributions of deaths by cause)



Source: Based on data from the World Health Organization data bank.

NOTE: Figure A is based on unweighted averages of the percentage distributions of causes of death for Chile, the Islamic Republic of Iran (urban population), Mexico, Peru and the Philippines, and should not be considered representative of the developing regions. Figure B is based on data for 33 countries representing 85 per cent of all deaths in the developed regions.

Category (1) refers to infectious and parasitic diseases, (4) to acute and chronic respiratory diseases and (6) to congenital anomalies.

II. Interactions between health, mortality and development

No country has reached an advanced level of economic and social development without a prior or concomitant reduction of mortality to a low level. This is as expected, since a long and healthy life is a defining characteristic of development. It is also a facilitator of other development characteristics. As stated in the Declaration of the Alma-Ata Conference on Primary Health Care, "the promotion and protection of the health of the people is essential to sustained economic and social development" (para. III). In view of the fact that mortality decline and health improvement are fundamental characteristics of the development process, the following sections review some interrelationships.

A. *Effects of development on mortality and health*

The World Population Plan of Action notes that "the reduction of morbidity and mortality to the maximum feasible extent is a major goal of every human society" and recommends that "it should be achieved in conjunction with massive social and economic development" (para. 20). While "development" is undefined, the Plan of Action includes indications of the scope of development goals, namely, "the promotion of social justice, social mobility and social development, particularly by means of a wide participation of the population in development and a more equitable distribution of income, land, social services and amenities" (para. 32 (*c*)). This specification is significant because strategies for accelerated economic development must be considered in the context of social development, and different development scenarios may each have their own major health implications, especially in the less developed countries.[24]

While it is well recognized that the causes of mortality decline are multifactorial, until recent years little attention had been given to defining critically the specific key determinants in the development process because downward trends seemed to be the rule, almost independently of the national development strategies that countries were pursuing. Over the past decade, however, the growing evidence of a stagnation of mortality decline at low levels of life expectancy in a number of less developed countries, coupled with trends suggesting deterioration in the health gains in some more developed countries, has been leading to a more critical assessment by national and international groups of how social and economic policies and programmes affect health.[25]

To turn first to the developing countries, the high level of mortality seen in those countries is but one dimension of the problem of poverty; other dimensions are low levels of literacy and low productivity because of poor health, lack of skills and inability to acquire physical capital. At the international level, the connection between poverty and mortality is broadly illustrated by the strong correlation between GNP per person and life expectancy.[26] A closer examination of the correlation of life expectancy with GNP per person reveals a very wide dispersion when individual countries are considered.[27] For example, China, Cuba and Sri Lanka (and the State of Kerala in India) show unusually high life expectancies at low-income levels, while the oil-producing countries of Iraq, the Islamic Republic of Iran, the Libyan Arab Jamahiriya and Saudi Arabia have far lower life expectancies at levels of national income 10 to 20 times higher. This indicates that it is not only the aggregate income level achieved by economic growth but also the structure of economic growth, particularly as it relates to the distribution of social benefits, that can markedly influence mortality levels.

For example, the national government institutions of many less developed countries have highly centralized administrative structures with weak extensions into the rural areas. Often associated with this governmental structure is an ecological structure of highly developed but small élite urban sectors located in a single primate city or in a few large cities surrounded by relatively underdeveloped rural areas. This results in an urban bias in many government institutions in less developed countries and is evident in formal health systems which reach 20 per cent or less of the rural populations in most African countries and in many countries of Asia and Latin America.[28]

An additional distinguishing feature of many less developed countries is a dependency on foreign economies, usually characterized by high rates of foreign investment and an ever-growing foreign debt. This tends to impose its own shape and direction on the structure of the productive system, with its own consequences for social welfare.[29] The critical nature of this dependency relationship with respect to the development goals of the less developed countries has become dramatically manifest in the past few years as the stagnation of the economies of the more developed countries has led to a global recession and brought some less developed countries to the verge of economic collapse because of the loss of foreign markets and massive foreign debts. This is not only forcing a drastic curtailment of many new development projects, but also leading to widespread decline in the levels of living in many countries where large proportions of the population were already surviving at a marginal level of existence.

Evidence from several areas of the world has clearly shown that economic deterioration in a society can be directly translated into rising death rates. At one extreme are the famines in Ethiopia in 1973-1974, and in 1974 in Bangladesh, where droughts caused local declines in farm incomes leading to starvation in the affected areas because people could not afford to buy food from unaffected areas.[30] In the same period, Sri Lanka faced a national food crisis owing to a partial crop failure, a rise in the price of food imports and a rise in oil prices, which forced the Government to halve the free rice rations and increase the price of food. Because those changes were coupled with depressed prices for exports of tea and rubber, the impact fell most

heavily on the estate workers, whose wages were already depressed, resulting directly in an almost 100 per cent increase in mortality.[31]

Sustained high, or even rising, mortality rates in less developed countries are a function not only of uncontrollable natural disasters or external economic forces, but also of the balance Governments choose between, on the one hand, development strategies favouring capital accumulation and concentrated investments, primarily designed to maximize economic growth, and, on the other, strategies oriented more strongly towards meeting basic needs and reducing inequalities in income and wealth. For example, it seems that policies adopted in Brazil to control inflation and stimulate economic growth, by a strategy of allowing pay increases to lag behind rises in the cost of living, resulted unexpectedly in a general rise in the level of infant mortality in the city of São Paulo in the late 1960s and early 1970s. The resulting reduction of purchasing power reduced the ability of families, especially those in the lowest income groups, to purchase adequate food, housing, sanitation and health. After 1974, the infant mortality rate did fall again to the pre-crisis level, presumably owing to government extension of basic sanitation and increased coverage by the social security system. Government social welfare programmes provided the necessary services when they could not be afforded in the private sector.[32]

While low family income can influence mortality rates directly by reducing diet quality and quantity, reducing access to medical facilities and limiting investments in better housing and sanitation facilities, it also can have indirect effects: when poor women are forced to work outside the home, their children may suffer from neglect in care and feeding.[33] Often this feeding problem is compounded by commercial interests which promote bottle-feeding of infants as a "modern" substitute for breast-feeding.

Since education, particularly women's education, is strongly associated with low levels of infant and child mortality, less developed countries which have placed a high priority on education for both sexes generally have higher life expectancies relative to their levels of income. This has been well documented for many countries, particularly in Latin America and Asia, but also in sub-Saharan Africa.[34]

From the standpoint of national development strategy, if the option in terms of mortality impact is raising per capita income versus raising education levels, it has been observed from cross-national correlation analysis that, while a 1 per cent rise in income is associated with a 0.05 year gain in life expectancy, if the 1 per cent gain in income were directed towards primary schooling the estimated gain in life expectancy would be four to eight years.[35] (There would be a time lag, however, as the mortality relationship has to do with adult education.)

The observation regarding mass education and mortality is consistent with the fact that generally less developed countries which have pursued development strategies stressing the distribution of social benefits have reached some of the highest levels of life expectancy relative to income. Classic examples are China, Sri Lanka, Cuba and the State of Kerala in India.[36] A more recent example is Costa Rica, which has achieved dramatic gains in life expectancy in the past decade as a direct consequence of a health and social development strategy directed specifically to the most disadvantaged groups in the population.[37]

Beyond those macro-developmental factors of income growth, and the distribution of social benefits, there are many other elements of the development process's impact on health which should be noted. For example, agricultural transformation may precipitate childhood malnutrition if appropriate food for purchase is not readily available, as families move from subsistence food crops to cash crops. Also the ecological changes, for example, irrigation systems, can lead to higher rates of water-borne and water-associated diseases such as malaria and schistosomiasis. As the society becomes more consumer-oriented, commercial enterprises may promote unnecessary and even dangerous products, such as baby bottles and unsafe drugs, among the rising population of consumers. Generally, a rising industrial sector will be associated with many more health hazards than now seen in the more developed countries because of poorer health and training of the workers, weaker safety standards and fewer or no environmental pollution controls. Similarly, the traffic accident rates are far higher because of poorer vehicle and road maintenance, less skilled drivers and more congested roads.

To turn to the more developed countries, the general process of development has been accompanied by a range of mortality responses. Generally, for infants and children under age 15, there has been a progressive decline in mortality with the steady control of infectious diseases owing to the high level of environmental sanitation and good nutrition. (It is noteworthy that, even in the more developed countries, the infant mortality rate continues to correlate closely with per capita GNP.)[38] Among adults, however, development has had mixed effects; while there has been a decline in rates of death caused by infections, particularly tuberculosis, and by some forms of cancer (for example, stomach), there has been a rise in mortality caused by "diseases of affluence", that is, coronary heart disease, cancer, motor vehicle accidents, alcoholism, suicides and homicides, particularly among males.[39]

When we look at the broad connection between development and one disease of affluence, namely, cardio-vascular disease, it is clear that the incidence of that disease and particularly coronary heart disease (in all countries except Japan) rose to become the single leading cause of death in the more developed countries by the middle of the twentieth century. Major determinants are life-style factors such as high blood pressure related to obesity and high salt intake, high consumption of animal fats, cigarette smoking and physical inactivity.[40] In the past two decades, however, there has been a decline in cardio-vascular mortality in the United States, Australia, and many countries of West-

ern Europe, with several studies correlating this with declines in consumption of animal fat and in cigarette smoking.[41] Over this same period, a continuing rise in cardio-vascular mortality in the Union of Soviet Socialist Republics has been associated with a large rise in the consumption of meat, eggs and milk products and in smoking.[42] Deaths from cancer, especially lung cancer, are also closely tied to development-related changes in life-style, such as diet and tobacco, as well as being tied, but perhaps less closely, to the modern environment, namely, hazards of the work-place and industrial pollution of the air and water. The role of life-style and of the potential political will of Governments to control industrial pollution suggests that even the new epidemic diseases of affluence may be ultimately controllable, though the social policy mechanisms are obscure. That those diseases of affluence pose a threat to the less developed countries is also evidenced by the more than 100 per cent rise in cardio-vascular deaths among middle-aged men in Sri Lanka between 1953 and 1971.[43]

Japan must be singled out as a unique case among the more developed countries, both because of the spectacular improvement in life expectancy since the end of the Second World War and because of the high levels reached, especially among males. The reduction in tuberculosis contributed the most to the decrease in mortality from 1950 to 1980, but mortality from cardio-vascular diseases, already at very low levels for a more developed country, has also declined sharply.[44] Because this mortality improvement has occurred concurrently with a rapidly developing economy and the institution of a wide range of health and social benefits to the population as well as several special disease control programmes, it is not possible to single out the social strategies that might have been most critical for the advances produced.

The contrasting levels and trends in mortality between the more developed countries of Eastern Europe, Western Europe and Japan seem to lead to two broad generalizations: first, that a high level of economic development does not necessarily lead to steady gains in life expectancy, and secondly, that in spite of the large amounts of data available from the more developed countries, there is an insufficient base of knowledge adequately to explain why such specific variations in the mortality levels and trends are occurring in the respective countries.

B. *Consequences of mortality and health improvement for development*

The clearest effects of mortality decline on development are on demographic characteristics, mainly the growth rate of the population and its age distribution. Those effects are not discussed in the World Population Plan of Action. Mortality decline was the primary factor responsible for the dramatic rise in population during the nineteenth century among the now-developed countries and for the unprecedentedly fast pace of post-war population growth in the currently developing world. The positive or negative consequences of those rapid rates of population growth for development have been the subject of considerable debate. However, it is worth noting that a rapid rise of life expectancy among the developing countries to levels now typical of the more developed countries would not in most areas have as large an effect on population growth rates as the rise experienced by the less developed countries during the 20 years following the Second World War because the death-rate component has generally already reached moderate or low levels.[45]

Fertility and migration remaining constant, the effect of mortality decline on the age distribution of the population depends solely on the age pattern of mortality change. Under typical patterns of mortality change, comparisons of stable populations suggest that mortality decline will lead to a decrease in the proportion of the population at the childbearing and economically active ages. The exact nature of the change depends on the initial mortality level. As mortality moves from high to moderate levels, declines take place in the proportion aged 15 to 65, with a corresponding increase in the dependent population, mainly among the under-15 age group. By contrast, movement from moderate mortality to low mortality leads to a continued decline in the proportion aged 15 to 65, with most of the corresponding increase taking place in the population aged 65 and over. Increases in proportions of the population in those dependent age groups raise issues of family and societal support for education, entry into and exit from the labour force, social and economic mobility, and retirement. Age distribution concerns in the developing countries have concentrated on the high proportions of the populations in the infant and childhood age groups, whereas concern in the more developed countries has centred on the high proportion at the older ages. The foregoing analysis points out that, under average conditions in less developed countries (that is, a life expectancy at birth of about 50 to 60 years), continued declines in mortality would not be expected to lead to as important increases in the 0 to 15 population as did earlier improvements in mortality rates. Reduction of the proportion of the population aged 0 to 15 depends on the reduction of fertility. That is true under typical patterns of mortality decline. However, if the mortality decline results from health intervention programmes targeted at a selected age group, such as infants and children, age distribution effects may differ. In the past, mortality declines in the more developed countries have made only a small contribution to increases in the proportion of the population aged 65 and over; the aging of the populations was mainly the result of past fertility trends.[46] But now a high proportion of mortality is centred on the oldest ages; declines in those age groups will greatly accelerate population aging.

Mortality declines can also have effects on other components of population change; for example, on fertility. Under moderate to high mortality conditions, mortality decline would lead to longer survival of married couples and hence to higher proportions of women subject to the risks of pregnancy. This can lead to higher total fer-

tility rates, if age-specific marital fertility rates remain unchanged. This effect could raise the total fertility rate by about 5 per cent (depending on the initial level of mortality).[47] An even greater effect could be expected if a corresponding improvement in health led to improved fecundity, including decrease in foetal mortality and hence higher marital fertility. The age distributional effect mentioned in the previous paragraph will, on the contrary, lead to proportionally fewer women in the childbearing ages and hence have a negative effect on the crude birth rate.

Under situations of controlled fertility, even the impact of longer joint survival could be weakened when marital fertility rates do not remain constant. Although reduced infant mortality, especially in the presence of traditional lactation practices, can lead to longer birth intervals and therefore reduced fertility, the number of surviving children per woman will rise.[48] If a certain number of surviving children is desired, parents will need to adjust their reproduction goals in order not to exceed that number in the face of declining mortality. The World Population Plan of Action appears to note this potential relationship, stating, in paragraph 21:

> "Sustained reductions in fertility have generally been preceded by reductions in mortality. Although this relationship is complex, mortality reduction may be a prerequisite to a decline in fertility."

However, demographic effects of mortality decline may not be limited to fertility only. As families and individuals adjust to new conditions caused by the control of mortality, new patterns of nuptiality and migration might also emerge.[49]

Discussions of economic consequences of mortality decline have generally concentrated on the effects of population growth on production and consumption and on the effect of longer and healthier survivorship on the quality of the work force and productivity. The effect of a high rate of population growth (owing to a sustained mortality decline) on economic development appears to be inconclusive, depending upon responses of other factors such as savings and capital investment, human capital and productivity, land use and economies of scale.

Increased survivorship and improved health have their own potential positive effect on economic growth through such factors as lengthening of expected years of working life, increase in physical and mental ability among workers, fewer days lost from work, and greater incentive for investment in schooling and on-the-job training and for other human investment. All of those factors could lead to higher ratios of output per unit of human and physical capita. The empirical studies of the role of health in thus improving productivity are neither large nor conclusive, but they generally point to the positive effects of greater longevity and improved health.[50] Health should not be regarded as a single variable. For example, lower incidence of morbidity from some parasitic diseases is correlated with higher productivity, but from other parasitic infections it is not.[51] Part of the effect of health on work productivity may also be indirect, acting through the education variable. Improved nutrition has positive effects on school performance, and school performance in turn affects later work productivity.[52] The potential significance of those issues is noted in the World Population Plan of Action, which recommends "particularly vigorous efforts to achieve . . . improvement of poor health and nutritional conditions which adversely affect working-age populations and their productivity and thus undermine development efforts" (para. 24 (*e*)).

Mortality declines also have important familial and societal implications. Those implications are not considered in the World Population Plan of Action. A basic change is the number of years and proportion of life spent carrying out various primary social functions. One study has shown that as life expectancy increases from 35 years to over 70 years at birth, the number of years expected to be spent with neither parenting nor work responsibilities increases from 1 year to 12 for males, and from 5 years to 23 for females.[53] Widowhood and orphanhood incidence and prevalence can also be affected, as well as ages at which those events take place. For example, assuming other aspects of nuptiality remain unchanged, the proportion widowed in the total population would decline. However, for the average person, the expected number of years of widowhood would remain largely unchanged, although the onset of widowhood would be delayed to a much older age.[54] The age of widowhood would now be more likely to occur during a period of life beyond the labour force ages, where provision of one's own support is less likely. The additional economic, social and psychological support needed because of such changes may have to be absorbed by national social service programmes such as pensions and health insurance schemes and other support programmes. Nevertheless, the mortality decline itself would be expected to increase the frequency of kin who could also provide support. The effect of mortality decline on orphanhood may have some demographic similarities to widowhood but its implications are very different. Parallel to the widowhood effect, the mortality decline raises the expected age of parental loss. However, with respect to orphanhood, the effect will be to reduce the proportion orphaned during their childhood years. Loss of parents will more likely occur during the adult years when the individual is mature and self-supporting and in less need of economic and social support programmes. Lower levels of mortality may also lead to important attitudinal changes. For example, mortality declines among children may affect perceptions of the value of children and intergenerational flows of resources; declines among adults may affect attitudes towards remarriage as well as kinds of living arrangements.

C. *Differentials in mortality and morbidity*

Although a decline in mortality and morbidity is brought about by the rise in the standard of living and advancement of medical technology, people benefit selectively from such progress. There are, in fact, significant differentials in mortality and morbidity in most countries. The intranational differences are pro-

duced by the unequal distribution of resources, skills and knowledge for the promotion of health and the prevention and treatment of diseases among social groups and geographical regions, often resulting from the national strategies for development and policy decisions on welfare and health. The differentials also reflect variations in environmental conditions of places of residence and work.

The inequality with respect to mortality is recognized in the World Population Plan of Action, and its reduction as well as the reduction of the overall mortality level is stressed: "It is a goal of this Plan of Action to reduce mortality levels . . . and to reduce national and subnational differentials therein" (para. 22). The mortality condition of a country in which underprivileged segments suffer from considerably higher mortality may not be deemed satisfactory even if the country has attained some success in reduction of the overall mortality level by reaching and passing the numerical targets suggested in the Plan of Action. It is thus recommended in the Plan of Action that "reduction or, if possible, elimination of differential morbidity and mortality within countries, particularly with regard to differentials between regions, urban and rural areas, social and ethnic groups, and the sexes" (para. 24 (*c*)) be achieved.

The inequality in morbidity and mortality is, however, still substantial in both developing and developed nations. For some developed countries, such as France, the United Kingdom of Great Britain and Northern Ireland and the United States of America, data are available for analysing trends over time in mortality differentials. The data seem to provide little evidence to support the earlier, rather naive, expectation that the decline in the overall mortality level would automatically be followed by a reduction in mortality differentials. In fact, the magnitude of variations is often striking. A study of mortality differentials among 17 occupational categories in France has shown that the difference between the lowest (teachers) and highest (unskilled workers) mortality occupations corresponds roughly to the past 80 years of progress in the reduction of the national mortality level.[55] In developing nations variations are generally even greater; it is not unusual to find differentials in the infant mortality rate as large as three to five times between the highest and lowest risk groups, when the national population is divided into a few segments with respect to a certain socio-economic characteristic.

Although data on mortality differentials are far from sufficient, especially for adults in developing regions, research results from various countries have been cumulated so that some widely observed patterns can be identified.[56] Notable mortality variations by the following four kinds of variables seem particularly important: socio-economic status characteristics; urban versus rural area of residence; a group of variables, including ethnicity, religion and geographical location, that are related to intranational cultural diversities; and sex differences.

First, in both developing and developed countries, the lower level of income, shorter period of education and manual-labour occupation tend to be associated with the higher risk of death and ill health. The underprivileged, trapped in poverty, are disadvantaged at different stages of the disease process. They are generally more susceptible and less resistant to diseases, in part owing to less access to immunization services, in part owing to malnutrition, including protein-energy insufficiencies and imbalances in diet, and in part owing to deficient housing facilities that do not provide enough protection from heat, cold, wind and rain. Poor facilities of environmental sanitation in households and communities, including supply of drinking water and waste disposal and sewage systems, raise the frequency of exposure to bacteria, viruses, parasites and vectors. The cost of medical services as well as the inequitable distribution of health services in favour of rich residential areas keeps the poor from receiving adequate treatment for disease and injury. Lack of knowledge about proper health care is conducive to a further increase of their disadvantage at every stage of the disease process. In addition, as far as infants and very young children are concerned, women of low-income families with little educational background tend to start childbearing at very young ages, have short birth intervals and give high-order births, all of which are considered to raise the risk of death of their children and themselves.

Secondly, with respect to geographical variations, mortality has been found significantly higher among rural than among urban residents in developing countries, although differences are minor in developed nations and do not allow generalizations about the direction of the association.[57] The excess of rural over urban mortality is partly attributable to the differential distribution of socio-economic characteristics in urban and rural areas. Better-educated and higher-income people live in greater proportion in cities. The urban/rural differences therefore diminish significantly by a statistical control of socio-economic characteristics, though in some countries the remaining differences are not negligible.

The remaining urban/rural differentials, if substantial, may be a result of the strong tendency in developing countries for health manpower and facilities to be concentrated heavily in major cities. The fact that the urban population is better provided with basic community amenities such as a clean water supply and a sanitary system of waste disposal and sewage seems also conducive to the lower urban mortality,[58] although there are some counteracting factors such as increased density and pollution in cities.

Thirdly, in addition to the urban/rural differences, remarkably large mortality variations among geographical locations such as districts and provinces as well as considerable differentials by ethnicity and religion have been found in some developing countries, particularly in Africa.[59] Their differentials are often more prominent than urban/rural differences and remain substantial after the impacts on mortality of socio-economic characteristics are taken into account. Differentials by location, ethnicity and religion are considered strongly interre-

lated in the nations where a variety of tribes and ethnic groups reside separately in different geographical areas. One plausible explanation of the differentials is that membership in groups that are bounded by language, culture, physical appearance and geographic locations of residence imposes the boundaries of the distribution of health-related habits and practices and the diffusion of information on health and diseases.

Finally, excess male over female mortality has been very widely observed. Success has not been attained in decomposing the excess attributable to the different physiological composition and that resulting from different sex roles and life-styles in societies. However, if the almost universal excess is found to be virtually non-existent or even reversed, it is a symptom of serious deprivation of women. Higher mortality of female over male children is widely observed among developing countries,[60] particularly in the South Asian region.[61] This may be related to the lesser importance attached to girls by parents who had preferred to have boys.[62]

It is very difficult to eliminate mortality and morbidity differentials through efforts of the traditionally defined health sector alone, in the presence of inequalities in other aspects of economic and social affairs. Some studies in developed nations have suggested that the differential mortality is related to socio-economic differences in life-styles and attitudes towards health, which are not easily manipulable by health policy planners.[63] Furthermore, the large magnitude of intranational mortality variations particularly in developing nations reflects the vast differences among social groups in standards of living and the inequitable geographical distribution of benefits of economic and social development. Nevertheless, the high mortality of the underprivileged, especially in rural areas, suggests that a potential of significant reduction of differential mortality and morbidity rests in a shift of the focus of health care from expensive curative treatments applicable to only a small segment of the population to the wider coverage of the largely neglected people with basic, low-cost preventive services. This is illustrated by mortality reduction in mortality levels and differentials in Costa Rica, resulting from a policy focusing on the less privileged segments.[64]

Observed patterns of mortality differentials may also underscore the significance of health education in developing regions. The greater mortality variations by education than by other socio-economic variables such as income and occupation, together with the large differentials by variables related to intranational cultural differences, suggest the important role of health-related knowledge, relative to financial resources and physical facilities of families, in reducing mortality and morbidity. This is compatible with the fact that it is possible to avoid many current deaths by adopting relatively simple and low-cost means such as breast-feeding, oral rehydration of diarrhoeal patients, washing hands before meals and boiling drinking water, and cutting the umbilical cord aseptically.

Lastly, it should be noted that some variations in mortality may be indicative of changes in family relationships that are induced by economic and social development. The education of the mother is often the single most powerful factor in the multivariate analysis of infant and early childhood mortality data. The strength of the factor has been discussed as indicative of changes in women's role and status within the family that are brought about by their attainment of higher education.[65] This seems to suggest that more light needs to be shed on the important role of the family as a unit for self-reliance in health care.

III. Health policies and their effects on mortality

A. *Curative programmes and preventive programmes*

In recent years there has been a growing recognition of the importance of preventive health programmes. In the developed countries, where degenerative diseases predominate, there is strong evidence that changes in life-style can contribute to the prevention of those diseases, or postpone their onset. Once established, the diseases can be difficult and costly to treat. In several developing countries, there is evidence from small-scale field studies that the introduction of modern curative services into high-mortality settings without considering the hygienic conditions and nutritional status of the population may have a small or negligible effect on health.[66]

In 1974, the World Population Plan of Action implicitly stressed a preventive approach, calling for, *inter alia*, "eradication, wherever possible, or control of infections and parasitic diseases, undernutrition and malnutrition; and the provision of a sufficient supply of potable water and adequate sanitation" (para. 24 (*d*)); "improvement of poor health and nutritional conditions which adversely affect working-age populations . . ." (para. 24 (*e*)); and "adoption of special measures for reducing mortality from social and environmental factors . . ." (para. 24 (*f*)). The components of primary health care as formulated at the Alma-Ata Conference also reflect the goal of achieving a better balance between preventive and curative aspects of health programmes.[67] However, a high percentage of actual expenditures for health programmes in developing countries have typically been for curative services. In recent years, there have been widespread changes in the formulation of health policy in many of those countries, with greater emphasis on primary health care and preventive programmes, but as indicated below in the section on primary health care, the extent to which those programmes will be implemented remains in doubt because of political obstacles.[68]

In considering the merits of preventive and curative programmes, however, one must take care not to create an artificial dichotomy between the two, as the distinctions between them are sometimes blurred and both have important roles to play in maintaining a healthy population. In determining the most suitable mix of preventive and curative programmes for reducing morbidity and mortality, countries must take many factors

into account, including their age and cause structures of mortality, their health infrastructure and the resources that can be allocated to health programmes. Because of the complexity of those factors and, in many less developed countries, the lack of data and experience from which to make rational choices, it is not an easy task for those countries to select the most appropriate and cost-effective means of achieving health-related goals. (Relevant to this problem, the World Population Plan of Action recommends the interchange of experience among countries in preventing and treating diseases (para. 26).)

Because the health problems of the developing countries differ greatly from those of the developed countries, it is useful to examine the two groups of countries separately in considering the potential impact on mortality of different types of programmes. Certain generalizations emerge from an analysis of the mortality experience of the developing countries in relation to specific preventive and curative technologic approaches. An important element in their effectiveness is their breadth of coverage, that is, their ability to reach large segments of the population. In the case of malaria, for example, in areas where the disease is endemic, the use of insecticides can have a major effect on the mortality level in the population.[69] Even where mass spraying is not applied, there is evidence that the wide availability of chemotherapy and chemoprophylaxis can keep mortality rates below levels expected without treatment.[70] If family planning programmes are considered from the standpoint of technologies for mortality reduction, there is considerable evidence that they can contribute substantially to maternal and child survival by affecting the age-parity structure of childbearing as well as birth spacing.[71]

Vaccines represent one of the most effective disease prevention technologies available, and have the potential to eradicate a disease with a measurable demographic impact when applied on a global scale, as was the case with smallpox.[72] Currently, there are three diseases—neonatal tetanus, pertussis and measles—which contribute significantly to childhood mortality and which are amenable to prevention by immunization. In most developing countries, however, little impact has been made on mortality from those diseases because of the low coverage of the population by vaccine programmes (in the range of 10 to 30 per cent).[73]

Another area that is amenable to a medically focused approach is maternity care during childbirth. Strategies to ensure that deliveries are attended by a trained practitioner with some basic surgical back-up in case of complications can reduce perinatal and maternal deaths significantly.

A more recent strategic approach to mortality reduction is the home use of effective therapies. The main therapy so far subjected to population-wide field testing has been oral rehydration to prevent deaths from acute diarrhoeal disease. While this therapy is highly effective in preventing a fatal outcome from an episode of acute dehydrating diarrhoea, including cholera, its impact in saving lives in a population living under adverse environmental and nutritional conditons has been questioned.[74] An illustration of the problem is the contradictory findings of two different controlled field trials in rural Egypt, one which showed a definite reduction in acute diarrhoea and total mortality over a six-month period in several small populations where mothers were intensively instructed by health professionals, while the other showed no effect on mortality in a larger population where mothers were given simple instruction along with packets of oral rehydration salts.[75] Elsewhere, in areas as diverse as Bangladesh and Costa Rica,[76] significant reductions in diarrhoea deaths following the distribution of oral rehydration salts to populations have been reported.

Regarding the popular dissemination of other potentially life-saving therapies, there has been a clear demonstration of the life-saving effect of the use of penicillin to treat pneumonia by auxiliaries in a properly designed vertical programme.[77] While this strategy has been proposed for broader use, so far it has not been endorsed by the medical profession in the less developed countries. This restriction on wider use of a few effective drugs in less developed countries which are underserved by qualified professionals represents a paradox, since in those same countries pharmaceutical sales are, for all practical purposes, totally uncontrolled. Thus, antibiotics as well as other drugs are usually dispensed by untrained persons, exposing the population to all the risks, but few of the benefits.

Moving beyond specific disease-oriented technologies, one comes to improvements in nutrition and sanitation. Nutrition interventions, specifically "vertical" feeding programmes administered by health or welfare agencies, can be considered as either a preventive or a curative strategy, depending upon how the target groups are selected. While some small-scale research projects directed towards infants or pregnant mothers have demonstrated measurable health impacts, there is little evidence that large-scale feeding programmes are beneficial.[78] Improvements in sanitation, except in urban areas where water and sewer systems may be installed, are basically dependent on personal hygienic practices in the home. Thus, effective strategies to tackle those two problems require broader intersectoral approaches addressing factors such as economics, education and agriculture.

It seems reasonable to conclude that, in high-mortality countries, broad coverage of the population by the most effective and economical elements of both curative and preventive strategies is essential for achieving large mortality declines, as has occurred in China or Sri Lanka.[79] In contrast, where resources have been concentrated in sophisticated curative facilities serving only a small subsegment of the population, as is particularly prominent in many parts of Africa, no mortality impact is likely to be forthcoming.[80]

In the more developed countries it is useful to look separately at two subgroups of the population, infants and adults. Regarding infant mortality, evidence from

several countries indicates that direct interventions through active programmes to provide every pregnant woman and new-born infant with the best quality of medical care, using a variety of new technologies, can reduce infant deaths to very low levels.[81] Among adults, where most of the deaths in the more developed countries occur, the role of curative medicine is far less important than are changes in life-style, the key elements of which are cigarette smoking, alcohol misuse, diet and exercise.[82] Of these, cigarette smoking deserves special attention because there is evidence that it is the largest single preventable contributor to mortality.[83]

Regarding life-style, one analysis in the United States of America of the 10 leading causes of death over the age of one year in 1975 estimated the average proportional allocation of contributing factors to mortality as: life-style, 48.5 per cent; hereditary or biological factors, 26 per cent; environmental factors, 16 per cent; and the medical system, 11 per cent.[84] An indication of the relevance of life-style to longevity in the more developed countries comes from one study which indicated that 45-year-old men who followed seven healthful habits (exercising regularly, maintaining moderate weight, eating breakfast, not snacking, not smoking, drinking moderately and sleeping seven hours each night) could expect an average of 11 more years of life than those following three or less of those habits.[85]

One problem area where life-style change enforced by legislation can have a dramatic influence is deaths resulting from violence.[86] As an example, the United States has homicide rates 10 times higher than the United Kingdom primarily because of the lack of laws controlling the personal use of guns. Regarding fatal automobile accidents in the United States, there was an immediate measurable drop in 1974 following the reduction of the speed limit (because of the oil crisis), while in Japan and the United Kingdom, low and declining rates can be directly attributed to strict control of alcohol consumption among drivers.

The emphasis on life-style changes does not detract from the important contributions that medical technology has made, and will continue to make, in the control and management of the degenerative diseases in a variety of ways, including early detection and diagnosis; the control of risk factors through medications, such as the new anti-hypertensive drugs; the reduction in mortality of some types of cancer and cardio-vascular diseases through a variety of interventions; and the improvement of the quality of life of persons suffering from different chronic diseases.

B. *Primary health care*

One of the fundamental principles underlying primary health care, as expressed in the Declaration of the International Conference at Alma-Ata in 1978, is that health care should be accessible, affordable and socially relevant.[87] Action taken by countries to translate this principle into policies and programmes has so far produced very variable results, ranging from dramatic mortality reduction to disappointing impacts.[88] This raises a host of issues which can be divided broadly into two questions: first, what are the critical elements of a primary health care strategy necessary for achieving a health impact; and secondly, to what degree can any direct health intervention strategy be effective independently of the general social and economic context in which it operates? The first set of issues will be addressed here, focusing largely on the less developed countries,[89] and the second set will be addressed below in the section on health care system and total social system.

Primary health care strategy is characterized by some basic elements, including, among others, active community participation; involvement of other development sectors, such as education and agriculture; provision of curative, preventive and health promotion services in a manner socially relevant to the local context; extensive use of paramedical personnel; and use of simple but effective technologies. Those elements are discussed below in reverse order. The World Population Plan of Action, prior to the Alma-Ata Conference, anticipated many of these strategic perspectives by noting that health programmes should "be integrated within a comprehensive development strategy" with "formulation of policies to widen their coverage" (para. 25), and, regarding health manpower, should "redistribute their functions among the different levels of professionals and auxiliaries . . ." (para. 29 (*f*)).

With respect to technologies used in the primary health care approach, it should be recognized that the most powerful disease prevention "technologies" are actually the fundamental necessities of life: pure water, good diet and adequate clothing and shelter. Modern medical science has added many more—vaccines, insecticides, antibiotics, oral rehydration and contraceptives, among others. The problem is making these accessible, affordable and acceptable (socially relevant) to the general population.

The most direct step taken to reach the people where they live has been the use of some type of a community-level health worker as an extension of the formal health system. This has a long historical precedent in the compulsory health programmes in most less developed countries with the use of sanitarians, vaccinators and malaria workers, but the real lead in the use, as a national policy, of auxiliaries to provide a wide range of preventive and curative services was taken by China with the "barefoot doctor" programme in the 1950s. For other less developed countries, one turning-point in considering this strategic approach seems to have come with the "deregulation" of contraceptive technologies beginning in the late 1960s, permitting auxiliaries to provide them at the village and household level without direct medical supervision.

The recent successes of a highly focused community-based distribution of contraceptives in some countries, for example, Indonesia and Thailand, have led not only to the rapid expansion of this approach in many other less developed countries but also to a growing movement to add to this delivery system a package of other medical technologies such as oral rehydration, vitamin

A, iron tablets, antihelminthic drugs and antimalarials.[90] In Indonesia, the National Family Planning Programme is undertaking the most ambitious effort of all by adding to the family planning field workers' tasks a complete nutrition programme designed to include monthly weighing and growth charting of all children in the community, nutrition, education, vitamin and iron supplementation activities and home gardening.[91]

Community-based distribution programmes are specifically designed to achieve the primary health care goal of mass coverage of the population and some have shown a definite impact on fertility, but at this stage there are some conditions that impose limitations to the programmes' mortality impact: (*a*) they are basically technology-oriented rather than directed towards more holistic strategies to root out the basic causes of high mortality; (*b*) the range of specific and effective morbidity/mortality control technologies actually available for this limited strategy is not very broad considering the multiple risk factors for death; (*c*) the strategies largely depend upon a "demand" for modern medical technologies, which may not exist in some cultures; and finally, (*d*) community-based distribution programmes so far being implemented depend heavily on external subsidies (national and often international) for their viability, rather than on local community initiative and support.

Many health ministries, however, are going beyond the narrow technological approach of a community-based distribution activity and developing more comprehensive primary health care programmes with workers trained to provide both simple curative and preventive services and to promote general health at the household and community level. Where this is part of a decentralization of health services based on an overall egalitarian philosophy, the approach can be highly effective in reducing mortality; this has been seen in China and in Costa Rica, where such an approach has recently been initiated. The impact, however, has been marginal in many less developed countries, owing partly to the lack of a commitment of significant national resources to this strategy, best manifested by the expectation in many countries that the primary health care workers will work as volunteers, with no financial rewards.[92]

To turn to the issue of social relevance, the evidence seems strong that, where different societies have their own traditions of disease prevention and sickness care, the introduction of the concepts and technologies of modern scientific medicine will have its most effective impact through an adaptation and accommodation to those existing systems.[93] The classic example that is widely acceptable is the training of traditional midwives to use aseptic techniques and to recognize signs of impending pregnancy complications that require special attention. In fact, a basic problem facing the existing very limited rural health facilities in many less developed countries is underutilization of the services available in spite of a heavy disease burden in the population, in large part because of traditional beliefs about the causes of and cures for diseases. It is apparent, however, that the "Westernized" medical professional leadership in many less developed countries is far from a consensus on the acceptability of any strategy to integrate the modern scientific and traditional medical systems to serve best the health needs of the populations of those countries, judging by the virtual absence of any consideration of this factor in most national health programmes.[94]

Discussions earlier in the present paper about the intimate connection between levels of mortality and social and economic development highlight the importance of an intersectoral strategy in primary health care to get at the basic causes of high mortality. Again, experience in the less developed countries indicates that where a multifaceted approach to social welfare is a part of broad national policy, intersectoral strategies naturally follow. By contrast, when primary health care is essentially added as another vertical appendage to a health ministry where all lines of authority are highly centralized, even intraministerial co-ordination may be difficult to achieve, not to speak of intersectoral co-operation. Unfortunately, broad intersectoral participation in primary health care has, so far, seldom been seen in many less developed countries.

A prime element of primary health care strategy is community participation: if social welfare is to be effectively improved it must involve the people in making their own decisions and taking their own actions. A key element in the success of primary health care in China is a very small central bureaucracy which communicates effectively with all regions of the country but is concerned basically with policy decisions. The local units have total responsibility for deciding how the policy will be implemented and when, where and by whom, and obviously control of their local resources for the implementation activities.[95]

It is interesting to observe that the successful small-scale primary health care experiments, covering a few thousand persons, that have been carried out in a number of less developed countries have been *de facto* locally managed and more likely to involve approaches appropriate to the village conditions. In fact, a recent review of 10 of those projects stressed this fact as a vital element in the degree of impact achieved.[96] Perhaps not surprisingly, when much larger-scale primary health care research projects have been attempted, covering several hundred thousand persons with essentially the same package of technological approaches but with a much more remote centralized management, little or no impact on mortality and morbidity has been documented.[97]

Based on those experiences, it seems reasonable to conclude that the lack of community participation is an important factor in the weak performance of primary health care in many less developed countries. While some health administrations are attempting to overcome this constraint, there are at last two formidable barriers: the first is that many health systems are already locked into an urban-biased, hospital-based, high technology

system that is essentially self-perpetuating, administratively and politically;[98] the second is the frequent lack of political or administrative institutional structures at the community level which can effectively assume this type of responsibility.

While problems that countries are facing in attempting to implement primary health care programmes are often deeply rooted and difficult to solve through efforts of the health ministries only, they should not be interpreted as signifying an inherent weakness in the primary health care concept. Rather, this only highlights the accuracy of the introductory statement in the World Population Plan of Action that "the basis for an effective solution of population problems is, above all, socio-economic transformation" (para. 1). Social change is always difficult; yet it is integral to the effective implementation of primary health care programmes in most less developed countries.

IV. Implementation of health policies

A. *Health care system and total social system*

In considering the goals of achieving a better quality of life, the background to the World Population Plan of Action clearly notes that human welfare cannot be divorced from the national and international social and economic contexts, namely, ". . . the present situation of the developing countries originates in the unequal processes of socio-economic development . . ." which ". . . still exists and is intensified by lack of equity in international economic relations" (para. 4). The Plan of Action also sets out a series of principles on which human welfare and development should be based, such as ". . . dignity of the individual, appreciation for the human person and his self-determination . . .". It observes that "population policies . . . should be consistent with . . . human rights of individual freedom, justice . . ." and that "in the democratic formulation of national population goals and policies . . . attention must be directed to the just distribution of resources . . ." (para. 14 (*b*), (*d*) and (*j*)). As is documented elsewhere in the present paper, the levels of health and mortality in various countries are usually sensitive indicators of the degree to which societies have been able to follow those principles in the course of their development.

Recognizing that health levels are the consequence of the functioning of the socio-economic system leads directly to the issue of the health system's relative dependence on or interdependence with the overall social system. This issue can be looked at from different perspectives. An examination of the structure of the health systems among both developing and developed countries—whether oriented towards the equal distribution of benefits to all citizens or with an allocation of resources skewed to benefit an urban élite—shows that national health policies are generally consistent with national policies in all other sectors of development.[99] For example, for Latin America the "underdevelopment of health" has been ascribed to the "health of underdevelopment", that is, "the present maldistribution of human health resources is brought about by the same determinants that cause underdevelopment of Latin America".[100]

The obvious reason for the close connection between the formal health system and the socio-economic system relates to the fact that the allocation of resources by Governments is determined by the power relations in the society. In so far as the formal health system is primarily supported by government expenditures, these will be allocated according to the priorities of those with the power over the political system. For the majority of the developing countries, these are Western-educated élites that design a health system that will meet their perceived needs. Thus, most countries adopt a Western model with sophisticated urban hospitals which consume most of the resources, leaving little for basic preventive measures to reach the masses.

It should be noted that a more egalitarian distribution of health services can be achieved under quite different political systems, as is evident from a comparison between Cuba and Costa Rica, in the context of Latin America. Both countries have directed special attention to providing medical and related social services to all of their populations and both now have comparable levels of life expectancies (for 1980: Costa Rica, 72.5; Cuba, 72.7) and infant mortality rates (for 1979: Costa Rica, 21.1; Cuba 19.4).[101] This point was reached, however, by very different paths of development and with widely different political systems. In the 1950s, both countries had relatively low levels of mortality in comparison with many other countries of the region. Cuba placed priority on the distribution of social benefits, even at the expense of economic growth, from the establishment of the present régime in 1959. However, in Costa Rica the most active efforts to extend health services to all sectors of the population began in 1973, in a favourable economic context.

Another dimension of the relationship of the health system with the overall social system is the prevailing ideology of the society, that is, whether it emphasizes hierarchical relationships or individual responsibility, entrepreneurship, political participation and egalitarian social relationships.[102] An example of the importance of those factors is India, a large and socially very heterogeneous country where the individual states have considerable autonomy. In that country there is great diversity among states in the structure and operation of the health system, depending upon the power relationships within the society, in spite of the uniform policy at the national level.[103]

A discussion of the relationships of the overall social system and the health care system would be incomplete without reference to the socialization process that occurs within the medical profession itself and which often has a dominant influence on the structure of the organization of medical services. Western medical education prevalent in most countries transmits not only scientific knowledge but a whole set of values. These are usually dominated by the priority of biological sciences over social concerns; an indoctrination that the challenge of

recent study conducted by WHO has shown that many countries are losing physicians through migration mainly because the countries concerned have more physicians than their economies can sustain.[110]

Utilization of manpower is all too often inefficient. On the one hand, physicians and professional nurses are usually kept busy performing tasks that could be done at much lower cost by the proper use of auxiliary personnel.[111] On the other hand, there are instances of the reverse direction; for example, expensive and complex equipment is sometimes left in the hands of health personnel lacking satisfactory qualifications for its manipulation.

With respect to the organizational structure of health care delivery systems, many countries are placing growing emphasis on regionalization, that is, "administrative and budgetary decentralization in order to make the allocation of health resources more relevant to local needs, involve communities in the development and operation of their local services, and simplify bureaucratic procedures".[112] Many developing countries are making every effort to conform with this approach. Local authorities in some developing countries, however, tend to be very weak and they often lack the financial resources and manpower necessary for the creation of local administrations.

Another organizational problem that may undermine the efficiency and effectiveness of health programmes is the lack of co-ordination among providers of health services. This is often due to the tendency for separate origins of funds to result in separate programmes of health services. Especially in countries with social security health programmes, serious rivalries have arisen with ministries of health. Since the social security moneys are normally collected through special channels from workers and employers, social security bodies make decisions on their use independently.[113] Lack of co-ordination may lead to wasteful duplication of effort in some health services, while in other services serious gaps may remain unfilled.

Lack of administrative flexibility in responding to the changing health needs may also jeopardize the efficiency in the use of health resources. For example, some countries still maintain hospitals specializing in tuberculosis and leprosy, even after preventive measures have made those diseases relatively infrequent and treatable at the local level. Poor adaptation to the culture and life-styles of the communities concerned may also lead to underutilization of health facilities. For example, in some societies women strongly prefer to consult with or be examined by female health workers, but find only male personnel in their local health centres.

Finally, it should be noted that growing emphasis has been placed on the co-operation in health care planning and administration between the health sector and other sectors. In particular, logistic and operational problems that hamper health programmes are often the result of deficient infrastructures, including means of transportation and communication, and supply of basic materials and energy. Over the years there has been an increasing realization that health development is not the affair of the traditionally defined health sector alone, but can be achieved through concerted efforts of many sectors concerned with various aspects of economic and social development.

In summary, successful implementation of health policies is often hampered by (*a*) scarcity, (*b*) inadequate allocation and (*c*) inefficient utilization of health resources. Improvements in health service management and planning have a potential for progress in those three areas, especially in utilization of resources.

C. *Health care financing*

In presenting its recommendations for action in the area of morbidity and mortality, the World Population Plan of Action set goals and recommended specific measures, but did not mention the financial implications of implementing the measures. Any course of action followed does, nevertheless, have financial implications, and these frequently constitute a serious impediment to further reductions in morbidity and mortality levels. Any given measure intended to achieve such reductions must compete for resources with actions directed to other goals, as well as with attempts to deal with other aspects of morbidity and mortality.

It is currently estimated that approximately 7.5 per cent of the total GNP in the developed countries is spent directly on health care.[114] In countries with a GNP of at least $US 7,500 (there were more than 15 countries in this category in the late 1970s), this would amount to $US 550 or more per person annually. Corresponding estimates for the developing countries are fragmentary and not entirely consistent, but it is probably safe to say that in those countries the percentage of GNP spent on health care is between 2.5 and 7.5.[115] In the lowest-income countries, 2 or 3 per cent of GNP may be on the order of only $US 5-10 per person per year on the average. Since the distribution of health care resources is generally unequal, those figures actually suggest that the amount is much less or even zero for some areas or social groups.

An even more striking contrast in health expenditure between the more and less developed countries as a whole is evident if attention is restricted to public, as distinct from private, expenditures. The distinction is important in that in all countries, but especially in the developing countries, lower income groups—particularly those living in rural areas—are normally much more dependent on health services based on public funding. As of about 1980, public expenditures for health were estimated to be just over 1 per cent of GNP in the poorest countries, while they were about 4.6 per cent of GNP in the industrialized countries.[116]

To complete this brief overview of existing patterns of financing health care, it should be mentioned that funds from bilateral and multilateral sources have made important contributions to health programmes in the developing countries. It should also be noted that many of the most significant expenditures, in terms of their potential for reducing morbidity and mortality, are not

readily calculated as elements of health care. Improvements in the supply of pure water, public sanitation, nutrition and housing and in other spheres are crucial indirect investments for mortality reduction, but are typically decided upon and budgeted in terms of a far wider range of criteria than health consequences alone.

To turn now to the leading unresolved financial issues in mortality reduction, four points are especially noteworthy. First, in a period of increased economic stringency and instability, now being experienced in most countries, relative levels of financial support for health activities tend to become more difficult to sustain. Financial strains do not invariably lead to a deterioration of the effectiveness of health measures; indeed, they may result in changes in the structure of health services—for example, in increased emphasis on primary health care—or in technical innovations that are advantageous in the long run. Frequently, however, a period of economic constraint may make structural changes even more difficult to achieve.

Secondly, even apart from the general state of economic stringency, medical costs themselves during at least the last decade have been escalating at a particularly rapid rate. The evidence indicates that the tendency of medical costs to rise more rapidly than other categories of expenditure is quite general; it is observed in both developing and developed countries with a wide variety of economic systems. Attempts to sustain further reductions in morbidity and mortality and at the same time control escalating costs of medical care are a crucial issue in health policy. Clearly, financial considerations cannot simply be ignored when considering the role of population in general and of mortality in particular as an element in the economic and social development process.

Analyses have been conducted of the reasons for the sharp rise in medical care costs in recent years, particularly in developed countries. The complicated web of causal factors seems to include the following: price inflation, improvements in the quality and intensity of medical services, extension of public and private health insurance coverage to larger proportions of the population, the development of sophisticated and costly diagnostic and treatment procedures (coronary artery bypass surgery, organ transplants, renal dialysis) and the growth of the elderly population, with its greater per capita needs for health care. While the growing prevalence of third-party payment of medical costs leads to the desirable goal of increasing the utilization of health services by disadvantaged groups, it also results in a situation in which neither the provider nor the consumer of such services has an intrinsic interest in controlling costs.[117]

A third issue is the method of financing direct health expenditures. Broadly speaking, health care costs may be met in one of three ways: direct consumer payment for services, some form of insurance, or payment out of existing or anticipated general tax revenues.[118] In most countries, some combination of those forms of financing is used in actual practice. Given the chronic shortage of health care funds, many countries need to resort to a broad range of support sources. It should be recognized, on the other hand, that excessive diversification of sources of health care financing is often associated with duplication of efforts and lack of co-ordination among health care programmes supported by different sources, relatively large administrative cost and insufficient flexibility to allow health care administrators to allocate the funds to high-priority areas.

Different approaches to health care financing should be assessed, in view of the idiosyncratic conditions of the country, on the basis of several criteria: efficiency, usually measured as the proportion of the total revenue that is used for administration; flexibility in the management of funds; reliability of the supply of health funds in the presence of changing economic conditions and politically unstable processes of resource allocation.

Various approaches have their own advantages and limitations. For example, social security and private insurance schemes have shown a strong tendency to support modern, hospital-based, doctor-centred curative programmes. Although social security has been widely accepted as a useful approach to health care financing,[119] its limited population coverage is sometimes criticized. Extension of health programmes to outlying rural areas and utilization of paramedical practitioners, on the other hand, are usually easier under public health authorities. The direct administration of health programmes by the public sector, however, is not without criticism because of its tendency to reduce incentives for health care practitioners. Although communal self-help is regarded as an important complement to other sources of support in various ways, including supply of community labour for construction and maintenance of local health facilities, the principle of local self-reliance may be difficult to implement in societies in which large portions of the population at the lower level of social stratification have always looked to higher levels for support and aid.[120] The optimal mix of various sources of financing health services in a country seems to depend on political, economic, social and other idiosyncratic conditions of the country.

A fourth and final issue to be noted concerns the importance of financing health care in part through international technical co-operation. The severe limitations on financial resources available for reducing morbidity and mortality in the developing countries have been somewhat overcome in the past by a flow of funds from external sources, as already mentioned. However, it must be recognized that conditions of economic stringency in the richer countries that have been the main sources of such funds may limit their future growth, at least as commensurate with growing needs in the recipient countries. Continuing efforts to sustain international co-operation for reducing mortality and improving health will clearly be called for.

A closer look at the expenditure of internationally provided health funds often reveals that foreign aid and national health policies are not always in harmony. The preference of international donors has largely been for

capital investments in health facilities and the introduction of new health programmes, which usually create a need for recurrent funds from internal sources, thereby possibly burdening the recipient country with rapidly increasing operating expenditure obligations. Once recurrent funds have been spent in one area, it is difficult in the following years to redirect the expenditure to other areas, even if they have higher priorities. Continuity and regularity are important requirements for international aid, and both external donors and recipient countries should carefully consider the amount of counterpart funding required from internal sources and the conformity of the funded projects with the order of health priorities of the population.[121]

In the formulation of any global policies in the area of mortality and morbidity, financial implications must at some stage be explicitly considered. The growing recognition given to the primary health care approach is in significant part the result of an awareness of the financial impediments to achieving mortality and morbidity goals in the developing countries by means of the more traditional organization of health services. Of course, primary health care itself cannot be extended without heavy financial commitments. (Estimates of total resources required to finance primary health care to the year 2000 range from just over $US 40,000 million to $US 100,000 million.)[122] In any case, two fundamental propositions clearly call for further consideration: financial implications of policies to deal with mortality cannot be ignored, and more effective means to cope with rising costs of health care are needed, if acceptable progress in mortality reduction is to be achieved.

NOTES

[1] *Report of the United Nations World Population Conference, Bucharest, 19-30 August 1974* (United Nations publication, Sales No. E.75.XIII.3), chap. I.

[2] World Health Organization and United Nations Children's Fund, *Alma-Ata 1978: Primary Health Care: Report of the International Conference on Primary Health Care, Alma-Ata, USSR, 6-12 September 1978* (Geneva, World Health Organization, 1978), para. I.

[3] For the report of the Symposium on Population and Human Rights, Amsterdam, 21-29 January 1974, see *The Population Debate: Dimensions and Perspectives. Papers of the World Population Conference, Bucharest, 1974* (United Nations publication, Sales No. E/F/S.75.XIII.5), vol. II; see also *Population and Human Rights: Proceedings of the Symposium on Population and Human Rights, Vienna, 29 June-3 July 1981* (ST/ESA/SER.R/51).

[4] Life expectancy values for the period 1980 to 1985 are from *World Population Prospects: Estimates and Projections as Assessed in 1982* (United Nations publication, to be issued), table A-15.

[5] The tabulations of numbers of countries according to life expectancy attained by the years 1985 and 2000 are based on life expectancy values that have been interpolated from data for five-year periods given in *World Population Prospects: Estimates and Projections as Assessed in 1982, op. cit.* Countries with fewer than 300,000 inhabitants in 1975 have not been counted.

[6] *World Population Prospects: Estimates and Projections as Assessed in 1982, op. cit.*, table A-16.

[7] World Health Organization, *Global Strategy for Health for All by the Year 2000*, "Health for All" Series, No. 3 and corrigenda (Geneva, 1981), p. 7.

[8] World Health Organization, *Global Strategy . . . , op. cit.*, p. 31.

[9] World Health Organization, *Formulating Strategies for Health for All by the Year 2000* (Geneva, 1979), para. 63; see also World Health Organization, "Taking off into health for all by the year 2000", *World Health Statistics Quarterly*, vol. 35, No. 1 (1982), pp. 2-3.

[10] United Nations, Department of Public Information, *International Development Strategy for the Third United Nations Development Decade* (New York, 1981), para. 48.

[11] "General and complete disarmament: comprehensive study on nuclear weapons; report of the Secretary-General" (A/35/392), paras. 9 and 195, chap. IV and appendix I. For a brief summary of this report, see *The Lancet*, No. 8247 (19 September 1981), pp. 628-629.

[12] Tables showing recent trends in expectation of life at birth and infant mortality are presented in the following document prepared by the Population Division of the United Nations Secretariat: "Recent mortality levels and trends in national populations" (IESA/P/ICP.1984/EG.IV/19), presented to the Expert Group on Mortality and Health Policy, Rome, 30 May to 3 June 1983.

[13] See D. R. Gwatkin, "Signs of change in developing-country mortality trends: the end of an era?", Overseas Development Council, *Development Paper 30* (February 1981); see also *Levels and Trends of Mortality since 1950: A Joint Study by the United Nations and the World Health Organization* (United Nations publication, Sales No. E.81.XIII.3), pp. 3-5.

[14] *World Population Trends and Policies, 1981 Monitoring Report, Volume I: Population Trends* (United Nations publication, Sales No. E.82.XIII.2), pp. 111-112.

[15] M. N. A. Azefor, "Counteracting forces in the continued decline of mortality in Africa", *International Population Conference, Manila, 1981: Solicited Papers* (Liège, IUSSP, 1981), vol. 2, pp. 16-18; *Levels and Trends . . . , op. cit.*, pp. 95-98.

[16] World Health Organization and United Nations Economic and Social Commission for Asia and the Pacific, *Mortality in South and East Asia: A Review of Changing Trends and Patterns, 1950-1975* (Manila, 1982); Economic and Social Commission for Asia and the Pacific, "Mortality decline and health policy: an overview of developing countries of the Asia-Pacific region" (IESA/P/ICP.1984/EG.IV/20), presented to the Expert Group on Mortality and Health Policy, Rome, 30 May to 3 June 1983.

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[19] See, for example, Eduardo E. Arriaga, "The deceleration of the decline of mortality in LDCs: the case of Latin America", *International Population Conference, Manila, 1981, op. cit.*, vol. 2, pp. 21-49; Alberto Palloni, "Mortality in Latin America: emerging patterns", *Population and Development Review*, vol. 7, No. 4 (December 1981), pp. 112-114.

[20] *World Population Trends and Policies, 1981 Monitoring Report, Volume I . . . , op. cit.*, pp. 112-114.

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[22] United Nations Economic Commission for Africa, "The influence of development-related changes on infant and childhood mortality in Africa", table 3 (IESA/P.1984/EG.IV/11), presented to the Expert Group on Mortality and Health Policy, Rome, 30 May to 3 June 1983.

[23] These data are reported regularly by the United States Department of Health and Human Services in the *Morbidity and Mortality Weekly Report*.

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Development Report, 1980 (Washington, D.C., World Bank, August 1980).

[25] See, for example, *Proceedings of the meeting on socioeconomic determinants and consequences of mortality, Mexico City*, 19-25 June 1979 (New York and Geneva, United Nations and WHO, 1980); and papers from *Seminar on Social Policy . . . , op. cit.*

[26] *World Development Report, 1980, op. cit.*

[27] *Ibid.*

[28] World Bank, *Health Sector Policy Paper* (Washington, D.C., 1980).

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THE CONTRIBUTION OF THE WORLD FERTILITY SURVEY DATA TO OUR UNDERSTANDING OF FERTILITY LEVELS AND TRENDS IN SELECTED DEVELOPING COUNTRIES

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SUMMARY

The World Fertility Survey (WFS) data represent an important addition to our stock of data on fertility for certain developing countries. The present article assesses the contribution of that data for the first 20 WFS countries to our knowledge of fertility levels and trends as of 1983. It is, of course, understood that there is much information to be gained from a detailed maternity history survey such as WFS other than simply levels and trends. However, only this one aspect is considered here.

In part one, the article summarizes the major highlights of the findings with respect to the quality of the fertility estimates from WFS data, which are reported in much greater detail in *Fertility Levels and Trends as Assessed from Twenty World Fertility Surveys*. In part two the fertility estimates for those 20 countries are reviewed in order to assess in each case whether WFS results have added new knowledge of fertility trends as well as more recent information on fertility that might not be available from other sources, that is, vital registration, census data or other fertility surveys.

The countries reviewed here are found to fall roughly into three groups: (*a*) a group for which we would have an accurate picture of fertility levels and trends even if WFS had not taken place but for which the WFS estimates are also of good quality; (*b*) a group for which WFS contributed fertility estimates which were of better quality (than were available previously); because of better enumeration of births for those countries, WFS provides a more complete picture of fertility than was available in the past; and (*c*) a group for which WFS provided new estimates but, unfortunately, the quality of those estimates is weak and thus, although those estimates may be the best available, uncertainty still exists with respect to the actual levels and trends in those countries. It should also be noted that the detailed maternity histories in WFS permitted the calculation of age-specific marital fertility rates which have not been systematically available for those countries prior to the World Fertility Survey, although, as with the total fertility, the quality of those estimates is not uniformly good.

INTRODUCTION

The World Fertility Survey, because of its standard type of maternity history questionnaire which has been applied in some 40 developing countries, represents a unique undertaking in data collection. For many developing countries which do not have a well-developed vital registration system and which have had infrequent censuses, the fertility survey represents an invaluable and relatively inexpensive means to collect fertility data. Not only did the World Fertility Survey permit the individual countries involved to assess their demographic situation thoroughly and sometimes for the first time but, because of the comparability in the design of the questionnaire, it permitted comparative analysis of the data both with respect to the assessment of its relative quality and with respect to patterns and differentials in fertility. Now that the first 20 countries using World Fertility Survey instruments have been subjected to a first round of comparative analysis, it is interesting to assess what those data sets have added to our knowledge of fertility levels and trends in the context of other available data, and to raise again the question whether a maternity history survey can be a reliable instrument for measuring fertility levels and trends.** It is, of course, understood that there is much information

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** Eight of the countries included in the assessment also included in their WFS household questionnaire a question on the date of the last birth, which can be used as an alternative estimate of recent fertility, but because this question was not used by all countries, those estimates are not included here.

to be gained from a detailed maternity history survey such as WFS other than simply levels and trends. However, in the present paper, it is only the contribution of WFS to our understanding of fertility levels and trends that is being assessed.

A recently completed study conducted by the Population Division of the United Nations Secretariat has done a thorough comparative assessment of the quality of WFS data with respect to age reporting and the birth and marriage histories for the first 20 countries for which standard recode tapes were available.[1] The countries included represent a wide variety of demographic characteristics as well as data collection experience. This study has come at a time when there is much attention being focused on demographic developments, after the World Population Conference held at Bucharest in 1974, in terms of new knowledge with respect to fertility levels and trends, particularly in the relatively poor and populous countries in the developing world. In fact, in preparation for the 1984 World Population Conference to be held at Mexico City, the Population Division of the United Nations Secretariat is currently in the process of monitoring levels and trends in fertility throughout the world since 1974 using the best and most up-to-date official data available directly or indirectly derived from vital statistics and censuses and fertility surveys.[2] Using this recent world-wide monitoring of fertility, it is possible to assess the role that WFS data have played in putting together an accurate picture of recent fertility levels and trends.

Table 1 provides a useful summary of the data collection experience of the 20 countries included in the present report in the context of the timing of their World Fertility Surveys. Implicit in this table is an inventory of the alternative data sources available for fertility estimates in each country. However, the existence of a recent census and/or survey does not necessarily mean that data are currently available, and the existence of "complete" (at least 90 per cent coverage) registration data does not necessarily mean that such data have been published for recent years. None the less, certain facts about this table are immediately striking. First, it can be seen that it is usually the least populous countries that have relatively complete vital registration systems. Mexico represents the only exception to this but, despite a vital registration system with roughly 95 per cent coverage, trends cannot easily be assessed for the 1970s from birth registration data because of certain changes in coverage. Second, it is striking that many Asian countries had a history of national fertility surveys before WFS, whereas for most Latin American countries, the fertility survey is a more recent phenomenon.

The discussion which follows is organized into two major parts: (*a*) a summary of the major findings with respect to WFS data quality which bear on the reliability of fertility estimates based on maternity history data and (*b*) an assessment of the role WFS data are currently playing in the picture of fertility levels and trends we now have in 1983 from all data sources of fertility levels and trends for the 20 countries included in the present

TABLE 1. SOURCES OF DATA FOR NATIONAL FERTILITY ESTIMATES, SPECIFIC COUNTRIES

Country	1975 population estimate (millions)	WFS year of inquiry	Birth registration data[a]	Recent census dates			Recent national survey data available for comparison (dates)	
				1960s	1970s	1980s	Before WFS	After WFS
Africa								
Kenya	13.5	1977/1978	U	1962,1969	1979	–	1973,1977/1978	–
Asia and Oceania								
Bangladesh	76.6	1975/1976	U	1961	1974	1981	1962/1965,1968/1969,1974	PES[b]
Fiji	0.6	1974	C	1966	1976	–	–	PES[b]
Indonesia	135.7	1976	U	1961	1971	1980	1976	PES[b]
Jordan	1.7	1976	U	1961	–	–	1972	–
Malaysia	12.4	1974	C	–	1970	1980	1966/1967	–
Nepal	12.7	1976	U	1961	1971	1981	1974/1975,1976	–
Pakistan	75.5	1975	U	1961	1972	1981	1962/1965,1968/1971	–
Philippines	43.1	1978	U	1960	1970,1975	1980	1968,1973	–
Republic of Korea	35.3	1974	U	1966	1970,1975	1980	1966,1971,1973	1979
Sri Lanka	13.6	1975	C	1963	1971	1981	–	–
Thailand	41.9	1975	U	1960	1970	1980	1964/1967,1969/1970 1972/1973,1974/1976	1978
Latin America								
Colombia	23.2	1976	U	1964	1973	–	1969	1978
Costa Rica	2.0	1976	C	1963	1973	–	1964	1978
Dominican Republic	5.2	1975	U	1960	1970	1981	–	1979 (WFS)
Guyana	0.8	1975	C	1960	1970	1980	–	–
Jamaica	2.0	1975/1976	C[c]	1960	1970	1982	–	–
Mexico	60.1	1976	C[c]	1960	1970	1980	–	1978,1979
Panama	1.7	1975/1976	C	1960	1970	1980	–	1975/1977
Peru	15.4	1977/1978	U	1961	1972	1981	1974/1976	PES[b]

Source: *Fertility Levels and Trends as Assessed from Twenty World Fertility Surveys* (ST/ESA/SER.R/50) and *World Population Trends and Policies: 1983 Monitoring Report* (United Nations publication, to be issued).

NOTE: – Not applicable.

[a] This assessment is based on evidence provided in *Fertility Levels and Trends* . . . country chapters. Malaysia is rated as complete because only Peninsular Malaysia was sampled by the World Fertility Survey. These ratings do not always correspond with the official country ratings published by the United Nations.

U = less than 90 per cent complete.

C = at least 90 per cent complete.

[b] PES = post-enumeration survey conducted by WFS.

[c] Although both registration data are considered at least 90 per cent complete, rates for the mid-1970s are not published.

report. Thus, the contexts where WFS has played a particularly useful role can be pointed out and the potential pitfalls of such data can be noted.

I. Major findings with respect to WFS data quality

A detailed assessment of the quality of age-specific fertility rates for different periods prior to the date of the survey require an in-depth examination of the quality of the age, marriage and birth history data. Good age reporting is a definite prerequisite for accurate estimation of age-specific fertility rates which relate births to the age of the mother at the time of the birth. In addition, systematic upward or downward biases in the reporting of age for particular cohorts can systematically distort trend estimates which are based on a comparison of fertility for different cohorts at the same presumed age. Since many of the World Fertility Surveys interviewed ever-married women only, an accurate estimate of the proportion ever married at each age is required to inflate marital age-specific fertility rates to derive total fertility rates. When trends in marital age-specific fertility rates are estimated, accurate dating of the month and year of first union is necessary to derive a correct estimate of exposure time for each woman. Last but not least, a complete enumeration of births to each woman and their accurate placement in the past is required to convert birth histories for women of different ages into fertility rates specific to different time periods in the past.

A set of simple direct internal and external checks on the quality of the age, marital history and birth history reporting for each survey were applied in the Population Division study. Internal checks included various measures of completeness and possible distortion which rely solely on the WFS data themselves, whereas external checks involved comparing patterns and trends based on the WFS data with external sources of data. Certain widely used indirect techniques, such as the P/F ratio, were not applied. P/F ratios have recently been used in the assessment of maternity histories, even in cases where the likelihood of fertility decline precludes the use of the ratios to adjust deficient data.[3] The ratios can sometimes aid in identifying patterns suggestive of data defects. In the present study such ratios were not used, as the graphical techniques and summary measures employed were considered adequate to identify suspicious patterns in the data. In fact, the patterns observed, whether identified with the aid of graphical methods, P/F ratios or other techniques, could well be consistent with several quite different combinations of data distortion and fertility trends.

Tables 2 to 5 provide information on the detailed ratings of the age data, the marital history data, recent birth enumeration and trends in births. In each case the data from each country were ultimately grouped in one of three data quality categories: good, acceptable or weak, keeping in mind both the relative rank of the country's WFS data compared to other WFS data sets and certain reasonable standards of data quality. It must be stressed that a rating of "weak" applied to recent fertility levels or trends usually does not indicate with certainty that the rates or trends are seriously misstated, but that the data show sufficient signs of deficiency that it would be risky to accept the estimates at face value, and that the estimates could not be confirmed by reference to reliable external sources. Similarly, a rating of "acceptable" means that some defects were noted, but that they were not so serious as for rates labelled "weak", while a rating of "good" implies the absence of serious defects evidenced through the quality checks employed. It is possible that the accretion of evidence from future censuses, surveys and other sources may reveal some of the level and trend estimates that are treated sceptically here to have been accurate, while some of the estimates given higher ratings primarily on the basis of internal checks may later appear to have been deficient.

Tables 6 and 7 summarize the findings with respect to data quality for fertility rates based on the zero to four years before the survey and trends in fertility rates assessed between zero to four and 10 to 14 years before the survey. The quality of the estimated rates depends not only on the assessed quality of recent birth enumeration and trends in births in tables 4 and 5 but also on the quality of the age and marital history data.

The five-year time interval was chosen for very specific reasons. In the case of the recent estimate, the concern was to minimize both sampling and non-sampling errors. Fertility rates previously published by WFS have been based on the three years before the survey, a period which was seen to be advantageous from the point of view of minimizing sampling error while keeping estimates reasonably current.[4] However, a detailed examination of the data has shown that in some World Fertility Surveys, there appears to be a dip in fertility one or two years before the survey, with a partial recovery in the year just prior to the inverview. A five-year reference was, therefore, chosen so as to minimize the impact of a possible displacement and/or underenumeration of recent births on recent fertility estimates. Although the maternity history provides some information about fertility rates as much as 30 to 35 years before the survey, when the oldest women interviewed began bearing children, trends in period fertility for the higher reproductive ages can be studied only for the recent past. The earliest rates are also thought to be subject to more serious problems of omission and date displacement than are rates for recent periods. Truncated samples and evidence of forward date-shifting suggested the conservative and practical approach of assessing trends for a 10-year period from roughly 2.5 to 12.5 years before the survey.

In the case of the quality of age reporting, internal checks included the Myer's Index of Digital Preferences computed from household data, the percentage of women reporting their own birth date with the month and year and a comparison of the male and female five-year age distribution from household data. The only external check consisted of a comparison of the female

age distribution from WFS with the most recent census or survey. Age-specific fertility rates are based on five-year groups and may be distorted if women's ages are misreported in systematic ways.

As can be seen in table 2, eight of the surveys were seen to have "weak" age data. All of these have marked distortions in the five-year age distribution within the ages 15 to 49, when women were eligible for the interview, and most had poor ratings with respect to completeness of date reporting and digit preference.

For countries in which only ever-married women were subjected to the individual interview, proportions ever married as indicated by the household interview are required to calculate age-specific fertility rates, and any problems with representativeness or reporting in the household sample can thus affect the fertility estimates. Proportions ever married, classified by age, were compared with similar data available from censuses and other surveys, as a rough check on consistency. Generally speaking, the proportions ever married were judged to be consistent with other sources or else, as in Latin America, the other sources were considered to have achieved less complete enumeration of consensual unions. In Pakistan and Thailand, however, the proportion for one age group differed substantially from the level deemed likely on the basis of other information.

In the assessment of the marital history data, as can be seen in table 3, internal checks included the percentage of respondents reporting both the month and year of first union and the percentage distribution, by single years, of years since first marriage for all ever-married women. This latter check was used to detect digit or calendar year preference in terms of the year of first marriage as well as any signs of a deficit in the reporting of marriages in the zero to four years before the survey. The external check consisted of a comparison for the three youngest age groups of the per cent ever married at specified intervals before the survey date from WFS with similar percentages from outside data sources. Nine countries were rated as having "weak" marital history data, as can be seen in table 3. They all ranked poorly with respect to the completeness of date reporting and with respect to the year-to-year volatility of the single-year marriage duration distribution. In addition, all showed some inconsistencies when trends in proportions married by age derived from the marriage history data were compared with comparable data from censuses and surveys.

An evaluation of the birth history data included, as internal checks, the per cent of all births reported with a month and year, an examination of cohort-period fertility rates for five-year periods before the survey for evi-

TABLE 2. INDICATORS OF QUALITY OF WORLD FERTILITY SURVEY AGE DATA

Country	Month and year reported by women interviewd (percentage) (1)	Myer's Index household data estimates for females aged 10-69 years (2)	Shifting out of eligible ages		Eligible age groups over-represented (5)	Extent of over-representation[c] (6)	Overall quality (7)
			To younger[a] (3)	To older[b] (4)			
Africa							
Kenya	34[d]	7.6	Some		25-29, 35-39	A lot, some	Weak
Asia and Oceania							
Bangladesh	1	7.9	Some		25-29, 45-49	Some, some	Weak
Fiji	67	5.1		A lot			Acceptable
Indonesia	22	11.4		A lot	35-39	Some	Weak
Jordan	30	23.2		Some	35-39	Some	Weak
Malaysia	58	4.3					Acceptable
Nepal	13	16.8	Some	A lot	20-29, 40-44	Some, a lot	Weak
Pakistan	7	15.9			25-34, 40-44	Some, a lot	Weak
Phillippines	97	2.4		Some	35-39	Some	Good
Republic of Korea	...	1.9					Good
Sri Lanka	72	8.9			35-39, 45-49	Some, a lot	Weak
Thailand	85	2.7					Good
Latin America							
Colombia	97	7.6			35-39	A lot	Acceptable
Costa Rica	...	2.8	Some[e]	Some			Good
Dominican Republic	72	7.5			35-39	A lot	Weak
Guyana	98	4.8[f]	...	...			Good
Jamaica	95	3.3		A lot			Good
Mexico	95	6.3			35-39	A lot	Acceptable
Panama	100	3.7	Some[e]	A lot	30-34	Some	Good
Peru	95	6.4			35-39	Some	Acceptable

Source: *Fertility Levels and Trends . . . , table 5.*

NOTE: In columns 3, 4, 5 and 6, a blank means that the characteristic referred to does not exist to a significant degree according to the criteria mentioned above. Three dots (...) in a column mean the data are not available.

[a] If $2P_{15-19}/(P_{10-14}+P_{20-24}) < 0.90$ then "some" evidence of shifting to younger ages is said to exist.

[b] If $2P_{50-54}/(P_{45-49}+P_{55-59})$ is greater than 1.10 and less than 1.30 then "some" evidence of shifting to older ages is said to exist. If the ratio is greater than 1.30 then "a lot" of shifting to older ages is said to exist.

[c] If the ratio of two times the overrepresented age group to the sum of the adjacent age groups is greater than 1.05 and less than 1.15 then "some" overrepresentation is said to exist. If the ratio is greater than 1.15 then "a lot" of overrepresentation is said to exist. A stricter criterion than for *a* and *b* is used as those age groups are within childbearing ages and therefore a greater impact on fertility rates is expected.

[d] Per cent reporting month of birth.

[e] Refers to ages 15 to 19.

[f] Based on ages 20 to 49.

TABLE 3. INDICATORS OF THE QUALITY OF THE WORLD FERTILITY SURVEY MARITAL HISTORY DATA

(0 to 14 years prior to the survey)

Country	Percentage of first unions reported by month and year (1)	Distribution by years since first union: Duration index[a] (2)	Distribution by years since first union: Deficit of unions 0-4 years before survey[b] (3)	Trend in proportions ever married: Cohort proportion overestimated[c] (4)	Trend in proportions ever married: Age groups for which trend inconsistent with external sources (5)	Overall quality rating (6)
Africa						
Kenya	69[d]	.102		30-34		Acceptable
Asia and Oceania						
Bangladesh	11[e]	.080			15-19	Weak
Fiji	85	.064			15-24	Good
Indonesia	46[e]	.048			15-19	Weak
Jordan	58[e]	.101		35-39	15-29	Weak
Malaysia	62	.064				Good
Nepal	27	.169	Yes		15-24	Weak
Pakistan	73	.117			15-24	Weak
Philippines	98	.084	Yes	40-44	20-29	Acceptable
Republic of Korea	..	.077				Good
Sri Lanka	70	.094			15-24	Acceptable
Thailand	75	.102		40-44	15-29	Acceptable
Latin America						
Colombia	97[f]	.060		30-34	15-19[g]	Acceptable
Costa Rica	..	.060	[h]	30-34		Acceptable
Dominican Republic	87[f]	.142		35-39	15-19[g]	Weak
Guyana	79[e]	.153		30-34	[g]	Weak
Jamaica	53[e]	.163	Yes		[g]	Weak
Mexico	94[i]	.077		40-44	15-19	Good
Panama	95	.114	[h]		[g]	Acceptable
Peru	81	.109	Yes	40-44	15-29[g]	Weak

Sources: *Fertility Levels and Trends* . . ., table 6, column 2: standard recode tape.

NOTE: In columns 3, 4 and 5, a blank space means that the characteristic referred to does not exist to a significant degree.

[a] This index is based on the 0 to 14 years before the survey and is designed to measure fluctuations in annual rates. The index is similar in concept to the age ratio score and is derived from the ratio of the actual number of marriages in year x to the average number of marriages in year $x-1$ and $x+1$. The index is the average over 15 years of the ratio's absolute deviations from one.

[b] There was considered to be a deficit of unions reported in the recent period if the number of marriages taking place 0 to 4 years prior to the survey was less than or equal to the number occurring 5 to 9 years before the survey.

[c] The cohort named in this column showed a proportion married at each age (see figure 4 in each country chapter of *Fertility Levels and Trends* . . .) which was too high in relationship to the observed trend for that age.

[d] Per cent who reported month of marriage.

[e] Some responses given in the form of age at union are as follows: Bangladesh, 67 per cent, Indonesia, 41 per cent, Jordan, 21 per cent, Guyana, 15 per cent and Jamaica, 47 per cent.

[f] Based on current marriages.

[g] Comparisons for those countries focused more on trends than levels as the external source took less full account of consensual or more casual unions.

[h] The deficit observed in the case of Costa Rica and Panama can be explained by the fact that only women 20 and over were eligible for interview.

[i] For most recent union only.

dence of omissions of births among older women and of systematic forward date-shifting of the type suggested by Potter[5] and of age-specific fertility rates for single years before the survey for evidence of calendar year or number preference in addition to backward or forward shifting of recent births. The external checks included a comparison of parity from WFS and other sources and a comparison of age-specific fertility rates from censuses or birth registration with the WFS data for comparable calendar years in the past.

The quality of recent birth enumeration was found to be good or acceptable in all but three countries (table 4), a testament to the effort and care that went into the collection of those data. Rates for Bangladesh, Pakistan and Indonesia were suspected of suffering from a transfer of births out of the zero to four years before the survey. The grounds for suspecting the rates for those countries of being too low are all indirect, because other estimates for those countries are too weak to permit a definitive resolution of the question by appeal to outside sources. In the case of Bangladesh, the problem of evaluation is further complicated by the effects of a famine which probably lowered fertility, albeit temporarily, in the year immediately preceding the survey. The pattern of rates in Bangladesh for single years before the survey was, however, characterized less by a sudden drop immediately before the survey—though some signs of this pattern do appear—than by a more or less steady decline over the six preceding years. This sort of trend was considered unlikely for Bangladesh, and this, combined with evidence consistent with backward date-shifting in other surveys conducted in this country, gave

TABLE 4. OVERALL QUALITY OF ENUMERATION OF RECENT BIRTHS FROM THE WORLD FERTILITY SURVEY

(0 to 4 years prior to the survey)

Country	Percentage of live births reported by month and year (1)	Parity comparison			Recent fertility (total fertility rates comparison					Deficit in births 1-2 years before survey[b] (10)	Index of irregularity in recent annual average fertility rates[c] (11)	Overall quality (12)
		Year of WFS (2)	Other source date (3)	WFS higher than other source for age groups (4)	WFS		Other source					
					Date (5)	Level (6)	Date (7)	Type of data[a] (8)	Level (9)			
Africa												
Kenya	80[d]	1977/1978	1977	35-49	1976-1978	8.0	1977/1978	S	8.1		.016	Good
Asia and Oceania												
Bangladesh	12	1975	1974	15-49	1971-1975	6.3	1974	S	7.2	A lot[e]	.031	Weak
Fiji	86	1974	1976	20-49	1970-1974	4.1	1970-1974	BR	3.6		.036	Good
Indonesia	47	1976	1976	Lower	1971-1976	4.7	1971-1975	S	4.9	A lot	.042	Weak
Jordan	67	1976	1972	40-49	1971-1976	7.8	1972-1976	S	7.8[f]		.036	Acceptable
Malaysia	86	1974	1970	40-49	1970-1974	4.7	1970-1974	BR	4.7		.013	Good
Nepal	...	1976	1971	20-49	1971-1975	6.0	1974-1976	S	6.3[g]		.036	Acceptable
Pakistan	80	1975	1971	20-49	1971-1975	6.2	...		...	A lot	.040	Weak
Philippines	96	1975	1975	20-49	1974-1978	5.1	...		...		.022	Good
Republic of Korea	100	1974	1975	30-49	1972-1974	4.0	1972-1974	C	3.9		.014	Good
Sri Lanka	73	1975	1971	40-49	1972-1974	3.6	1972-1974	BR	3.7	Some	.034	Acceptable
Thailand	84	1975	1970	45-49	1970-1974	4.8	1970-1974	S	4.9	A lot	.032	Acceptable
Latin America												
Colombia	91	1976	1973	40-49[h]	1970-1974	4.9	1972-1973	C	4.4		.035	Good
Costa Rica	...	1976	1973	Lower	1970-1974	4.3	1970-1974	BR	4.3		.018	Good
Dominican Republic	91	1975	1970	35-49	1971-1975	5.7	...		...[i]		.025	Good
Guyana	91	1975	1970	40-49	1970-1974	5.1	1970-1974	BR	4.5		.029	Good
Jamaica	94	1975-1976	1970	35-49	1971-1975	5.0	...	j	...		.037	Good
Mexico	96	1976	1970	35-49	1971-1972	6.5	1971-1972	BR	6.3		.010	Good
Panama	98	1975/1976	1971	40-49	1971-1975	4.4	1971-1975	BR	4.5	Some	.064	Acceptable
Peru	93	1975/1976	1975/1976	35-49	1974-1976	5.5	1975	S	5.3		.014	Good

Source: *Fertility Levels and Trends* . . . , table 7 and country chapters, part two.

NOTE: Three dots (...) in a column mean the data are not available. A blank in column 10 means the index was greater than 0.95.

[a] S = Estimated from results from a survey.
BR = Based on birth registration data.
C = Estimated from Population Census data.

[b] Deficit in births 1-2 years before the survey is measured as "a lot" if $(P_1 + P_2) / (P_0 + P_3) < 0.90$ and "some" if this ratio is less than 0.95 and greater than or equal to 0.90. In cases coded "a lot", backward shifting of births from 0-4 to 5-9 years before the survey is strongly suspected.

[c] This index is based on the average fertility rate, P_i (defined as births to women of all ages divided by total exposure for the period 0 to 4 years before the survey. The index is defined as the average absolute deviation from 1.0 of the ratio of average fertility rate to a three-year moving average centred on the rate, that is,

$$\frac{1}{4}\sum_{i=1}^{4}[1-3P_i/(P_{i-1}+P_i+P_{i+1})]$$

[d] Based on first child only. Eighty-seven per cent knew month of birth of last child.

[e] Although the index of Bangladesh is greater than 0.95, backdating of births from 0-4 to 5-9 years before the survey is strongly suspected, as shown in the country chapter of *Fertility Levels and Trends* . . .

[f] This is not really an independent estimate, because it is based on the parity changes between the 1972 survey and WFS to permit a comparison with the 0 to 4 years before the survey.

[g] An average of estimates from the 1974-1975 survey and the 1976 survey.

[h] However, parity at ages 45 to 49 is shown to be higher in the 1978 Contraceptive Prevalence Survey.

[i] Cohort-period rates from a subsequent survey in 1980 allowed a comparison of recent rates in the country chapter of *Fertility Levels and Trends* . . .

[j] Registered vital statistics have not been published since 1964.

sufficient grounds for rating those data as "weak".[6] In the cases of Indonesia and Pakistan the rates for single years before the survey strongly suggested heaping on particular ages of children. There was a relative deficit of children aged one year (Indonesia) or aged one to two (Pakistan) and, for more distant periods before the survey—that is, for older children—there was an apparent preference for even-numbered years before the survey. Age heaping in itself cannot establish whether there was a net shift into or out of the entire zero-to-four-year period before the survey. However, a tendency to overestimate ages of young children, so that there is a net shift out of the 0-4 age group, has been reported in a variety of societies with generally deficient age reporting. The appearance in birth histories of marked heaping on single years was thus judged to be a serious defect which cast doubt on the quality of rates for the recent period, as well as on apparent trends.

The assessment of the quality of trends in births from maternity histories for the period 0-4 to 10-14 years before the survey brought to light sufficiently serious problems in the cases of Panama, Kenya, Jordan, Nepal and the Dominican Republic that, in addition to Bangladesh, Pakistan and Indonesia, those data were viewed as inadequate for assessing trends (see table 5). The case of each country was slightly different but all showed evidence of severe problems because of either date distortion or irregularities in age-specific trends.

Tables 6 and 7 summarize the quality assessment presented in tables 2 to 5 and translate those individual assessments into a rating of the fertility rates themselves which combine all those data. As can be seen in table 6, the assessed quality of recent birth enumeration was downgraded in the rating of recent age-specific fertility rates in three cases (Kenya, Nepal and the Dominican Republic) because of weak age data, thus calling atten-

TABLE 5. OVERALL QUALITY OF TRENDS IN BIRTHS FROM THE WORLD FERTILITY SURVEYS

(0-4 to 10-14 years before the survey)

Country	Quality birth data 0-4 years (see table 7) (1)	Index of irregularity in average fertility rate[a] (2)	Omissions: P40-44 less than P45-49[b] At survey (3)	Omissions: P40-44 less than P45-49[b] At age 40-44 (4)	Displacement in age profile of cohort fertility[c] (5)	Recent trend comparison (total fertility rates): WFS Dates (6)	WFS Percentage change (7)	Other source Dates (8)	Other source Percentage change (9)	Other source Type of data (10)	Trends consistent by age of mother[d] (11)	Overall quality of trends 0-4 to 10-14 years (12)
Africa												
Kenya	Good	.035		Yes	A lot	1968/1970-1976/1978	−11	1969-1977/1978	+ 7	C/S		Weak
Asia and Oceania												
Bangladesh	Weak	.029	Yes	Yes	A lot	1963/1965-1971/1975	−21	1963/1965-1974	+ 3	S		Weak
Fiji	Good	.023			Some	1960/1964-1970/1974	−38	1960/1964-1970/1974	−33	BR	Yes	Good
Indonesia	Weak	.064	Yes	Yes	A lot	1967/1970-1971/1976	−16	1967/1970-1971/1975	− 6	S		Weak
Jordan	Acceptable	.030		Yes	Some	1960/1962-1971/1976	− 7	1961-1972/1976	+ 5	C/S		Weak
Malaysia	Good	.020			Some	1966/1969-1970/1974	−10	1966/1969-1970/1974	−10	BR	Yes	Good
Nepal	Acceptable	.038		Same	A lot	1962/1966-1972/1976	9	...	...	...	...	Weak
Pakistan	Weak	.051	Yes	Yes	A lot	1963/1965-1968/1971	− 1	1963/1965-1968/1971	−14	S		Weak
Philippines	Good	.017		Yes	Some	1964/1966-1969/1971	− 2	1963/1967-1960/1972	− 6	S		Good
Republic of Korea	Good	.020			Some	1959/1961-1972/1974	−35	1960-1972/1974	−35	C	Yes	Good
Sri Lanka	Acceptable	.026				1964/1966-1972/1974	−27	1965-1972/1974	−23	BR		Acceptable
Thailand	Acceptable	.031				1960/1964-1970/1974	−27	1960/1964-1970/1974	−25	C/S	Yes	Acceptable
Latin America												
Colombia	Good	.024		[e]	Some	1966/1969-1971/1974	−21	1967/1968-1972/1973	−27	S/C		Good
Costa Rica	Good	.026				1960/1964-1970/1974	−39	1960/1964-1970/1974	−39	BR	Yes	Good
Dominican Republic	Good	.021		Yes	[f]	1961/1965-1971/1975	−24	...	...	...[g]	...	Weak
Guyana	Good	.026		Same	Some	1960/1964-1970/1974	−23	1960/1964-1970/1974	−26	BR	Yes	Good
Jamaica	Good	.032		Same	A lot	1960/1964-1969/1971	− 8	1960/1964-1970	− 4	BR/C		Acceptable
Mexico	Good	.021		Yes	Some	1966/1970-1974/1976	−15	1966/1970-1978	−18	BR/S	[h]	Good
Panama	Acceptable	.044		Same		1961/1965-1971/1975	−24	1961/1965-1971/1975	−14	BR		Weak
Peru	Good	.024				1967/1969-1974/1976	−18	1967/1968-1975	−20	S	Yes	Good

Source: *Fertility Levels and Trends* . . . , table 9.

NOTE: Three dots (...) in a column mean the data are not available. In columns 3, 4, 5 and 11, a blank means that the characteristic referred to does not exist to a significant degree according to the criteria mentioned above.

[a] This index is defined in the same manner as that for the 0 to 4 years before the survey in table 7 but includes the 0 to 14 years before the survey.

[b] P40-44 is the parity of the 40-44 cohort and P45-49 is the parity of the 45-49 cohort.

[c] "A lot" of displacement occurred if the age profile of cohort fertility (figure 5 of country chapters of *Fertility Levels and Trends* . . .) became progressively older for the older cohorts, that is, the age group at which fertility peaks moved from younger to older age groups as the cohorts got older. "Some" displacement occurred if only the oldest cohort (45-49) showed an older pattern of fertility. The displacement in the age pattern indicates the extent to which forward-dating of births from the distant past occurred (the Potter-type effect).

[d] Trends by age are available in table 3 of each country chapter in *Fertility Levels and Trends* . . . Trends were rated as consistent and given a "yes" if all age groups showed similar trends or if all age groups but the 15-19 group showed similar trends.

[e] Comparisons with the 1978 Contraceptive Prevalence Survey suggest the possibility of some omissions among women aged 45-49.

[f] The 35-39 cohort shows unusually high fertility at ages 25 and 30, which somewhat masks the effect of displacement using the criteria above.

[g] Cohort-period rates from a subsequent survey in 1980 allowed a comparison of rates in the country chapter.

[h] Time periods are not the same.

tion to the importance of good age data for good fertility estimates. The assessed quality of the recent marital history data required a further downgrading for four countries (the Philippines, Guyana, Jamaica and Peru). In the case of trends in fertility rates as assessed in table 7, the quality of the marital history data required the downgrading of six countries, five in Latin America, where the collection of marital history data is particularly problematic because of the existence of other union types ("consensual" and "visiting" as well, in the Caribbean countries).

In conclusion, it can be seen that despite a standard survey instrument, the quality of the data derived from WFS varies from good to weak depending on the context within which the survey was implemented. Accurate estimates of trends, well corroborated by good external sources of data, were achieved in some surveys but not in others. When contrasted with recent censuses and surveys, the WFS data have a good record with respect to the enumeration of children ever born, particularly with respect to older women, who are more likely to omit births. None the less, certain patterns of age and birth date misstatement, well known from analysis of earlier maternity history surveys, appeared to have recurred in the WFS data collection experience. There is a suggestion of underenumeration and/or shifting of births for the one to two years prior to the survey for Bangladesh, Indonesia, Pakistan, Sri Lanka, Thailand and Panama, leading to the possibility of some underestimates of recent rates. In addition, evidence of possible backdating of recent births and forward displacement of births from the more distant to the recent past lead to the likelihood that estimates of recent declines in birth rates have been exaggerated for certain countries. This is expected to be particularly true for Bangladesh, Indonesia and Pakistan, which show evidence of both

TABLE 6. OVERALL QUALITY OF RECENT AGE-SPECIFIC FERTILITY RATES AND RECENT MARITAL AGE-SPECIFIC FERTILITY RATES

Country	Quality of recent births (table 4) (1)	Quality of age distribution (table 2) (2)	Current marital status inconsistent (3)	Quality of recent age-specific rates (4)	Quality of marital history (table 3) (5)	Quality of recent marital age-specific rates (6)
Africa						
Kenya	Good	Weak		Acceptable[a]	Acceptable	Acceptable
Asia and Oceania						
Bangladesh	Weak	Weak		Weak	Weak	Weak
Fiji	Good	Acceptable		Good	Good	Good
Indonesia	Weak	Weak		Weak	Weak	Weak
Jordan	Acceptable	Weak		Acceptable	Weak	Acceptable
Malaysia	Good	Acceptable		Good	Good	Good
Nepal	Acceptable	Weak		Weak[a]	Weak	Weak
Pakistan	Weak	Weak	15-19[b]	Weak	Weak	Weak
Philippines	Good	Good		Good	Acceptable	Acceptable[c]
Republic of Korea	Good	Good		Good	Good	Good
Sri Lanka	Acceptable	Weak		Acceptable	Acceptable	Acceptable
Thailand	Acceptable	Good	15-24[b]	Acceptable	Acceptable	Acceptable
Latin America						
Colombia	Good	Acceptable		Good	Acceptable	Good
Costa Rica	Good	Good		Good	Acceptable	Good
Dominican Republic	Good	Weak		Acceptable[a]	Weak	Acceptable
Guyana	Good	Good		Good	Weak	Acceptable[c]
Jamaica	Good	Good		Good	Weak	Acceptable[c]
Mexico	Good	Acceptable		Good	Good	Good
Panama	Acceptable	Good		Acceptable	Acceptable	Acceptable
Peru	Good	Acceptable		Good	Weak	Acceptable[c]

Source: *Fertility Levels and Trends* . . . , table 8.
[a] Change from column 1
[b] See *Fertility Levels and Trends* . . . , part two, country chapters on Pakistan and Thailand.
[c] Change from column 4.

TABLE 7. OVERALL QUALITY OF 15-YEAR TRENDS IN AGE-SPECIFIC FERTILITY RATES AND MARITAL AGE-SPECIFIC FERTILITY RATES

Country	Quality of birth trends (table 5) (1)	Quality of age distribution (table 2) (2)	Quality of trends in age-specific rates (3)	Quality of marital history (table 3) (4)	Quality of trends in marital age-specific rates (5)
Africa					
Kenya	Weak	Weak	Weak	Acceptable	Weak
Asia and Oceania					
Bangladesh	Weak	Weak	Weak	Weak	Weak
Fiji	Good	Acceptable	Good	Good	Good
Indonesia	Weak	Weak	Weak	Weak	Weak
Jordan	Weak	Weak	Weak	Weak	Weak
Malaysia	Good	Acceptable	Good	Good	Good
Nepal	Weak	Weak	Weak	Weak	Weak
Pakistan	Weak	Weak	Weak	Weak	Weak
Philippines	Good	Good	Good	Acceptable	Acceptable[a]
Republic of Korea	Good	Good	Good	Good	Good
Sri Lanka	Acceptable	Weak	Acceptable	Acceptable	Acceptable
Thailand	Acceptable	Good	Acceptable	Acceptable	Acceptable
Latin America					
Colombia	Good	Acceptable	Good	Acceptable	Acceptable[a]
Costa Rica	Good	Good	Good	Acceptable	Acceptable[a]
Dominican Republic	Weak	Weak	Weak	Weak	Weak
Guyana	Good	Good	Good	Weak	Weak[a]
Jamaica	Acceptable	Good	Acceptable	Weak	Weak[a]
Mexico	Good	Acceptable	Good	Good	Good
Panama	Weak	Good	Weak	Acceptable	Weak
Peru	Good	Acceptable	Good	Weak	Weak[a]

Source: *Fertility Levels and Trends* . . . , table 10.
[a] Change from column 3.

types of dating distortions, but is also likely to be true of Kenya, Nepal, the Dominican Republic, Panama and Jamaica, which show evidence of forward date misplacement.

II. Estimates of recent levels of fertility and trends: the role of WFS data

In all the countries reviewed in the present report WFS represents one data collection effort in the mid-1970s set in the context of roughly decennial censuses and occasional fertility surveys. In eight cases, birth registration has also been judged to be at least 90 per cent complete, although in only five of these have the data been continuously available to permit a study of trends in the 1970s.* In this context, the actual findings from WFS on fertility levels and trends will be summarized while calling attention in particular to the findings which supplement or improve the quality of otherwise available information.

The fertility levels and trends estimated from the WFS data provide a new perspective on fertility and fertility change in selected countries of the developing world. A summary of those findings is presented in table 8. Although in all but four countries included here (Pakistan, the Philippines, the Dominican Republic and Jamaica), other age-specific fertility estimates were available for the period encompassing the five years before each WFS, the WFS estimates have greater comparability in terms of definitions, and their relative strengths and weaknesses are more fully known. In fact, as can be seen in table 9, the 1983 United Nations assessment of fertility levels and trends found that, for 11 of the 20 countries considered here, the WFS estimate covering roughly the early to mid-1970s represented the best recent estimate available despite the fact that it is now roughly five to nine years since the date of the original WFS. In the case of Guyana, it is notable that, despite the availability of vital registration data for the same period, WFS was considered the best recent estimate because of higher birth enumeration than the registration system. Although all of those 11 countries have had censuses in 1980 or 1981, the data necessary to construct estimates of an age-specific fertility rate and a total fertility rate are not yet available.

When comparing WFS estimates with other fertility estimates available for the same period** it is interesting to note that, in the case of Fiji, Colombia and Guyana, WFS estimates show fertility to be at least 10 per cent higher than other estimates. WFS estimates are also slightly higher than other estimates in the case of Mexico and Peru. Bangladesh, Indonesia and Nepal, all rated as having weak WFS estimates, show lower fertility than other recent survey estimates for those same countries. For the other nine countries, WFS fertility estimates are remarkably similar to other estimates. Thus, overall it can be said that, with only three exceptions, WFS estimates show fertility to be as high as or higher than other recent estimates.

* Guyana, Jamaica and Mexico have not published recent birth registration data.

** Pakistan, the Philippines, the Dominican Republic and Jamaica do not have estimates from another source for the recent period.

Table 8. Recent estimates of total fertility rates and trends in total fertility rates for specific countries

Country	Quality of recent estimate	Total fertility rates 0-4 years before survey	Quality of 10-year trend estimates	Percentage decline 10-14 to 0-4 years before survey	Percentage decline 5-9 to 0-4 years before survey	Percentage decline 10-14 to 5-9 years before survey
Africa						
Kenya	Acceptable	8.3	Weak	a	a	a
Asia and Oceania						
Bangladesh	Weak	6.1	Weak	a	a	a
Fiji	Good	4.2	Good	38	23	19
Indonesia	Weak	4.7	Weak	a	a	a
Jordan	Acceptable	7.6	Weak	a	a	a
Malaysia	Good	4.7	Good	25	14	12
Nepal	Weak	6.0	Weak	a	a	a
Pakistan	Weak	6.3	Weak	a	a	a
Philippines	Good	5.3	Good	23	19	5
Republic of Korea	Good	4.3	Good	23	10	15
Sri Lanka	Acceptable	3.8	Acceptable	33	21	15
Thailand	Acceptable	4.6	Acceptable	31	24	10
Latin America						
Colombia	Good	4.7	Acceptable	36	25	14
Costa Rica	Good	3.8	Good	46	31	23
Dominican Republic	Acceptable	5.7	Weak	a	a	a
Guyana	Good	4.9	Good	30	20	12
Jamaica	Good	5.0	Acceptable	25	16	10
Mexico	Good	6.2	Good	17	12	6
Panama	Acceptable	4.5	Weak	a	a	a
Peru	Good	5.6	Good	18	14	5

Source: *Fertility Levels and Trends* . . . , table 1.
[a] Quality of fertility trend data rated as weak.

TABLE 9. 1983 MONITORING OF FERTILITY LEVELS AND TRENDS

Country	Date of most recent official estimate	Source
Africa		
Kenya	1972-1977	WFS
Asia and Oceania		
Bangladesh	1971-1975	WFS
Fiji	1977	V
Indonesia	1976-1979	C
Jordan	1971-1976	WFS
Malaysia	1978	V
Nepal	1970-1975	WFS
Pakistan	1971-1976	WFS
Philippines	1974-1978	WFS
Republic of Korea	1979	S
Sri Lanka	1979	V
Thailand	1970-1975	WFS
Latin America		
Colombia	1978	S
Costa Rica	1980	V
Dominican Republic	1970-1975	WFS
Guyana	1971-1975	WFS
Jamaica	1971-1979	WFS
Mexico	1977-1979	S
Panama	1980	V
Peru	1973-1977	WFS

Source: *World Population Trends and Policies: 1983 Monitoring Report* (United Nations publication, to be issued).

NOTES:
WFS = World Fertility Survey
S = Other survey
C = Census
V = Vital registration

Fertility trends for the period 10-14 to 0-4 years before the survey can be estimated with reasonable accuracy for 12 of the 20 countries considered here. Only five of those countries have "complete" vital registration data covering this same period prior to the survey (Fiji, Malaysia, Sri Lanka, Costa Rica and Guyana), and thus for the other seven countries (the Philippines, the Republic of Korea, Thailand, Colombia, Jamaica, Mexico and Peru), fertility trend estimates generated internally from the WFS maternity history data provide us with a glimpse of fertility change in those countries which would otherwise not be available. Accordingly, the information presented in table 10 more than doubles the information on fertility trends for this period of time and this group of countries.

Sizeable trends are evident in all countries, with the percentage decline varying from 46 per cent in Costa Rica to 17 and 18 per cent in Mexico and Peru respectively. With only one exception (the Republic of Korea), the rate of decline has accelerated, as can be seen when the percentage decline for the recent five-year period (0-4 to 5-9 years before the survey) is compared with the percentage decline for the previous period (5-9 to 10-14 years before the survey). The rate of decline has more than doubled between the two periods in the Philippines, Thailand, Mexico and Peru.

The National Academy of Sciences (Committee for Population and Demography) has prepared in-depth studies of fertility and mortality trends for six of the countries included in this assessment (Bangladesh, Colombia, Indonesia, Panama, the Republic of Korea and Thailand).[7] In the case of three of those countries—Colombia, the Republic of Korea and Thailand—WFS has produced trend estimates of at least acceptable quality. In each of the three studies prepared by the National Academy of Sciences the data from WFS represented an important data ingredient in the process of data analysis. In the case of the Republic of Korea and Thailand, the estimate of levels and trends from 1960 to 1975 was ultimately based on own-children and other reverse survival methods using census data, and WFS provided an alternative scenario but not the one selected as most accurate. However, using the United Nations approach of presenting five-year averages from WFS, the levels and trends using those two alternative estimates would have been roughly the same. In the Colombia study, WFS data were a major source for estimated levels and trends, with the 1978 survey bringing the trends three years past the 1975 survey.

In the case of the three other countries—Panama, Bangladesh and Indonesia—for which National Academy of Sciences studies of fertility levels and trends were prepared, the WFS fertility estimates were not considered consistent with the best currently available estimates of levels and trends in fertility. In the case of Panama, for which the WFS trend estimate was rated of weak quality, the National Academy of Sciences concluded that the most reliable estimates for the period 1955 to 1975 were the inflated total fertilities from registered births. A strong suggestion of misplacement of births in time, leading to an exaggeration of fertility decline, led the researchers to reject the WFS trend estimates. In the case of Bangladesh, current fertility estimates covered a wide range, but the National Academy of Sciences panel considered it likely that total fertility was in the range of 6.8 to 7.3 in the 15 years (prior to 1975), which is well above the 6.1 estimate from WFS for the zero to five years before the survey. In Indonesia, the panel considered that more reliable estimates of fertility in the 1971-1975 period could be derived from the own-children method using several of the large surveys conducted during the 1970s, including the intercensal survey taken in 1976. Their estimate of the total fertility rate for the period 1971-1975 was 5.1, significantly higher than the WFS estimate of 4.8 for the same calendar period.

Looking again at the WFS data, the age pattern of the fertility decline varies quite considerably, with some countries having reasonably even declines across the age groups over the 10-year period, which leave the age-pattern fertility relatively unaffected, and others showing a different pace of decline at different ages (see table 10). Five of the countries (Colombia, Costa Rica, Jamaica, Mexico and Thailand) show the most rapid declines taking place at ages 25 to 29 and older, resulting in a fertility profile which is younger in the most recent period. Six other countries (Peru, Guyana, the

Philippines, Sri Lanka, Fiji and Malaysia) show reasonably even declines in absolute terms, although the percentage declines are obviously greatest at the oldest ages. Again, the Republic of Korea is a peculiar case showing an increasingly concentrated period of childbearing with rapid declines at ages 20 to 24 and at ages 30 to 34 and over, but not at the peak age of childbearing–25 to 29.

Fertility decline at the younger ages is of particular interest because of the possible implications of changing age at union and because fertility rates are at very high levels by ages 20 to 24. It is interesting to note that a rapid fertility decline at ages 20 to 24 has occurred in some Asian countries which have had recent rapid increases in the singulate mean age of marriage and in some Latin American countries which have not. Sri Lanka and Thailand show declines in fertility over the past five years at ages 20 to 24 of 18.4 and 16.8 per cent, respectively, and increases in the singulate mean age of marriage of 1.8 and 1.0 years, respectively.[8] On the other hand, Costa Rica and Panama show declines for the same age group of 24.3 and 15.4 per cent, respectively, and increases in the singulate mean age of marriage of only 0.3 and 0.6 years, respectively. Jamaica is an interesting case because, despite a 0.8 year decrease in singulate mean age of marriage, fertility decreased 14 per cent at ages 15 to 19 and 7 per cent at ages 20 to 24. Thus, changes in the age at union are not the only cause of declines in fertility at the youngest ages. Contraceptive use has obviously played a role as well, particularly in Latin America.

The maternity history data from WFS also permit the estimation of marital fertility rates which, for the purposes of the present paper, have been calculated using all exposure time since first union. Those rates represent much newer information in general because age-specific marital fertility rates have not been systematically available for developing countries prior to the World Fertility Survey, given the necessity of linking recorded births to women of a particular age and marital status.

The extent of fertility control can be roughly indicated by relating the age pattern of marital fertility to a model schedule of natural fertility. Table 11 and the figure below use the age schedule of natural fertility published by Coale and Trussell[9] as a benchmark for measuring the decline in marital fertility with age; in the figure, changes in this pattern over time are presented where marital fertility rate trends were deemed at least of acceptable quality. The measures shown in table 11 are index numbers comparing an index of the age pattern of marital fertility with an index of the age pattern of a model schedule of natural fertility. Because natural fertility is highest at ages 20 to 24, 20 to 24 is used as a base, with fertility rates at subsequent ages measured in relationship to fertility rates at 20 to 24. The higher the index in table 11, the less the actual age pattern of marital fertility deviates from the natural pattern. Louis Henry defined voluntary fertility control as behaviour that is modified as parity increases,[10] and thus the exercise of fertility control is indicated here by a decline in the value of the index at successively higher ages. However, in countries with a high level of contraceptive use even at ages 20 to 24, the index will be biased upward and the degree of control underestimated.

As can be seen in the figure below, the natural fertility schedule is convex in shape, with fertility dropping most sharply after ages 35 to 39. An examination of the age structure of marital fertility among European populations undergoing fertility decline has shown a gradual transition to a concave shape as fertility decline becomes sharper at progressively younger ages. The figure indicates that all the Latin American countries show an age pattern of marital fertility evidencing fertility control, with Mexico and Peru showing the least effect. The profile for the Dominican Republic shows the distortion caused by heaping at ages 35 to 39 (see table 2 above). Kenya, Pakistan and Nepal have profiles which suggest that a pattern of natural fertility continues to prevail. Bangladesh, Jordan and Indonesia show a profile which suggests some fertility control. This is somewhat surprising in the case of Bangladesh, which has very low levels of contraceptive prevalence.[11] However, data from those three countries were rated as weak. Many of the Asian countries show substantial control (that is, Fiji, Malaysia, the Philippines, the Republic of Korea, Sri Lanka and Thailand). And, for all those countries with data of sufficient quality to assess trends in marital fertility, evidence of increasing fertility control over time is universally apparent. However, for some countries (that is, Malaysia, Sri Lanka and Mexico) the change, particularly at the younger ages, has been evidenced mainly in the most recent period.

III. Conclusion

In conclusion it can be stated that for the large majority of countries included in the present report, the maternity histories survey instrument designed by WFS has performed remarkably well in enumerating recent births and in serving as the basis of fertility rate estimates around the time of the survey. None the less, because of problems relating to sampling errors and certain frequently observed distortions in birth rate trends in the zero to two years before the survey, fertility rates cannot be reliably pinpointed for individual calendar years. In addition, it is unfortunate to note that in certain populous countries (that is, Bangladesh, Nepal, Indonesia and Pakistan) whose fertility has been the subject of much international concern and attention, WFS, which was carefully designed to take account of past survey experience, failed to provide reliable estimates of even recent fertility levels. Even five to nine years after the completion of the surveys, fertility estimates from WFS remain the best and most recent estimates available in 11 of the 20 countries reviewed here. The case of Kenya represents a notable success story from the point of view of recent birth enumeration because the recent fertility rate estimated to stand at the extraordinarily high level of 8.3 in the mid-1970s is considered a reliable one and considerably enriches our demographic picture of Kenya.

TABLE 10. TRENDS IN LIVE BIRTH RATES BY AGE OF WOMAN AND TOTAL FERTILITY RATES, 0-4, 5-9, 10-14 YEARS BEFORE SURVEY FOR SPECIFIED COUNTRIES

Region, country and years prior to survey	Age of woman (in years)						Total fertility rate (to 40-44)
	15-19	20-24	25-29	30-34	35-39	40-44	
Asia and Oceania							
Fiji							
10-14	.142	.324	.308	.271	.205	(.099)[a]	6.75
5-9	.094	.290	.260	.201	.141	.099	5.43
0-4	.061	.247	.225	.165	.092	.145	4.18
			Percentage change				
10-14 to 5-9	−33.0	−10.5	−15.6	−25.8	−31.2	...	−19.56
5-9 to 0-4	−35.1	−14.8	−13.5	−17.9	−34.8	−54.6	−23.02
10-14 to 0-4	−57.0	−23.8	−27.0	−39.1	−55.1	...	−38.07
Malaysia							
10-14	.120	.298	.306	.248	.181	(.073)[a]	6.13
5-9	.087	.257	.291	.225	.144	.073	5.39
0-4	.063	.232	.252	.201	.132	.041	4.61
			Percentage change				
10-14 to 5-9	−27.5	−13.8	−4.9	−9.3	−20.4	...	−12.07
5-9 to 0-4	−27.6	−9.7	−13.4	−10.7	−8.3	−43.8	−14.47
10-14 to 0-4	−47.5	−22.2	−17.7	−19.0	−27.1	...	−24.80
Philippines							
10-14	.073	.261	.328	.307	.243	(.125)[a]	6.69
5-9	.073	.249	.310	.287	.223	.125	6.34
0-4	.054	.214	.253	.239	.179	.089	5.14
			Percentage change				
10-14 to 5-9	0.0	−4.6	−5.1	−6.5	−8.2	...	−5.23
5-9 to 0-4	−26.0	−14.1	−18.4	−16.7	−19.7	−28.8	−18.93
10-14 to 0-4	−26.0	−18.0	−22.9	−22.1	−26.3	...	−23.17
Republic of Korea							
10-14	.016	.234	.331	.266	.188	(.069)[a]	5.52
5-9	.015	.189	.320	.217	.129	.069	4.70
0-4	.012	.188	.319	.196	.094	.040	4.25
			Percentage change				
10-14 to 5-9	−6.3	−19.2	−3.3	−18.4	−31.4	...	−14.86
5-9 to 0-4	−20.0	−0.5	−0.3	+9.7	−27.1	−42.0	−9.57
10-14 to 0-4	−25.0	−19.7	−3.6	−26.3	−50.0	...	−23.01
Sri Lanka							
10-14	.093	.242	.282	.237	.187	(.063)[a]	5.52
5-9	.064	.185	.259	.223	.145	.063	4.70
0-4	.038	.151	.207	.181	.116	.045	3.69
			Percentage change				
10-14 to 5-9	−31.2	−23.6	−8.2	−5.9	−22.5	...	−14.86
5-9 to 0-4	−40.6	−18.4	20.1	−18.8	−20.0	−28.6	−21.49
10-14 to 0-4	−59.1	−37.6	−26.6	−23.6	−38.0	...	−33.15
Thailand							
10-14	.085	.266	.310	.292	.239	(.122)[a]	6.57
5-9	.080	.256	.293	.239	.197	.122	5.94
0-4	.069	.213	.220	.179	.154	.071	4.53
			Percentage change				
10-14 to 5-9	−5.9	−3.8	−5.5	−18.2	−17.6	...	−9.59
5-9 to 0-4	−13.8	−16.8	−24.9	−25.1	−21.8	−41.8	−23.74
10-14 to 0-4	−18.8	−19.9	−29.0	−38.7	−35.6	...	−31.05
Latin America							
Colombia							
10-14	.132	.300	.328	.287	.260	(.124)[a]	7.16
5-9	.117	.281	.287	.234	.185	.124	6.14
0-4	.101	.230	.221	.172	.130	.062	4.58
			Percentage change				
10-14 to 5-9	−11.4	−6.3	−12.5	−18.5	−28.9	...	−14.25
5-9 to 0-4	−13.7	−18.2	−23.0	−26.5	−29.7	−50.0	−25.41
10-14 to 0-4	−23.5	−23.3	−32.6	−40.1	−50.0	...	−36.03
Costa Rica							
10-14	.125	.313	.323	.312	.238	(.101)[a]	7.06
5-9	.086	.255	.250	.209	.191	.101	5.46
0-4	.103	.193	.178	.137	.093	.053	3.79

TABLE 10 (*continued*)

Region, country and years prior to survey	Age of woman (in years)						Total fertility rate (to 40-44)
	15-19	20-24	25-29	30-34	35-39	40-44	
Latin America (continued)							
Costa Rica			*Percentage change*				
10-14 to 5-9	−31.2	−18.5	−22.6	−33.0	−19.8	...	−22.66
5-9 to 0-4	19.7	−24.3	−28.8	−34.5	−51.3	−47.5	−30.60
10-14 to 0-4	−17.6	−38.3	−44.9	−56.1	−60.9	...	−46.30
Guyana							
10-14	.158	.369	.323	.264	.196	(.082)[a]	6.96
5-9	.133	.325	.305	.232	.151	.082	6.14
0-4	.114	.283	.242	.184	.112	.042	4.89
			Percentage change				
10-14 to 5-9	−15.8	−11.9	−5.6	−12.1	−23.0	...	−11.78
5-9 to 0-4	−14.3	−12.9	−20.7	−20.7	−25.8	−48.8	−20.36
10-14 to 0-4	−27.9	−23.3	−25.1	−30.3	−42.9	...	−29.74
Jamaica							
10-14	.191	.287	.297	.264	.195	(.072)[a]	6.53
5-9	.171	.283	.265	.224	.158	.072	5.87
0-4	.147	.262	.227	.178	.114	.058	4.93
			Percentage change				
10-14 to 5-9	−10.5	−1.4	−10.8	−15.2	−19.0	...	−10.11
5-9 to 0-4	−14.0	−7.4	−14.3	−20.5	−27.9	−19.4	−16.01
10-14 to 0-4	−23.0	−8.7	−23.6	−32.6	−41.5	...	−24.50
Mexico							
10-14	.150	.314	.340	.291	.240	(.124)[a]	7.30
5-9	.127	.313	.334	.275	.203	.124	6.88
0-4	.114	.290	.294	.254	.178	.084	6.07
			Percentage change				
10-14 to 5-9	−15.3	−0.3	−1.8	−5.5	−15.4	...	−5.75
5-9 to 0-4	−10.2	−7.4	−12.0	−7.6	−12.3	−32.3	−11.77
10-14 to 0-4	−24.0	−7.6	−13.6	−12.7	−25.8	...	−16.85
Peru							
10-14	.112	.282	.307	.293	.217	(.123)[a]	6.67
5-9	.100	.274	.305	.264	.196	.123	6.31
0-4	.084	.237	.262	.242	.171	.092	5.44
			Percentage change				
10-14 to 5-9	−10.7	−2.8	−0.7	−9.9	−9.7	...	−5.40
5-9 to 0-4	−16.0	−13.5	−14.1	−8.3	−12.8	−25.2	−13.79
10-14 to 0-4	−25.0	−16.0	−14.7	−17.4	−21.2	...	−18.44

Source: *Fertility Levels and Trends* . . . , table 12.
NOTE: Three dots (...) in a column mean the data are not available.

[a] Rate not available. Total fertility rate calculated assuming rate from the period 5 to 9 years before the survey.

Although only 12 countries were found to have trend estimates of acceptable quality and five of these already had and continue to have fertility trend data readily available from "complete" birth registration data, most of the seven countries for which fertility trend data from WFS provide new information were reasonably large and populous countries (the Philippines, the Republic of Korea, Thailand, Colombia, Jamaica, Mexico and Peru). Thus, in more than one third of the surveys, the trend data implicit in the WFS maternity history has significantly expanded our knowledge of fertility change in the period from the early to mid-1960s to the early to mid-1970s. It is to be hoped that the next 20 WFS data sets, which in general represent countries which have many fewer alternative sources of demographic data, will have an even higher rate of success.

The derivation of trends from one single survey instrument is an imaginative way to make up for a lack of historical data but, as can be seen from the discussion above, is a very costly one in terms of both data collection and data assessment. The extensive round of 1980 censuses and the increasing use of household surveys of various kinds heralds a new era of data collection in which many countries for whom WFS represented a major first step in sophisticated demographic data collection will now have a reliable base point from which further fertility changes can be monitored. None the less, it is disturbing to note that some of the countries with the most difficult population problems to tackle (such as Bangladesh, Nepal and Pakistan) remain the most disadvantaged when it comes to the collection of basic demographic data.

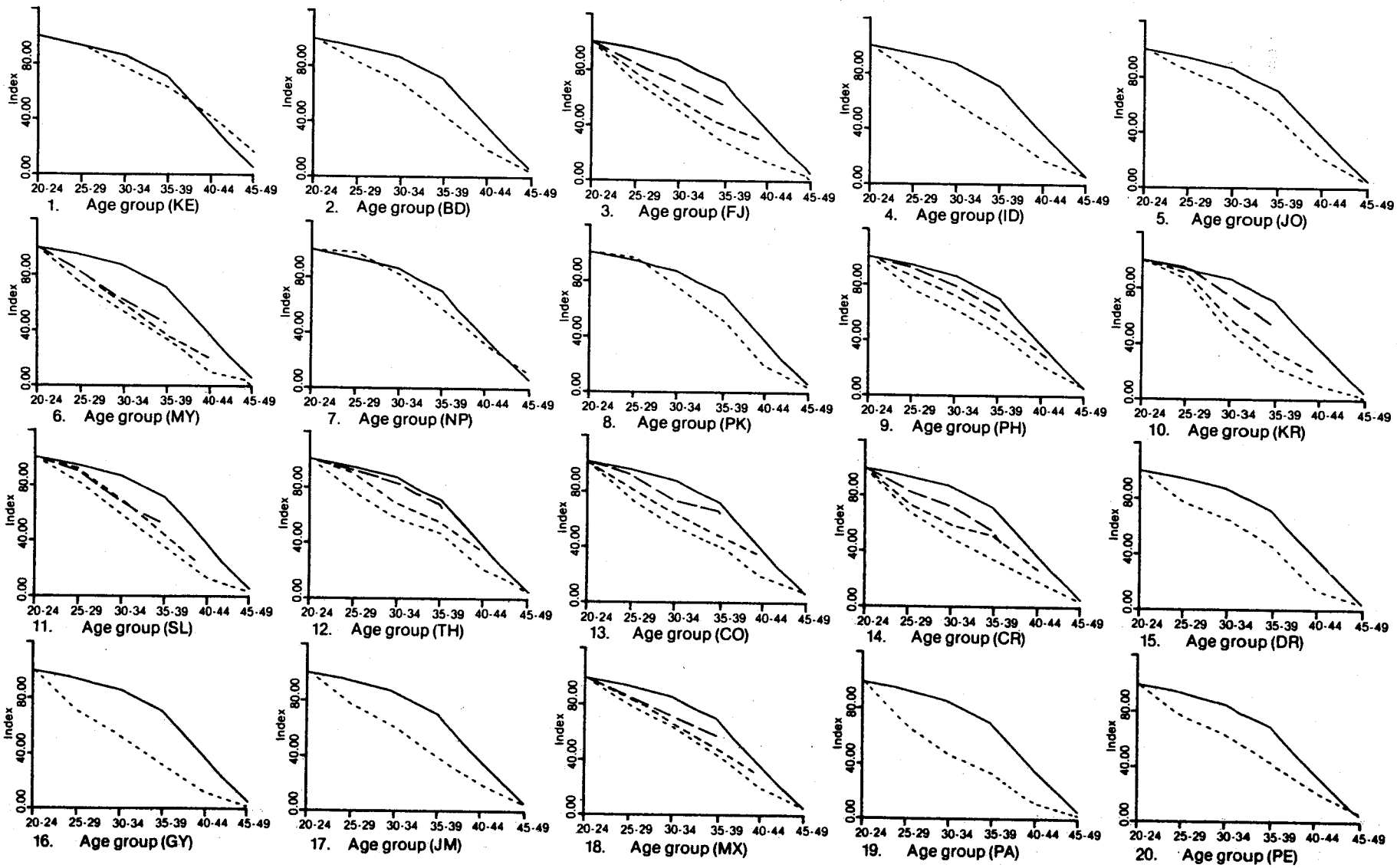
NOTES

[1] United Nations, *Fertility Levels and Trends as Assessed from Twenty World Fertility Surveys* (ST/ESA/SER.R/50).

[2] *World Population Trends and Policies: 1983 Monitoring Report* (United Nations publication, to be issued).

[3] Noreen Goldman and John Hobcraft, "Birth histories", *Comparative Studies: Cross National Summaries*, No. 11 (Voorburg, Nether-

Age patterns of marital fertility (20-24 = 100)



Legend: —— Natural fert.; - - - - marital fert. 0-4 years before survey; – – – marital fert. 5-9 years before survey; —— marital fert. 10-14 years before survey.

Source: Table 11.

NOTE: Countries for which past periods have not been shown have been rated as having trend estimates of inadequate quality.

TABLE 11. INDEX NUMBERS COMPARING AGE PATTERN OF MARITAL FERTILITY WITH A MODEL SCHEDULE OF MARITAL FERTILITY

Country	Quality of recent marital fertility estimates	Index of fertility control [a]			
		25-29	30-34	35-39	40-44
Africa					
Kenya	Acceptable	1.00	.90	.89	1.17
Asia and Oceania					
Bangladesh	Weak	.88	.80	.64	.57
Fiji	Good	.75	.58	.39	.37
Indonesia	Weak	.86	.68	.55	.48
Jordan	Acceptable	.90	.84	.73	.61
Malaysia	Good	.79	.62	.48	.28
Nepal	Weak	1.04	.82	.83	.88
Pakistan	Weak	1.03	.88	.75	.51
Philippines	Acceptable	.82	.72	.64	.60
Republic of Korea	Good	.92	.57	.33	.27
Sri Lanka	Acceptable	.87	.67	.50	.37
Thailand	Acceptable	.81	.66	.66	.59
Latin America					
Colombia	Good	.77	.62	.56	.50
Costa Rica	Good	.73	.57	.49	.51
Dominican Republic	Acceptable	.82	.75	.65	.40
Guyana	Acceptable	.76	.62	.46	.33
Jamaica	Acceptable	.82	.71	.56	.53
Mexico	Good	.86	.76	.63	.57
Panama	Acceptable	.73	.55	.48	.32
Peru	Acceptable	.83	.75	.63	.64

Source: *Fertility Levels and Trends* . . . , table 2.

[a] Ratio of index values of age-specific marital fertility (with 20-24 rate = 100) to index value of a model schedule of marital fertility (with 20-24 rate = 100). Model marital fertility taken from A. J. Coale and T. James Trussel, "Model fertility schedule: variations in the age structure of child-bearing in human populations", *Population Index*, vol. 40 (April 1974).

lands, International Statistical Institute/World Fertility Survey, December 1981).

[4] Robert Hanenberg, "Current fertility", *Comparative Studies: Cross National Summaries* (Voorburg, Netherlands, International Statistical Institute/World Fertility Survey, May 1980).

[5] J. E. Potter, "Problems in using birth history analysis to estimate trends in fertility", *Population Studies*, vol. 31, No. 2 (July 1977), pp. 335-364.

[6] Panel on Bangladesh, Committee on Population and Demography, *Estimation of Recent Trends in Fertility and Mortality in Bangladesh*, Report No. 5 (Washington, D.C., National Research Council, 1981).

[7] Hania Zlotnik, *Levels and Recent Trends in Fertility and Mortality in Colombia*, Committee on Population and Demography, Report No. 12 (Washington, D.C., National Research Council, 1982); Panel on Thailand, Committee on Population and Demography, *Fertility and Mortality Changes in Thailand, 1950-1975*, Report No. 2 (Washington, D.C., National Research Council, 1980); Ansley J. Coale and others, *Estimation of Recent Trends in Fertility and Mortality in the Republic of Korea*, Report No. 1 (Washington, D.C., National Academy of Sciences, 1980); Panel on Bangladesh, *op. cit.*; Geoffrey McNicoll and Masri Singarimbun, *Fertility Decline in Indonesia, Analysis and Interpretation* (Washington, D.C., National Academy Press, 1983); Juan Chackiel, Vilma Medica and Kenneth Hill, *Fertility and Mortality in Panama, 1950-75*, Committee on Population and Demography (to be issued).

[8] D. P. Smith, "Age at first marriage", *Comparative Studies: Cross National Summaries*, No. 7 (Voorburg, the Netherlands, International Statistical Institute/World Fertility Survey, April 1980), table 2.

[9] Ansley J. Coale and T. James Trussell, "Model fertility schedules: variations in the age structure of childbearing in human populations", *Population Index*, vol. 4 (April 1984).

[10] Louis Henry, "Some data on natural fertility", *Eugenics Quarterly*, vol. 8, No. 2, pp. 81-91.

[11] United Nations, *Variations in the Incidence of Knowledge and Use of Contraceptives: A comparative analysis of World Fertility Survey results for twenty developing countries* (ST/ESA/SER.R/40).

TECHNIQUES FOR INTEGRATING POPULATION VARIABLES INTO DEVELOPMENT PLANNING: A PREVIEW OF A FORTHCOMING MANUAL OF THE POPULATION DIVISION OF THE UNITED NATIONS SECRETARIAT

*United Nations Secretariat**

SUMMARY

The need for integrating population variables into development planning has been reiterated on various occasions since the 1974 World Population Conference. Yet, at the present time, a relatively complete integration is confined to a comparatively small number of developing countries, among other reasons, owing to a limited accessibility of appropriate methodology to development planners. To assist in the process of this integration, the Population Division of the United Nations Secretariat, with the financial assistance of the United Nations Fund for Population Activities, is currently engaged in the preparation of a manual on the methodology for integrating demographic variables into development planning. The manual will consist of two parts, dealing with methodologies relevant to, respectively, overall and sectoral planning.

The present paper, which is a preview of the forthcoming manual, is primarily concerned with the first of the two projected parts. The paper begins with a brief discussion of the recent evolution of a typical planning framework and suggests how this evolution has increased the need for the use of demographic variables in the planning process. Next, various projection techniques, which the manual recommends for use in overall planning, are described. The emphasis there is on the types of results the techniques generate, inputs needed for their application, principles of computations performed with the techniques and on the requisite data. The discussion deals with methods for projecting four major demographic variables: population, students, labour force and households, as well as techniques for making projections of a number of socio-economic variables: employment, household income, household consumption and saving, and government consumption and investment—the variables which are, in one way or another, influenced by the demographic variables. Finally, the paper briefly considers how the proposed methodology can be applied in planning and what constraints this application is likely to encounter.

INTRODUCTION

During the past decade or so, arguments for integrating population variables with development planning were made on a number of occasions.[1] The arguments called for population policies to be formulated together with development policies, for development plans to be drafted by taking population factors into account, and even for integrating development and population planning. They also called for suitable institutional arrangements within the planning organizations of the developing countries to facilitate the integration. As a result of the debate, as well as the efforts made by national Governments and international and non-governmental organizations, an increasing number of development plans taking demographic variables into account were drafted during the past decade. Population policies or plans were formulated simultaneously with development plans in a way that took note of the development policies and envisaged socio-economic change. In a number of countries, "population units" were embedded in the planning machinery and charged with a variety of tasks, such as preparation of demographic inputs into development planning, analysis and monitoring of population-development interrelationships and formulation of population policies or plans.

In spite of those encouraging beginnings, a rather complete integration of population factors with development planning is still restricted to a relatively small number of developing countries. In particular, the use of demographic variables in preparing development plans is still fairly limited, and the reasons for this appear to be largely as follows: first, until quite recently, the development objectives in a majority of developing

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countries were confined to accelerated economic growth and structural change conducive to the growth. It was widely assumed that rapid economic growth translates into a rising standard of living for the majority, if not all, and therefore population variables, except for the population size and growth rate, were not of particular interest to planners. Second, until 5 to 10 years ago, adequate demographic data and other relevant statistics required to take demographic variables fully into account in preparing development plans were, as a rule, unavailable in most countries. Those data are now becoming gradually available on a broader scale. And third, methodology that allows for the use of demographic variables in the preparation of development plans has been largely inaccessible to the planners in many developing countries. It has been scattered through the technical literature that is often unavailable in those countries, and has often been presented in a fashion not conducive to its easy use.

To make this methodology more readily accessible to development planners, the Population Division of the Department of International Economic and Social Affairs of the United Nations Secretariat has recently embarked on the preparation of a manual on the methodology for integrating population variables into development planning. The manual is designed to facilitate integration of demographic variables into both overall and sectoral planning. It will primarily be useful in the mixed and market-oriented developing economies which have moderate to extensive experience in development planning, possess basic social, economic and demographic statistics, and recognize the importance of integrating demographic variables into the planning process. The manual will be mainly useful to planning that aims, among other things, at accommodating population change, rather than to planning exercises concerned with influencing demographic processes. It will be relevant to both medium- and long-term planning.

The manual will focus on the techniques for preparing demographic, economic and social projections needed in the course of drafting a development plan. The techniques for projecting socio-economic variables will be restricted to those requiring demographic inputs. The materials to be included will be mainly useful to the intermediate-level planners working at the national planning organizations and planning units of various sectoral ministries. They will describe techniques that have been used by the planners in the past as well as those which, although potentially useful, have not yet been applied in planning. Though some of the methods may appear rather advanced and data-intensive at present and, therefore, difficult to apply, it is hoped that in time they will become increasingly applicable, particularly as statistics become more plentiful and reliable and as planners become increasingly skilful. The preparation of the manual will not involve the development of new methods; rather it will reflect the state of the art in this field.

I. Evolution of the planning framework and its implications for the use of demographic variables in planning

As noted earlier, until a decade ago or so, development objectives have mainly been concerned with accelerated economic growth and required structural change. As a result, a typical planning framework has primarily dealt with the productive structure of the economy and scarce factors of production–capital, foreign exchange and occasionally skilled labour.[2] The framework was primarily concerned with the manufacturing and other organized sectors of the economy and employed the familiar sectoral classification of economic activities. It was used by planners mainly in order to trace the links from the given composition of final demand to the required commodity composition of production and the derived demand for scarce factors. The policy alternatives considered within this framework were essentially concerned with satisfying balance of payments and investment constraints. Possibly with the exception of population size and growth, demographic variables had no explicit role to play in the framework.

During the past decade, in an increasing number of developing countries, the growth-oriented development objectives have been supplemented with those of employment creation, income generation and redistribution, as well as the fuller satisfaction of the basic requirements of all the population. Those additional objectives were meant to assist in eradicating mass poverty and generating a more equitable distribution of the benefits of development, the problems which economic growth *per se* was unable to address satisfactorily. Consequently, the original planning framework has been extended in order to accommodate employment, household incomes and consumption. The result of this is a new, broader framework that provides for a number of linkages that were non-existent in the traditional framework, such as links from production to employment, from population to labour force, and from employment and labour force to unemployment and/or labour shortages. This framework also allows for linkages from production, employment and asset ownership to incomes of households and other institutions, as well as from household income and population to household consumption. Further, it allows for links from population, households and other demographic variables to government consumption and investment.

The new planning framework derives from three interrelated developments, namely, (*a*) the attempts to address problems associated with unemployment and underemployment, as well as income inequalities and poverty, in a concrete planning exercise, (*b*) the search for a framework for planning economic growth with redistribution and (*c*) the development of policy-oriented economic-demographic models focusing on employment, income distribution and poverty.[3] Since this framework did not arise primarily in the course of actual planning, it is not yet widely employed by the planners in the developing countries. As a result, rela-

tively few development plans at present closely reflect the philosophy underlying the framework. The most recent plan of India is perhaps the best example of a development plan which most closely reflects the philosophy of the new framework.[4]

The policies that can be explored within the new framework include those that were dealt with within the traditional framework plus those concerned with promoting employment growth, generating and redistributing incomes and increasing private and public consumption, thereby raising the living standards. Those policies can make use of a variety of instruments and/or structural changes and reforms.[5] Examples of such instruments are factor prices, taxes and subsidies, public investment, and provision of consumption goods. Instruments that have a direct bearing on population include family planning programmes and resettlement schemes. Examples of structural changes and reforms include land reform, changes in ownership of physical assets and educational reform.

The new planning framework entails the use of rather elaborate disaggregation schemes, not formerly used in planning. For example, the framework calls for production activities to be disaggregated into a greater number of sectors, as well as by location (urban/rural) and/or form of organization (modern/informal). Populations need to be disaggregated by socio-economic groups, or at the minimum by location—on the assumption that urban and rural populations can be treated as two broad socio-economic groups—and so on. The use of new disaggregation schemes and the broader scope of planning implied by this framework also require a rather rich data base. Thus, for example, finer disaggregation of production activities than heretofore necessitates measurement of output and interindustry flows in much greater detail. At present, however, the data-gathering systems in many developing countries still do not permit the collection of the requisite statistics.

The new framework calls for an unprecedented use of demographic variables in overall development planning. It clearly implies that planning that aims at meeting employment, income and consumption objectives must draw on a number of key demographic variables, such as population, labour force and households. In particular, it suggests that in order to make, say, planning for employment meaningful, the labour force needs to be brought into the planning exercise. Integrating the labour force into planning, in turn, requires that the population be made a part of the planning exercise. Further, planning for household incomes and consumption also necessitates the introduction of population and/or households. This is required in order to capture the implications of planned development for per capita and/or household income levels and for the distribution of household income among population groups. It is also needed in order to account for the effects of population and household characteristics on the level and structure of household consumption. Similarly, planning for government consumption and investment, especially in areas such as health, education and housing, also necessitates the use of such key demographic variables as population, students and households.

In order to facilitate planning based on this new framework, the first part of the forthcoming manual brings together a number of techniques especially suited for this type of planning. As the preparation of a development plan normally entails making projections of various sorts, the techniques to be presented there are of a projection variety. Specifically, the techniques make possible preparation of projections of four key demographic variables: population, students, labour force and households. They also facilitate projections of a number of important socio-economic variables requiring demographic inputs, namely, projections of employment, household incomes, household consumption and savings, as well as government consumption and investment. The techniques are reviewed in the following section, where the emphasis is on the types of projection results generated by the techniques, inputs required for their application, principles of computations performed by the techniques and the type of data required.

II. Techniques for preparing plan projections of selected demographic and socio-economic variables

A. *Techniques of population projections*

The manual describes two population projection methods, both of the cohort-component variety. These are the standard cohort-component technique and an extended cohort-component method. Either technique makes it possible to prepare a national population projection, or to project urban and rural populations and to derive the national projection by aggregating urban and rural results. However, the techniques are not capable of preparing projections of populations of several socio-economic groups at the same time. The cohort-component technique makes a projection by tracing over time age and sex structures of the national or urban and rural populations on the basis of specified fertility, mortality and migration assumptions. The extended cohort-component method projects population by tracing the national or urban and rural age, sex and educational structures as these change under the influence of given demographic conditions as well as given educational rates. To capture the impact of the educational process on the population structure, the extended cohort-component technique is applied jointly with one of the methods of student projection, the so-called age-grade technique.

Both techniques yield broadly the same type of projection results, which include the size as well as the age and sex structure of the population; various indicators of the age-sex structure, such as the sex ratio of the population; and indicators of population change, such as crude birth, death and migration rates. Depending on the type of projection made, the results refer to the national population alone, or to the urban, rural and national populations. Except for the rates of population change, the results refer to dates five years apart; the rates are

computed for the intervening five-year time intervals. The results produced by the extended cohort-component technique also include age, sex and educational structures of the population, as well as the proportionate distributions of persons of various age and sex groups by educational levels.

1. *Cohort-component technique*

Preparing a projection by means of the cohort-component technique requires inputs consisting of the initial population and assumptions on the components of population change over the plan horizon. Thus, a national projection needs the age and sex structure of the national population for the initial year of the plan and the assumptions concerning fertility, mortality and, where required, international migration for the subsequent quinquennial time intervals. A projection of urban and rural populations requires initial-year age and sex structures of the two populations, assumptions on fertility, mortality and international migration for those same populations, as well as internal migration assumptions.

In principle, assumptions needed to project a population could be formulated in terms of various fertility, mortality and migration measures. The manual, however, recommends the use of measures that are more or less readily estimable under the data conditions prevailing in the developing countries. Thus, it suggests that the fertility assumptions be formulated in terms of total fertility rates and proportionate fertility rates by five-year age groups. The mortality assumptions could be expressed in terms of either expectations of life at birth or infant mortality rates and expectations of life at age five. Where assumptions on international migration are required, they would be formulated in terms of overall net international migration rates and proportionate net international migration rates by age, all of which are specific by sex. Similarly, where assumptions on international migration are needed, they are to be given in terms of overall net migration rates and proportionate net internal migration rates by age. Those rates, which are also specific by sex, refer to the rural population. In principle, various assumptions ought to be decided upon by taking into consideration the socio-economic changes and population policies expected to take place over the plan horizon as well as by assessing their likely impact on the components of population change.

Projecting a population by means of the cohort-component technique amounts to calculating the age and sex structure of the national population or those of urban and rural populations at the end of each successive five-year time interval spanning the plan horizon. The calculations are based on the structure(s) at the beginning of the interval and on the relevant assumptions on the component of population change. The principles of those computations are well known and, therefore, will not be discussed here.[6]

In most circumstances, irrespective of the type of projection sought, the preparation of inputs for the cohort-component method would require a preliminary population projection. This projection, prepared by the same technique, enables a derivation of the initial structure(s) from the comparable population structure(s) coming from a recent population census. Assumptions for the preliminary projection would normally be formulated by drawing on the observations of the relevant fertility, mortality and migration measures for the recent past.

Where the requisite observations on the relevant measures are not readily available or could not be directly obtained from the appropriate demographic data, it would be necessary to derive them by means of indirect estimation. Similarly, where the projection of urban and rural populations is intended, but the census-date age and sex structures of those populations are unavailable, it will be necessary expressly to prepare them. Where feasible, this type of projection should be made for the urban and rural populations defined as populations permanently living in communities that are, respectively, greater than or equal to and smaller than the predetermined population size, such as the 5,000 population. In principle, in most circumstances, preparing inputs required for the projection of urban and rural populations would be considerably more data-intensive than preparing them for the national projection.

2. *Extended cohort-component technique*

This technique utilizes inputs similar to those required by the cohort-component method. Depending on the type of projection desired, the method is applied to the national or urban and rural population structures by age, sex and educational level. Assumptions for the national projection include those on fertility, mortality and, where necessary, international migration. Assumptions for the urban and rural projections are those on these same components of population change, separately for the two populations, plus internal migration assumptions. Irrespective of the type of projection made, fertility assumptions are given in terms of the measures used by the cohort-component technique, plus an additional measure—the average annual change in the total fertility rate. Mortality and migration assumptions are formulated in terms of exactly the same measures as those used by the cohort-component method, except that the migration measures are specific by educational level, in addition to other characteristics.

The present method, which is akin to the methodology embodied in a recent economic-demographic model of a BACHUE family, embodies a number of features similar to those of the standard cohort-component technique.[7] It projects population by tracing its structure over successive five-year time intervals but, unlike the cohort-component technique, derives the segments of the population structure below and above age 30 by different procedures. At the end of each interval, the segment above age 30 is derived by means of calculations that are typical of the cohort-component method. As for the segment below age 30, the portion aged 5-29 is derived by means of a suitable transformation of the results generated by the age-grade method (discussed in greater detail below), modified where necessary to allow for migration. The portion below age 5 is derived in the

standard fashion, except that the annual numbers of births, as well as the resultant numbers of persons at single years of age at the end of the interval, required by the age-grade method, are calculated in the process.

Although inputs utilized by the extended cohort-component technique are similar to those required by the cohort-component method, their preparation could be far more data-intensive and laborious. In particular, in order to enable the preparation of initial population structure(s) by a preliminary projection, it would often be necessary expressly to tabulate census population by age, sex and educational level, since those tabulations are normally unavailable in the developing countries. Furthermore, to formulate migration assumptions which are expressed in terms of migration measures specific by education, it would often be necessary to have access to appropriate data, facilitating direct or indirect estimation of those measures. As a result, the extended cohort-component technique is likely to be less frequently applicable in planning than its standard counterpart.

B. *Techniques of student projection*

The manual describes two distinct techniques for preparing projections of students undergoing formal schooling. (They do not deal with students receiving non-formal education.) The techniques could be used to make projections at the national level or those for the urban and rural areas, and through aggregation, for the country as a whole. One of the methods, known as the enrolment-ratio technique, is the standard tool of educational planners.[8] The other method, referred to below as the age-grade technique, is similar to the flow models used by educational planners, but also has additional features not found in them.[9] As suggested earlier, the manual recommends that the age-grade technique be used together with the extended cohort-component method.

Either technique yields the same type of projection results, which include the number of students, both overall and by type of school (public and private) and various indicators, such as proportion of female students and growth rates of students, all by school level. All results except the growth rates pertain to dates five years apart; the growth rates are computed for the intervening time intervals. If the projection is made at the national level, the results are for the country as a whole. If it is made for the urban and rural areas, they are generated for the two areas as well as the entire country.

1. *Enrolment-ratio technique*

This method generates projections of students on the basis of age and sex population structures below age 30, assumptions on school enrollment, as well as assumptions on attendance of public schools. Enrolment assumptions could be expressed either in terms of enrolment ratios specific by school level and sex or ratios specific by school level, age and sex. The latter assumptions are specified in terms of proportions among students attending public schools by school level. Depending on the type of projection sought, the inputs are prepared for the country as a whole or for the urban and rural areas and refer to dates five years apart, from the initial year of the plan onward. Where prepared for the two areas, the inputs also include assumptions on attendance of urban schools among students residing in rural areas, expressed in terms of proportions of rural students attending urban schools, by school level.

In principle, this method generates the numbers of students at different school levels and different dates by applying appropriate enrolment ratios to the population at special age groups within the school age span. The special age groups consist of legal years of age of schooling at different school levels. The number of persons within those groups are derived from the age-sex population structure below age 30. Where the projection is prepared for the urban and rural areas, the result of applying the enrolment ratios is the number of students residing in the two areas. The number of students attending schools in the two areas is obtained from the number of students by area of residence and assumptions on the attendance of urban schools among rural students.

The application of this technique does not place particularly heavy demands on data, especially where the method is utilized to prepare a national projection on the basis of enrolment ratios specific by school level and sex. Thus, in this particular case, in order to formulate enrolment assumptions, the requisite data should include the number of students by school level and sex, as well as information on persons of the school-age span 5-24 classified by single year of age and sex. On the other hand, if the urban and rural projection utilizing enrolment ratios specific by school level, age and sex is sought, considerably more information will be required. Thus, in order to facilitate computation of observations on enrolment ratios, needed to formulate enrolment assumptions, the data should include those on persons attending schools classified by school level, single year of age and sex, as well as on the school-age population distributed by single year of age and sex. The data should be available separately for urban and rural areas.

2. *Age-grade technique*

Inputs required to prepare a projection by the age-grade technique for the country as a whole include the initial-year structure of persons below age 25, classified by single year of age, sex and school-attendance/educational-level category. They also include assumptions on enrolment, dropout and attendance of public schools, which all refer to dates five years apart starting from the initial year. The same type of inputs are needed for urban and rural areas, when projection for the two areas is required, plus assumptions on attendance of urban schools among rural students. Enrolment and dropout assumptions need to be expressed in terms of enrolment and dropout rates, both by school level and sex. To simplify the preparation of inputs, an assumption is made that the dropout rates at any school level do not vary among the grades.

As indicated earlier, the age-grade technique is applied jointly with the extended cohort-component

technique, since it does not only project students but also helps shape the educational composition of the population below age 30 at the end of each five-year interval. Therefore, the method deals with all persons below age 25 at the beginning of each interval, and not only with students and pre-school children eligible for schooling during the interval. Those persons consist of pre-school children, students and other population of this age span, including all persons at the earliest age of schooling and older who are out of school. Among the persons below age 25, pre-school children and students are classified by single year of age and sex, while the other population is classified by single year of age, sex and educational level.

The application of the age-grade technique assumes the existence of a one-to-one correspondence between single years of age and individual grades of various school levels. The assumption is equivalent to assuming that children enter successive school levels at specific years of age and that there are no delays in schooling arising from repeating a grade. The computations are carried out over successive five-year time intervals yielding the number of students at dates five years apart as well as other results required by the extended cohort-component technique. More precisely, at each date, the results include the numbers of pre-school children, students and other population within the age span 5-29. Those results, modified by the extended cohort-component technique in order to allow for migration, are used to reach the number of students at various school levels on the basis of the one-to-one age-grade correspondence underlying the projection. Once those numbers are obtained, the remaining results are derived in a manner identical to that used by the enrolment-ratio method.

Calculations performed by the age-grade technique over any five-year time interval are rather complex and therefore difficult to describe here, given the limited space available. Hence, only computations that yield the number of students classified by single year of age at the end of the five-year interval will be outlined. First, the number of persons among pre-school children and students, at the beginning of the interval, who are destined to survive to the interval's end are computed. Those numbers are the result of applying appropriate survival ratios, generated by the extended cohort-component technique, to the number of pre-school children and students at the beginning of the interval. Then, those persons destined to survive are exposed to enrolment and dropout rates computed for the individual years of the five-year interval on the basis of the enrolment and dropout assumptions. As a result, the number of students at the end of the interval, classified by single year of age, is the result of a projection which replicates the process of formal schooling rather closely.

The age-grade method is considerably more data-intensive than the enrolment-ratio method. Thus, under most circumstances and at least for some years to come, its application will require that population census returns be expressly processed in order to prepare the census-date population structure(s) below age 25. To prepare the structure(s), required in order to derive comparable initial-year structure(s) through a suitable preliminary projection, information on age, sex, school attendance, educational attainment, and possibly residence is required. Further, in order to ensure the one-to-one age-grade correspondence in the census-date structure(s), suitable adjustments will be necessary in the census tabulations.

C. *Technique of labour force projection*

The manual describes a single labour force projection technique, which projects labour force on the basis of population structures and labour force participation rates.[10] The method can be used to project the domestic civilian labour force, overall or by educational level, at the national level or for urban and rural areas, as well as by aggregation for the entire country. This technique yields projections of labour force structure and growth. The indicators include, for example, proportionate distribution of the labour force by broad age groups, the proportion female in the labour force and the growth rates of various labour force aggregates.

Inputs required to make a labour force projection include structures of the population at age 10 and above and assumptions on labour force participation rates. One or two of the following supplementary inputs are also needed: the numbers of students at age 10 and above, assumptions on the proportion of the domestic labour force in civilian occupations and assumptions on proportions of the population engaged in non-civilian employment. The additional inputs needed for a particular projection depend on the type of labour force participation rates used. The planner may choose among four different types of rates.

Projecting the labour force by this technique amounts, in principle, to deriving labour force structures by multiplying the population structures by labour force participation rates. If the projection is made for the country as a whole, it yields labour force structures by age and sex or by age, sex and education, depending on whether the projection of the overall labour force or that of the labour force by educational level is sought. If the projection is prepared for the urban and rural areas, the labour force structures are produced for the two areas and by aggregation for the country as a whole. The projection further requires derivation of the labour force size and various indicators of labour force structure and growth.

The preparation of the inputs needed to project labour force by the present technique necessitates that an appropriate projection of population be made. Under some circumstances, it also requires appropriate projection of students. To formulate the assumptions on the future labour force participation rates, observations on the past rates are normally required. Those rates could be derived from the population censuses, demographic sample surveys and/or other specialized surveys. Whichever statistical sources are used, they should preferably provide the data that are based on the same

definition of the labour force. They should enable the computation of the labour force participation rates of the type used by the planner. Further, to formulate assumptions on relevant proportions, such as proportions of overall labour force in civilian occupations, data on non-civilian employment, suitably classified, will also be required.

D. *Technique of household projection*

The manual describes a single household projection method, which permits projections on the basis of population structures and headship rates.[11]

The technique can be used to prepare a projection at the national or urban and rural levels. It yields the number of households and average household size at dates five years apart, and the growth rate of the number of households for the intervening intervals.

The only inputs required to prepare a projection by the technique are age and sex population structures at age 10 and above, population sizes and assumptions on age and sex specific headship rates, all for dates five years apart beginning with the initial year. Depending on the type of projection sought, the inputs should refer to the country as a whole or to the urban and rural areas.

Projecting households with the present technique amounts to multiplying the age and sex population structure at each date with appropriate headship rates, summing up the results across age and sex to obtain the number of households and deriving other results in an equally straightforward fashion.

The application of this technique entails preparation of the age and sex population structures using either of the two population projection techniques described earlier and the formulation of assumptions on the headship rates. To formulate those assumptions, observations on past rates or data facilitating their computations are required. As far as the data are concerned, all that is needed here is the population census or demographic survey information on household heads and population classified by age and sex.

E. *Techniques of employment projections*

The manual elaborates two distinct employment projection techniques. One of them utilizes simple employment-output models, while the other draws on two well-known types of production functions. Both methods could yield projections of employment by production sector alone or by sector and educational (or skill) level. In addition, the method utilizing employment-output models facilitates projections of employment for the urban and rural areas and/or for different organizational forms of producers, modern and informal. In contrast to this, it is rarely possible to prepare such projections by means of the technique based on the production functions, since information required to estimate production functions by location and/or organizational form is virtually impossible to collect.

The projection results produced by either technique include, at the minimum, employment by sector and total employment, plus indicators of employment structure and growth, such as the proportionate distribution of employment by sector as well as overall and sectoral employment growth rates. If the projection is made by sector and education, the results can include employment levels by educational level, for the whole economy and by sector, as well as indicators such as proportionate distributions of employment and employment growth rates, both by education. The technique using employment-output models can produce those results whether the projections are disaggregated by organizational form or not. If disaggregation by location is allowed for, the technique is also capable of generating employment projection results separately for urban and rural areas.

1. *Technique based on employment-output models*

Projecting employment by means of employment-output models requires the use of one such model (or possibly more).[12] The manual discusses five different models and demonstrates how they can be used to make employment projections. The simplest and least realistic of the models assumes a fixed relationship between output and employment and, thus, does not recognize the possibility of factor substitution. This assumption implies the equality between average and marginal employment-output ratios as well as unitary elasticity of employment with respect to output. A slightly more complex and realistic model assumes the constant marginal ratio and allows for the average and marginal ratios to diverge as well as for the average ratio to vary over time. Yet another model assumes fixed elasticity of employment with respect to output, and therefore where the elasticity differs from one, allows for both average and marginal ratios to change over time. While those three models do not provide for the presence of technical change, the remaining two models do. Both of them assume a fixed rate of technical change, which measures the rate of change of the employment-output ratio. Furthermore, the latter of the two also makes an assumption of the fixed marginal ratio.

In order to prepare an employment projection by means of a selected model, it is necessary that the model by suitably disaggregated. For example, if a projection for urban and rural areas by economic sector is sought, the chosen model would be disaggregated by both location and sector. Further, to make a projection, estimates of the model's parameters as well as appropriate output projections for selected dates are required. For the type of projection just cited, the parameter estimates and the projected output levels would be needed for each sector in both urban and rural areas. Given the parameter estimates and output projections, projecting employment simply amounts to evaluating levels of employment by means of appropriate model equations.

The estimation of the parameters of any given model requires information on employment and output. The amount of data needed increases with the complexity of models to be estimated. Accordingly, for the simplest of

the five models, data for a single year would suffice. On the other hand, the most complex model necessitates information for three years or more. Thus, there is a clear trade-off between the complexity of the model and the amount of data required to estimate it. Since the more complex models are likely to yield more reliable projections, whenever the data permit, their use is to be preferred to that of the simpler models.

2. *Technique based on production functions*

In order to make employment projections that take into account possible differences in the rates of growth of various production factors and at the same time allow for the effects of technical change, the manual recommends the use of Cobb-Douglas and constant elasticity of substitution (CES) production functions.[13] To prepare projections of overall employment or employment by educational (or skill) level, it proposes that alternative specifications of the two types of production functions be used. Those alternative specifications, respectively, treat labour as an aggregate input and differentiate among a few (normally two or three) distinct educational categories of labour.

The production functions are almost exclusively estimable only for the economic sectors, and not for finer categories of producers, such as modern and traditional activities of various sectors. Therefore, the present technique could generate projections of employment, overall or by educational level, but not for the finer disaggregation schemes. To produce those projections, it is necessary that the estimates of the parameters of the sectoral production functions are prepared. In addition, projections of value added and of production factors other than labour for selected dates are necessary. The manual does not discuss how such projections could be made.

Given the inputs, projections of overall employment by sector are simply obtained by evaluating the so-called inverse production functions of the selected type, sector by sector. The inverse form of a function is the one which expresses labour in terms of value added and other factors and is the result of a suitable rearrangement of the standard functional form.* The projection results are made for the same dates for which the projections of value added and non-labour production inputs are prepared. Since the labour force projections are generated for dates five years apart, it is logical to prepare the employment projections for the same dates.

To obtain the estimates of the production function parameters, the time series information on value added and various production factors by sector are needed. If projections of employment by educational level are required, the data should also include information on employment by education. Further, to reach the parameter estimates, moderately advanced statistical techniques normally need to be used. As a result, this technique is not likely to be widely applicable in the developing countries.

F. *Technique of household income projection*

The manual describes a single technique for projecting household incomes, based on the social accounting matrix (SAM). The method can be used to make projections of household income at the national level or alternatively to prepare household income projections for the urban and rural areas and, through aggregation, for the country as a whole. The projection results include absolute levels of disposable household income, levels of per capita and per-household income as well as growth rates of those income variables. If the projection is made for urban and rural areas, the results also include indicators of urban-rural income disparities. In the process of projecting household income, the technique also yields projections of incomes of other institutions, namely, corporations and Government.

The social accounting matrix is a double-entry accounting device, developed by Pyatt and Thorbecke, which provides a complete picture of income and product flows in an economy during a particular period, normally a year.[14] The matrix consists of an equal number of rows and columns where each row and its corresponding column refer to a particular accounting category. Those categories may include accounts of factors of production (labour and capital), accounts of institutions (households, corporations and Government), indirect taxes account, combined capital account, accounts of production sectors (agriculture, industry etc.) and the foreign sector ("rest of the world") account. Each row in the matrix refers to the receipts for a given accounting category, while each column indicates the corresponding expenditures or the way receipts are distributed.

A SAM itself could not be used to project household income. It could, however, be used as a basis of technique that projects levels of income received by various types of institutions, including households. The manual presents such a technique, which derives household income and incomes of other institutions by transforming sectoral value added into incomes of production factors, and further by mapping the factorial incomes onto incomes of institutions. The technique also derives the disposable household income as a difference between the total household income and taxes paid by the households, as well as computes levels of per capita and per-household disposable income.

In order to make a projection by the proposed technique, a SAM for a recent year ought to be constructed as well as value added, and population and household projections over the plan horizon need to be prepared. In addition, the future values of a number of relevant parameters ought to be specified, using the data for the recent past. As a rule, those parameters govern the mapping of value added on factorial incomes, and that of the factorial incomes on incomes of institutions. Those parameters include, for example, factorial income shares, tax rates and so on. Where the income projec-

* Projecting employment by educational level is somewhat more complex than projecting overall employment and, due to limited space, is not discussed here. In the case of CES functions, for example, such projections require the use of the so-called two-level constant-elasticity-of-substitution production functions.

tions are sought for the urban and rural areas, SAM should allow for the disaggregation of labour and household accounts by urban and rural areas, and most of the inputs—value added, population size, the number of households, plus many of the requisite parameter values—need to be supplied for the two areas separately.

G. *Techniques of household consumption and saving projections*

The manual presents two techniques for making projections of both household consumption and saving and three techniques facilitating only projections of household consumption. Two out of those five methods are based on the Kelly model and the household-consumption-and-saving block of the BACHUE-Philippines model, respectively.[15]

Those methods postulate that household demand is primarily a function of income and demographic variables. Three remaining techniques draw, respectively, on the linear expenditure system (LES), the extended linear expenditure system (ELES) and the almost ideal demand system (AIDS).[16] Those three techniques suggest that demand is a function of income and prices and to a lesser extent of demographic variables.

All five methods permit projections for the country as a whole or those for the urban and rural areas. In addition, all are capable of generating results on the structure of household consumption. Techniques based on the BACHUE model and the ELES also yield levels of household consumption and savings. Owing to restrictive assumptions underlying LES and ELES, techniques based on those two demand systems are suitable only for medium-term projections. The remaining techniques are applicable to both medium- and long-run projections.

Owing to limited space, the present discussion will deal with only two of the techniques, namely, those based on the Kelly model and ELES. The former technique is representative of the techniques which only permit projections of the structure of household consumption by commodity category but allow for a considerable impact of demographic variables on this structure. The latter technique is representative of techniques which are capable of projecting both the level and structure of household consumption and the level of household savings but make limited use of demographic variables.

1. *Technique based on Kelly model*

The Kelly model makes very few assumptions about the nature of consumer behaviour. Thus, it does not assume that households maximize a utility function subject to a budget constraint. Further, it omits prices, which is equivalent to assuming that relative prices do not influence demand. The model assumes the existence of simple demand functions for commodity groups, which postulate that the demand of an average household for a given group is a function of the total expenditure as well as the size of the household.

Therefore, to prepare a projection of household consumption, say, at the national level using this model it is only necessary to have estimates of the national demand functions and to evaluate the functions by drawing on the projections of the average household expenditure, average household size and the number of households. Similarly, to project urban and rural and, by aggregation, national consumption, all that is needed are the estimates of the relevant demand functions by location and urban and rural projections of average household expenditure, average household size and the number of households.

Irrespective of the type of projection prepared, the demand functions could be estimated by using a household expenditure survey and, in particular, data on the household size, household expenditures (overall and by commodity group) and, if necessary, the household's location.

2. *Technique based on ELES*

Unlike the Kelly model, the extended linear expenditure system derives from the neoclassical economic theory of utility maximization. It assumes that all households or consumers have identical preferences—a condition that can be relaxed under some circumstances. Central to this expenditure system is a postulate that the per capita expenditure on a given category of commodities is a function of commodity prices and the per capita disposable income.

In order to facilitate projections of household consumption and saving using ELES, estimates of the system's parameters are needed. It is also necessary to draw on the projection of the per capita disposable income as well as projections of commodity prices. Where those inputs could be prepared, the projection of household consumption and savings could easily be derived by evaluating the ELES equations.

The parameters of ELES can be estimated both when there is a variation in prices and when there is no such variation. Normally, the estimation that allows for price variations relies on time series data and could therefore be performed, as a rule, at the national level; time series data are normally unavailable for subdivisions of a country. The estimation that does not require price variation can yield parameter estimates either for the country as a whole or for the urban and rural areas separately. It relies on cross-sectional data deriving from a household survey.

Among the projections that are required as inputs into household consumption and saving by means of ELES, the projection of per capita disposable income could be obtained using the technique based on SAM. As far as requisite projection of commodity prices is concerned, it would most often have to be prepared through some informal extrapolation of past prices; at present there are no robust and widely accepted methods for price projections. Since the price projections are inherently unreliable, the use of the present technique should be, at best, limited to the medium term.

H. *Technique of government consumption and investment projections*

A relatively simple technique, similar to the methodology embodied in the Long-Range Planning Model 2

(United States of America, Bureau of the Census), is recommended by the manual for preparing projections of government consumption and investment, for sectors including primary, secondary and tertiary education, health, as well as housing.[17] The technique is capable of yielding the levels of government consumption and investment over the plan horizon by calculating the resources needed to cover the operating costs at specified dates, and resources needed to meet the capital outlays over the intervening intervals. Like the other methods described in the manual, this technique is capable of generating results through application at the national or urban and rural levels.

Inputs required to project government consumption for a given sector include the number of users served by the sector, the number of units of various services needed for current operation per thousand users, and the unit cost of operating each of those services. Depending on the type of projection sought, the inputs are supplied for the country as a whole or for urban and rural areas separately. Calculating government consumption on the basis of those inputs is straightforward.

Inputs needed to project government investment for a given sector include the current value of various types of facilities in the initial year, utilized to supply the services, and the number of users to be served by the sector at various dates. They further consist of the number of units of the various types of facilities needed per thousand additional users, the unit cost of installing each of the different types of facilities and rates of depreciation of the various types of facilities. Those latter inputs should refer to the time intervals for which the investment projections are sought.

In principle, given those inputs, government investment is computed in a rather simple manner. The computations amount to determining the amount of investment needed to construct additional facilities, plus the investment required to replace facilities to be scrapped during the interval. Those calculations also generate the current value of various types of facilities at the end of each interval.

One of the principal inputs into this technique is the number of users for each given sector at various dates over the plan horizon. In the case of various educational sectors, the users are students attending public schools, which can be projected by either of the two techniques of student projection discussed earlier. In the case of health and housing sectors, the users will consist of the population and households to be provided with public health and public housing services, respectively. Normally, they would represent only a portion of the population and a fraction of all households, which presumably could not afford health and housing services provided by the private sector. To arrive at the portions of the population and households to be supplied the services by the Government, it will be necessary to draw on population and household projection that can be made by the techniques discussed above.

To prepare the inputs other than those for the users of services, it will be necessary to draw on relevant information that permit computation of the number of units of services per thousand users, the unit operating cost for various services, the unit cost of constructing various types of facilities etc. For educational subsectors, the information, for example, would consist of the number of teachers and students, teacher salaries, school construction costs and so on. It should also consist of the current value of capital embodied in various facilities, such as schools, and the rates at which this capital depreciates.

III. Some reflections on possible application of proposed methodology

An integration of population variables into overall planning, as complete as the proposed methodology permits, would entail the preparation of a series of projections. This series would start with the projections of population, students, labour force and households, continue with the projections of employment, household income, household consumption and possibly saving, and end with the projections of government consumption and investment. To prepare this chain of projections, it would be necessary to apply selected techniques in a sequential manner, essentially in the order in which they were discussed above. The sequential application, necessitated by the interdependence of projections of various variables, would ensure that the specific inputs needed by various methods are produced prior to their application. Thus, through the application, a population projection would precede the preparation of labour force and household projections, since population structures are inputs into the latter projections. Similarly, students will be projected before projecting labour force, if the numbers of students are a requisite input to the labour force projection. Yet, as another example, population and household income projections would precede the projection of household consumption and saving, where population and income are inputs into the latter projection, and so on.

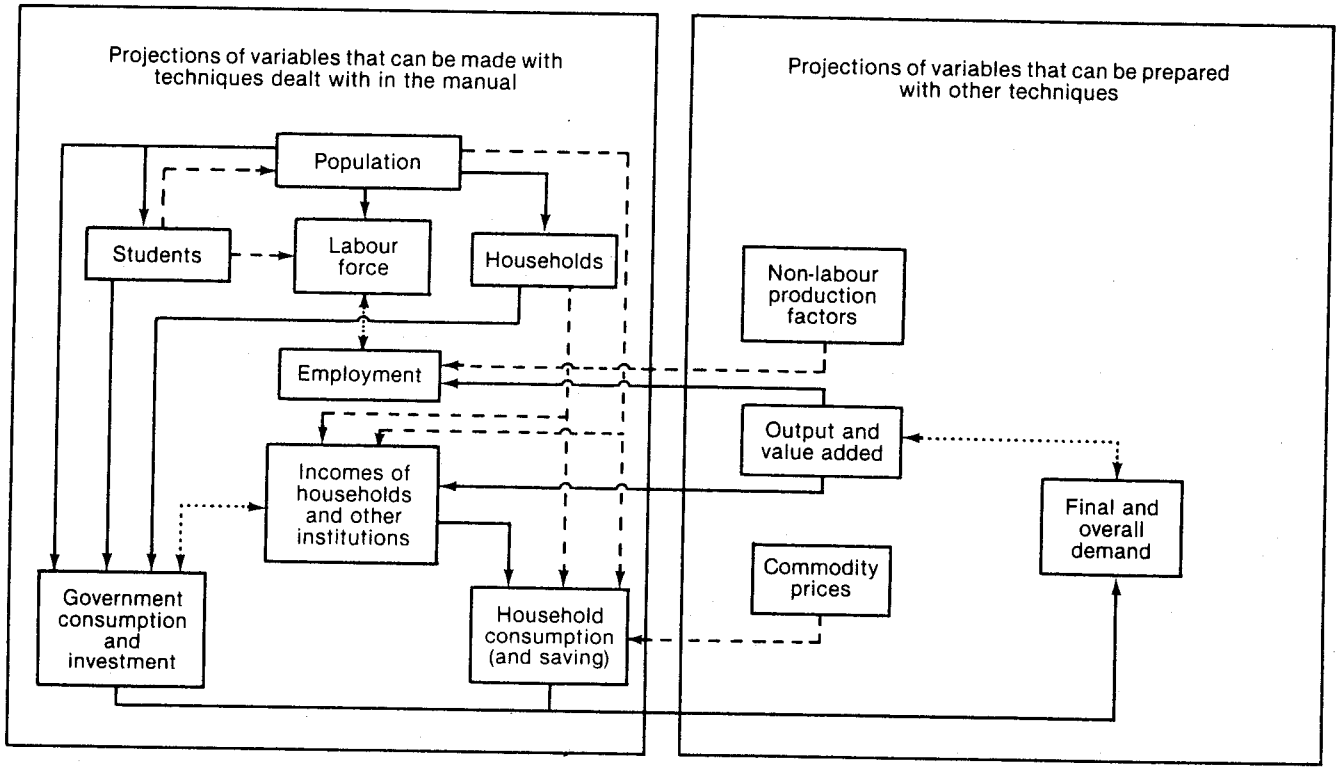
Projections that could be generated by the proposed methodology represent only a portion of a larger set of projections that would normally be made in the course of preparing a development plan. Indeed, in order to facilitate the preparation of projections by the methodology of the manual, it would be necessary to make projections of other selected variables, by techniques which are not described in the manual. Those variables include output and value added as well as, where required, physical capital and other non-labour production factors, plus commodity prices. Projections of output and value added are as important to the application of the methodology as the population projection itself. They are needed as inputs into employment and household income projections, as well as indirectly for projections of other socio-economic variables dealt with in the manual. Projections of non-labour production inputs are necessary for employment projection, if the method used is that based on production functions. Projection of commodity prices is necessary only where the techniques based on demand systems embodying prices are used.

In addition to being dependent on projections of variables such as output and value added, some of the projections produced by the proposed methodology could feed into projections produced by other methods. In particular, projections of household consumption as well as government consumption and investment could be drawn upon to derive projections of final demand, and ultimately overall demand. Those projections could, in turn, be compared with original output projections in order to check for consistency between projection demand and supply in commodity markets. As a result, the proposed methodology could indirectly be relevant to production planning, since major inconsistencies between demand and supply over the plan horizon would normally require changes in output projections.

The figure below illustrates the interdependence of projections that can be generated by the manual's methodology, as well as interdependence of those projections, and the projections of other variables that can be produced by methods not covered in the manual but used by planners. Among the other projections shown only in the figure are those that are directly relevant to the application of the proposed methodology. A distinction is made in the figure between two types of inputs into a projection of any given variable which are results of other projections (see notes to the figure). One type includes inputs that are required no matter what kind of technique is used to project the variable; the other type consists of inputs that are used only if a certain technique or a variant of a technique is applied. For example, household consumption is projected on the basis of household disposable income, no matter which technique is employed. However, depending on the specific technique used, the projection requires population or households and possibly prices, as additional inputs. Also indicated in the figure are projections of variables the results of which should normally be checked against each other for consistency.

In most applications, and especially in those allowing for the urban-rural disaggregation, it will prove necessary to use the proposed techniques in an iterative fashion. The iterative application will often be necessary in order to remove gross inconsistencies among projection results generated by various techniques. For example, iterations would be required where population, labour force and employment projections prepared for urban and rural areas indicate sizeable imbalances between the labour supply and demand for those areas. In particular, if the imbalances appear to be a consequence of unrealistic internal migration assumptions, those assumptions would have to be reformulated and the population and labour force projections repeated until the imbalances are removed. Or, if the output projections for urban and rural areas are deemed unrealistic, the output projections would have to be revised and employment projections repeated.

Interdependence among projections of variables based on the manual's methodology and between those projections and projections based on other methods



Notes:

——→ Stands for necessary input(s) into projection of a given variable, obtained by projecting some other variable.

– – → Represents input(s) into projection of a given variable, required or not depending on the technique used, obtained by projecting other variables.

←·····→ Denotes requisite comparison between results of different projections to check for consistency.

Practically all proposed techniques allow for the urban-rural disaggregation in projections. Whenever a relatively complete and sound integration of population variables into the planning process is sought, it will be desirable to prepare the projections allowing for this disaggregation. Such projections would, as a rule, be superior to the projections made for the country as a whole. The principal reason for this is the urban-rural dualism, which is typical of both economies and populations of many developing countries. In particular, in long-term planning exercises, the effects of this dualism could not be captured adequately unless the projections were based on the urban-rural breakdown. This is especially likely to be true of countries undergoing rapid structural changes of economy as well as rapid urban-rural population redistribution.

As the foregoing discussion suggests, the application of various projection techniques to be included in the manual makes it possible to take into account in the planning process some of the most important and obvious interrelationships between demographic and socio-economic variables. Some of the effects between those two classes of variables, namely, those running from the demographic to the socio-economic variables, can be taken into account in a rather rigorous fashion. This is done, for example, by utilizing empirically estimated relationships, such as equations of various demand systems embodying demographic variables. The opposite effects, those running from socio-economic to demographic variables, are dealt with informally by formulating underlying projection assumptions and, if necessary, revising them in the course of iterative application of the proposed techniques. This informal treatment, for example, applies to effects running from employment to internal migration and thereby to urban-rural distribution of population and labour force. This asymmetry in the treatment of the two-way effects between the demographic and socio-economic variables derives from the state of knowledge of those effects. At present, the effects of the former on the latter variables seem to be better understood and more amenable to rigorous treatment than the opposite effects.

The use of proposed methodology in planning is likely to encounter a variety of constraints, possibly even in countries that are expected to be the prime users of the manual. In any particular setting, those constraints may derive from data limitations, lack of sufficient expertise to prepare requisite projection inputs and/or limited access to computing facilities. Further constraints could arise where assumptions embodied in certain techniques are grossly violated. However, to counter some of the difficulties of application arising from those causes, the manual brings together a mixture of techniques, which for a number of variables offer a choice between two or more techniques, some of which are relatively easy to apply and others are not.

In the long run, inadequacy of existing statistical sources may prove to be the principal constraint on the application of the manual's methodology. This inadequacy derives from the traditional preoccupation of planners with the productive structure of economy and scarce factors and is unlikely to be redressed shortly. The requisite data are likely to improve only gradually as the recognition of the importance of dealing with employment, income, consumption and therefore demographic variables in planning increases. In the meantime, the application of the proposed techniques would prove considerably more difficult at the urban-rural than at the national level, as a result of the fact that urban-rural projections place far greater demand on data than do national projections.

The manual is being designed as a "how-to-do" book, which would indicate to the planner the types of inputs required for various projections. It would also show how these inputs are used to arrive at particular types of results. However, apart from general instructions, the manual would not indicate how the requisite inputs could be prepared. As a result, the application of the proposed methodology would depend on the local availability of expertise needed to prepare the inputs. This expertise includes a diversity of skills, ranging from those needed to process, say, a sample survey to those required to obtain indirect estimates of selected demographic measures and/or estimates of parameters of production functions. Clearly, where this spectrum of necessary skills is unavailable, the application of the whole range of proposed techniques would be impossible.

The use of certain techniques pre-supposes rather laborious calculations. Even when the application of such techniques can be avoided, the use of the proposed methodology is likely to necessitate extensive calculations. The main reason for this is an iterative use of the methods that would be required under most circumstances. As a result, a relatively easy access to an electronic computer of some sort would be desirable. The application of the methodology on a computer would, however, necessitate the development of appropriate software, which is still unavailable. However, the relative ease with which the software in general could be produced and made available today suggests that this would be the first obstacle to be removed.

Finally, to be useful to development planners, the proposed methodology would have to demonstrate its applicability in the context of the developing countries. This is true especially of those techniques that derive from the body of economic theory which purports to describe economic behaviour in the developed market economies. It also applies to two methods that jointly project population and students, and employ a rather strong assumption on the one-to-one age-grade correspondence. Whether some of those techniques would be applicable or not under the conditions of the developing countries could be established, however, only through their use in concrete planning exercises in those countries.

IV. Conclusions

Over the past decade or so, it became increasingly obvious that further improvements in socio-economic

planning in developing countries could be achieved primarily by rendering the planning process more responsive to the needs of the populations of those countries, which all along have been assumed to be the principal beneficiaries of social and economic advancement. It was argued that those improvements could only materialize if the scope of development planning were extended to accommodate variables such as employment, income and consumption, private as well as public. This, in turn, made it clear that this broader planning must necessarily make a much greater use of the demographic variables than did the traditional planning.

As a result of this, a broader framework for planning was proposed, suggestions were made for the collection of data not formerly used in planning, and promising methodologies were outlined.[18] At the same time, planners were engaged, although in a rather limited number of countries, in drafting development plans based on objectives that were increasingly oriented towards the requirements of the population and which, therefore, made greater use of demographic variables. Nevertheless, the relatively complete integration of demographic variables into the planning of developing countries is at present still a goal to be reached rather than established practice.

There are several reasons for this, important among which is the inaccessibility of appropriate methodology in a number of developing countries. To make this methodology more readily accessible, the Population Division of the United Nations Secretariat is currently preparing a manual on this methodology, relevant to both overall and sectoral planning. Upon production of the manual, it will be made available to planners in developing countries and will possibly be used as training material in workshops and programmes focusing on the integration of population variables in development planning. To the extent that the manual's methodology will be used in concrete planning, this use will probably contribute to the improvement of overall planning as well as provide the bases for future improvements of the proposed methodology.

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