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NOTE

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The term "country" as used in the text of this publication also refers, as appropriate, to territories or areas.

In some tables, the designations "developed" and "developing" economies are intended for statistical convenience and do not necessarily express a judgement about the stage reached by a particular country or area in the development process.

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PREFACE

The purpose of the *Population Bulletin of the United Nations*, as stipulated by the Population Commission, is to publish population studies carried out by the United Nations, its specialized agencies and other organizations with a view to promoting scientific understanding of population questions. The studies are expected to provide a global perspective of demographic issues and to weigh the direct and indirect implications of demographic policy. The *Bulletin* is intended to be useful to Governments, international organizations, research and training institutions and other bodies that deal with questions relating to population and development.

The *Bulletin* is prepared by the Population Division of the Department of International Economic and Social Affairs of the United Nations Secretariat and published semi-annually in three languages—English, French and Spanish. Copies are distributed widely to users in all member countries of the United Nations.

Although the primary source of the material appearing in the *Bulletin* is the research carried out by the United Nations Secretariat, officials of governmental and non-governmental organizations and individual scholars are occasionally invited to contribute articles.

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Explanatory notes

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

The term "billion" signifies a thousand million.

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

A hyphen between years (e.g., 1984-1985) indicates the full period involved, including the beginning and end years; a slash (e.g., 1984/85) indicates a financial year, school year or crop year.

A point (.) is used to indicate decimals.

The following symbols have been used in the tables:

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

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

A hyphen (-) indicates that the item is not applicable.

A minus sign (-) before a number indicates a deficit or decrease, except as indicated.

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

The following abbreviations have been used:

CELADE	Centro Latinoamericano de Demografía
CICRED	Comité international de coopération dans les recherches nationales en démographie (Committee for International Co-operation in National Research in Demography)
CMEA	Council for Mutual Economic Assistance
ESCAP	Economic and Social Commission for Asia and the Pacific
ECE	Economic Commission for Europe
ECLAC	Economic Commission for Latin America and the Caribbean
ESCWA	Economic and Social Commission for Western Asia
FAO	Food and Agriculture Organization of the United Nations
ISI	International Statistical Institute
IUSSP	International Union for the Scientific Study of Population
OECD	Organisation for Economic Co-operation and Development
UNDP	United Nations Development Programme
UNFPA	United Nations Fund for Population Activities
WFS	World Fertility Survey

ARE THE ECONOMIC CONSEQUENCES OF POPULATION GROWTH A SOUND BASIS FOR POPULATION POLICY?*

*Samuel H. Preston***

SUMMARY

The author examines whether the effects of fertility decisions are such as to justify policies which go beyond assisting couples in reaching their child-bearing goals. Research findings on the impact of population growth on per capita income and resources are reviewed, and such growth is found to be adverse only in poor, agrarian countries, although evidence remains weak. Nevertheless, it is argued that aggregate relations do not provide appropriate policy guidance. Population policy should be grounded in welfare economics—that is, based on whether the sum of individual welfare gains exceeds the sum of individual welfare losses.

On the basis of an examination of the economic effects of the household's fertility on other families, it was found that the net balance of external effects was not likely to be quantitatively large. Population growth would, however, tend to increase income inequality among households. Policies to reduce fertility would, however, improve the welfare for children in the family whose fertility is reduced. Public policy is generally based on the assumption that parents act in the best interests of their children. The paper concludes that on the basis of available evidence and the tenets of welfare economics, voluntary family planning programmes appear to be well justified.

Part of the support for efforts to reduce rates of population growth and for family planning as the means to that end has been predicated on the presumed negative effects of continuing rapid growth on economic development and on individual welfare. This paper will review some of the evidence currently available on the economic consequences of high versus low fertility. The primary focus of this paper is whether the economic consequences of population growth, as we now understand them, are a sound basis for population policies of various types. The analysis will apply the apparatus of welfare economics to the question. It will consider the question of whose welfare we are considering—the State's or the individual's—and among individuals, it will distinguish among effects on various interested parties to a child-bearing decision.

Most policy discussions have focused on voluntary family planning programmes. A few countries—China being the most notable—decided that their population problems were severe enough to justify policies that went beyond family planning. Much of the analysis of welfare economics is pertinent to the discussion of such policies. Therefore, this paper will also consider the question of whether—and if so, when—the effects of individual fertility decisions justify policies that go beyond enabling a couple to reach their child-bearing goals.

PER CAPITA INCOME AND POPULATION GROWTH

We will first consider the relative magnitudes of various influences on economic growth and the measures that have conventionally been used to study them. In matters of human well-being it is thought that per capita measures are what really matter. But, accepting them as the definitive indicators of human welfare immediately creates a link between population size and social progress. In fact, per capita measures of well-being appear to give population size coequal importance with whatever appears in the numerator. With any given numerator (goods), an increase in the denominator (population growth) spreads the goods more thinly and results in a loss of well-being. The logic of the connection is unassailable. Since many of the goods involve products of nature—land, minerals, energy, species—and since the abundance of nature is seen as more or less fixed, it becomes reasonable to think that population growth diminishes the per capita availability of most goods. It seems fair to say that this is the predominant way in which the issue of the economic effects of population growth has traditionally been considered. It is an approach that can be traced back at least to Malthus.

At the same time, a host of the "bads" are seen as man-made. Crime, war, pollution, social disarray, and even poverty increase at least proportionally with population size. To

*Reprinted, with minor changes and with references and table added, from Jane Menken (ed.), *World Population and U.S. Policy: The Choices Ahead* (New York and London, W. W. Norton, 1986), pp. 67-95.

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many, it appears reasonable to believe that social problems increase even faster than population because larger numbers of people are forced to contend for more limited resources, producing various forms of social disorganization. According to a recent statement by the chairman of the board of the Environmental Fund, Thomas Brokaw (1985):

> "[Americans] are treated to the spectacle of millions of well-meaning people working diligently to overcome the effects of over-population. Here I refer to law enforcement agents, educators, environmentalists, transportation authorities, health and social workers, and many others, but most of all politicians. All of them are busily ignoring the basis of the problems that they are working to correct."

At this extreme, such views are a self-parody. In only slightly less extreme form, they can pass for conventional wisdom. These modes of thought seem to come particularly easily to biologists and ecologists, who as a group almost surely have an above-average reverence for nature and are inclined to view man's intrusions as violations of a sanctified order. More importantly, they often reason about human affairs by analogy to species that do not systematically and purposively construct the environment from which they derive sustenance. For such species, it is plausible to view the fixity of nature as presenting immutable constraints. But does this constraint apply equally to humans?

NATURAL AND OTHER RESOURCES

Man constructs his own environment, and therein lies the basic fallacy of much reasoning in matters of population growth. The availability of natural resources has simply played a minor role in modern economic growth. European countries in the eighteenth century had far more resources per capita than they do today, but they also had per capita income levels that were shockingly poor by modern standards. Economic growth occurred through the accretion of physical and human capital, the development of supportive institutions, and above all through the accumulation of knowledge about techniques of production.

Japan provides a more vivid and contemporary example. After the Second World War, Japan's per capita income was below pre-War standards. Resource-poor, it appeared to many contemporary observers to be "over-populated". The Population Planning Commission report of 1946 concluded that "unparalleled surplus population is now an undeniable fact".[1] In 1949 the Population Problems Council, established by the Cabinet, argued that "the solution of our problems demands suppression of population expansion through birth control but also through emigration overseas".[2] But the population of Japan, already densely populated, was to grow by 40 per cent between 1950 and 1980, while per capita income grew by a factor of 7.40 (Summers and Heston, 1984). Hong Kong, the Republic of Korea, Singapore and Taiwan Province have of course made great economic strides despite being resource-poor. More recently, China has expanded its food production by a dramatic 55 per cent over a six-year period, largely through an institutional change that has replaced a command system with markets (Smil, 1985). The fact that those examples are all Asian enhances rather than diminishes their demonstration value, because it illustrates the dependence of economic growth on institutional, cultural and human resource factors.

On the other hand, Zaire is extraordinarily rich in resources, including agricultural land. According to a recent study by the Food and Agriculture Organization of the United Nations (1983), it could feed the entire projected population of Africa in the year 2000 several times over if the best of currently available production techniques were employed, Yet Zaire is exceptionally poor, with the seventh lowest gross national product (GNP) per capita in 1982 among the 126 countries for which the World Bank provides such estimates.

The success stories cited above are well known, but their lesson is easily overlooked. Most of the things that we appear to value as a species are not fixed in abundance. They are produced by people using man-made tools and relying on techniques that are derived from an ever-growing storehouse of knowledge. The techniques accumulate rather than erode because of the cultural inventions of speech and language, books and education. As Julian Simon (1981) has stressed, in view of the importance of the human factor in production, it makes no sense to assume that the number of goods in the numerator of a per capita index is unrelated to the size of the denominator.

Demographers and economists have long recognized the vital role of physical and human capital in producing goods and services. Nevertheless, their habits of thought drove them in the same direction as that of the non-expert: to represent economic processes through relatively simple formulas in which the size of the population or labour force was one element and the relationship between population size and the dependent economic indicator remained fixed over time. The effect of population growth could then be studied by performing mental (or computer) experiments which varied the size of population. The results from those early models have been questioned on several grounds: that the relationships may not be fixed over time or at all population levels; that the economic indicators (e.g., capital/labour ratios) may not be as relevant as once thought; and that the models omitted prices, which direct the behaviour of individuals and firms in adaptive ways.

ECONOMIC/DEMOGRAPHIC MODELS AND THE SOURCES OF ECONOMIC GROWTH

An early economic/demographic model by Ansley Coale and Edgar Hoover (1958) focused on the effects of population growth on capital supply and, through capital/labour ratios, on per capita income. They concluded that fertility was likely to reduce the supply of capital, capital/labour ratios and per capita income because it was associated with a higher "burden of dependency": the larger population of youths would tend to divert income so that, instead of being saved, it would go into immediate consumption in the form of larger expenditures on food, health, schooling and other social programmes. Many qualifications have been raised about the Coale/Hoover model. It has been argued, for example, that population growth itself might be expected to increase the demand for capital, that a rise in the rate of return to capital induced by capital shortages could be expected to increase the demand for capital and increase investment, and that educational expenditures might be treated as a form of investment rather than of consumption. Despite those qualifications, a recent review of evidence in the matter by the National Academy of Sciences (1986) concludes that capital/labour ratios would be expected to be modestly higher in a slowly growing population than in a similar but rapidly growing one.

But capital/labour ratios, like natural resources, have left the centre stage of the debate. Their importance was undercut by the empirical demonstration that the growth of capital stock has played a far smaller role in economic growth than had previously been believed. In a highly influential series

of studies, Denison, Abramovitz and others show that the principal factor in economic growth in the United States, Europe, Japan, and certain developing countries has not been growth in the volume of capital or labour or in the two combined but rather a change in production techniques, gains in the amount of value of output that could be extracted from given physical quantities of inputs.

In retrospect, it does not appear reasonable to attempt to represent the millions of daily decisions made in a modern economy and the extraordinarily variegated structure in which that economy operates by a few indexes, mechanically combined. But framing the issue in terms of simplified formulas was useful precisely for demonstrating that results typically were inaccurate in the direction of under-predicting economic growth. Using fixed formulas to relate inputs to outputs usually produces pessimistic biases in economic predictions, because it neglects the uni-directional changes in accumulated technical knowledge. The bias is present whether we deal with fixed factors of production alone (e.g., land) or whether we add produced factors of production (e.g., factories).

But focusing exclusively on the economic success stories can also produce biased accounts. While resource scarcity has not prevented certain countries at different times in world history from enjoying rapid economic growth while undergoing rapid population increase, resource availability remains an important element in economic well-being in many poor countries today precisely because the essential elements for economic growth have been missing. Telling Bangladesh that what it needs is to be more like Hong Kong is like telling an unemployed man in an urban slum that what he needs is to go to Harvard University. What is needed is advice on how to ascend the next steps on the development ladder, in full awareness of the conditions at hand.

The situation in Bangladesh is wretched, and population growth has probably helped to bring it about. A. R. Khan (1984) presents evidence that real agricultural wages in Bangladesh in the 1970s were below their level in the 1830s. Much of the decline occurred in the period of most rapid population growth, after 1950. The decline in real wages was accompanied by an apparent large increase in landlessness between 1951 and 1977 and by a reduction in average calorie consumption and a rise in the proportion of the population living in poverty. Several economists—Boserup (1965), Hayami and Ruttan (1985), and others—have demonstrated convincingly that greater density of population can promote technological change in agriculture that takes advantages of more abundant labour. But others, including Ghatak and Ingersent (1984), note that once Bangladesh's density is reached, there may be no technological tricks left in the bag.

There is other evidence that Malthus's dismal scenario is not always averted: time-series evidence on real wages and population in England, France, and a composite of European countries between about 1300 and 1750 (Slicher van Bath, 1963) leave little doubt that exogenous changes in population, induced by epidemics, plagues, weather changes and wars, affected average wages. In periods of unusually small population numbers, wages were unusually high. Ronald Lee's (1980) estimates for preindustrial England suggest that a 10 per cent increase in population depressed real wages by 22 per cent and raised rents by 19 per cent. Robert Evenson (1984) reaches similar conclusions from cross-sectional data in contemporary northern India: a 10 per cent increase in population density is associated with a 3.3 per cent decline in per capita output and a decline of 6.4 per cent in wages of the landless, even after all of the adaptive changes in technique are factored in.

So it is reasonable to believe that the economic consequences of high fertility and rapid growth vary with many features of the national setting. One would expect the effects to be most serious in poor, dense, agrarian countries where ratios of natural resources to population are most consequential for economic processes.

What policy implications follow from a demonstration that population growth has negative effects on per capita income? What kinds of population policies can be justified in an effort to increase well-being? A clear answer to these questions requires that we give some thought to whose well-being we are concerned with.

THE STATE AND THE INDIVIDUAL

An exclusive focus on characteristics of the aggregate, such as per capita income, income distribution, life expectancy, or mean years of schooling, greatly simplifies the analysis of development. The conventional approach to studying the impact of population growth focuses on these aggregate indicators. However, it is obvious that many of these indicators can be made to improve by implementing population policies that actually reduce individual welfare. For example, per capita income will almost certainly rise in the short run (through reduced dependency burdens) if all couples are forcibly sterilized; per capita measures of income distribution will improve if low-income people are selectively prevented from reproducing; mean levels of schooling will rise if the illiterate are forced out of the country. Even though the aggregate measures improve, no one is necessarily made better off by those policies, and many may be worse off. In the sensitive area of population policy, it makes little sense to talk about improvements in well-being as though they can be separated from the policies that bring them about.

In other words, a government musing over population growth is not equivalent to a couple musing over the size of their family. If it were, we could simply collectively examine the costs and benefits of additional children for some national indicator such as per capita income and decide how many babies we wanted. Many debates over population growth seem to assume that this is the way countries proceed or at least should proceed.

On the contrary, the gains and losses from economic growth, as well as from children, count only to the extent that they are registered in individuals' well-being; governing structures do not "enjoy" income—they are insensible—nor do they bear children. It is parents who bear the brunt of the costs and enjoy the bulk of the benefits, many of them non-economic, from children. If parents are willing to pay the price of having and raising children, why should countries interfere, even if per capita income in the family and nation is reduced by an additional birth? As Paul Demeny (1971) notes, the situation is analogous to individual work/leisure decisions. Per capita income would surely rise if the Government decreed that everyone must work on Sunday. But who is made better off by the decree?

WELFARE ECONOMICS

A more appealing framework for population policy discussions than looking simply at per capita measures is provided by the apparatus of welfare economics. Here a good policy is one that increases the welfare of someone or some group without making anyone else worse off. More broadly,

a reasonable policy is one in which individual gains exceed individual losses such that the losers can be fully compensated and still leave the gainers better off. Whether or not the compensation actually occurs is a separable issue having to do with choices about the distribution of well-being (or income), and we will for the most part leave this issue aside, simply noting some distributional consequences if compensation does not occur.

Forcible sterilization, to take an extreme example, would be rejected by the criterion of welfare economics unless it could be shown that the benefits to the non-sterilized exceed the welfare losses among the sterilized. Obviously there are moral and human-rights features of such policies that must be considered; here we are dealing only with what are in principle quantifiable economic gains and losses.

There is, however, one type of population policy that clearly benefits those whose fertility is affected and for which a demonstration of benefits to others is, therefore, not required. Family planning programmes that provide couples with the means to achieve their desired family size have positive payoffs for the couples who use the services. Because they empower couples to achieve their personal goals, they increase the private welfare of users, at the expense of a (usually small) tax on non-users. (This assumes, of course, that the means employed by the users are acceptable to the non-users; otherwise an additional cost to non-users is entailed.) The voluntary nature of family planning programmes accounts for much of their appeal as a policy instrument. To some extent, the rationale for governmental involvement in family planning programmes is much like that for governmental involvement in health information or agricultural extension activities: there is a high informational content to such programmes, and private firms may have no incentive to spread the proper information, e.g., about the rhythm method or the health consequences of sterilization. Furthermore, the required size and organizational complexity of family planning programmes may be so great that no private companies would be willing to undertake the risk of supplying the services.

While this justification seems entirely valid, there are many other areas in which people could profit from information and services supplied by Governments but where corresponding programmes are essentially absent in poor countries: job placement services, home-building advice, assessments of household water quality and so on. Such programmes use scarce resources—as do family planning programmes—and most Governments have chosen not to bear the costs. It is safe to say that much of the special interest in family planning programmes historically reflects a belief that the benefits derived therefrom extend beyond the couple that is making the child-bearing decision to other members of society. Those benefits reflect presumed social gains from the effects of slowing rates of population growth. Thus, while one rationale for family planning programmes does not require us to examine the benefits and costs to anyone other than the child-bearing couple, the policy context directs our attention to those external effects. And if the effects are indeed present, then a properly constituted policy should be aware of them and set programme intensities accordingly.

EXTERNALITIES

Welfare economics has a well-developed framework for examining the effects of one person's behaviour on aggregate welfare, recently elaborated with regard to population issues by Nerlove and others (1984), Willis (1985), and others. Central to this framework is the notion of an "externality". An externality exists when resources could be reshuffled in such a way as to make someone better off without making anyone else worse off. More generally, it exists if on balance the benefits produced by the reshuffling exceed the losses incurred. Economists have shown that if fully competitive markets existed to reflect accurately the costs to producers and benefits to consumers for all commodities, externalities could not exist; they reflect the failure of markets to represent fully those costs and benefits in setting prices. When an externality is present, prices no longer provide the correct information about the social value of resources used in production and consumption. In the presence of such failure, Governments could intervene in markets to improve the average level of well-being.

A classic example of an externality is untaxed air pollution by a factory. Such pollution imposes a cost on those outside the factory, but that cost is not reflected in the price—zero—that the factory owner is charged for creating the pollution. A suitable tax could be found such that the factory owner's decisions reflected the full social cost of air pollution, and such a tax would be expected to reduce air pollution. The expected gain to sufferers from air pollution can be shown to exceed the loss to the factory owner and consumers of the product of the factory.

The fact that one person's behaviour has an effect on others does not constitute a prima facie case that an externality exists. For example, when one wheat producer expands his output, it may drive down the price of wheat for all other producers, but it also increases the amount of wheat that consumers can buy for a certain amount of dollars, and no net welfare loss is entailed. A welfare loss would result, however, if the Government prevented him from marketing his wheat or if it paid him above market prices for producing the wheat and then let it rot or even sold it at market prices (in which case too many resources would be devoted to wheat production and too few to the production of other goods). It is easy to see why those interferences with market mechanisms produce a net loss of welfare.

An analogous situation exists with respect to fertility. When one family has an additional child, it can be expected (marginally) to drive down the wages paid to members of other families decades hence. But at the same time, it increases rates of return to owners of other factors of production (capital or land). Lee's work on preindustrial England and Evenson's on northern India reveal precisely those effects: rapid population growth depressed wages and increased rents. If markets adjust in this fashion to a larger population, there is no necessary or likely average loss of welfare for other families. Economists, using simple supply and demand curves and assuming a downward-sloping demand curve for labour, have shown that the loss in wages is approximately equal to the gain in returns to other productive factors. If all of the capital is owned by the family having the child, everyone else would be made worse off, on average; if it is all owned by others, they will be made somewhat better off. In that situation, fertility does not create an externality and, therefore, would not satisfy the strictest welfare economics criterion for governmental action.

These are not notions known only to the professional economist. Much of the controversy over immigration policy in the United States today reflects the conflicting positions of unions representing wage earners, who correctly perceive that faster immigration could be expected to depress wages, and owners of land and factories, whose profits could be expected to be higher when wages are lower. The connection was also known to slave owners who encouraged

the reproduction of their slaves in order to increase the returns from their land.

The relative effects of population growth on wages and on payments to other factors of production require elaboration. The reduction in rates of return to labour from faster population growth, and the increase in rates of return to other factors of production, would be expected to exacerbate income inequality. Owners of capital and land typically have above-average incomes, and those who earn the bulk of their income through wages usually have below-average income. So faster population growth could be expected to increase income inequality and raise the fraction living in poverty. In theory, those effects could be essentially offset by increased taxes on rents and redistributions to labourers. However, it would not be sensible to suppose that such redistributions are likely to occur. To the extent that we care about income inequality, the example provides a basis for social intervention in child-bearing. It is important to recognize that it is a distributional ground, reflecting relativistic judgements about how much various groups should have, and not an externality ground.

Thus far, we have considered only wages. But if the labour markets are, in economists' jargon, "sticky", in that they fail to adjust to population growth in such a way as to equate supply and demand at an equilibrium wage, then one family's child-bearing might also be expected to reduce employment levels for other families. In that situation, high fertility would lead to externality; a market failure is present that is exacerbated by population growth. A review in the recent National Academy of Sciences report (1986) of the limited evidence available fails to find an empirical connection between population growth and unemployment. Rates of labour force growth across countries and over time are not found to be statistically related to unemployment levels. The low-wage informal sector in developing countries evidently has substantial capacity to "absorb" labour. It takes a very few saved or borrowed resources to set up shop as a petty trader on the streets of cities in developing countries, for example. The incentives to find some form of work are very great when one is very poor; as the aphorism says, the poor cannot afford to be unemployed. In this situation, wages rather than unemployment statistics are where we would expect the consequences of population growth to appear.

In summary, there is no evidence that effects of population growth on unemployment, wages, and returns to land and capital typically lead to externalities. Where markets are operating effectively, the influence of population growth on rates of return to labour and other factors of production do not represent true externalities. But there are other instances where market imperfections are known to create externalities from child-bearing. The most important are discussed below.

Subsidized schooling and other social programmes for children

Parents do not pay the full cost of schooling in developing countries. For a variety of reasons, the State usually subsidizes schools, at least up to a certain grade level. Those subsidies impose a cost of one family's child-bearing on other families. The social cost could, of course, be eliminated by making parents pay the full cost of schooling. Short of that, it could be reduced by imposing other kinds of penalties on parents for child-bearing, thereby reducing the total burden of externalities.

There is another side to the coin, however. Educated children grow up and pay taxes that subsidize the education of other people's children. No one has, to my knowledge, computed the net balance of lifetime charges against and contributions to the educational system of an additional birth. The costs are incurred before the benefits are received. Economists typically "discount" the value of benefits received at a later date to take into account the time lag during which there is no return on the investment in education. It is likely that this calculation would result in each child representing a net cost rather than a net benefit, although in a high-fertility population each child whose education is subsidized may in turn subsidize the schooling of several children in the next generation.

Societies could react to higher fertility by spreading the same amount of resources among more school-age children, thereby sacrificing some of the social benefits expected from subsidized schooling, or by spending the same amount per child and hence raising the total costs of education, or by some intermediate strategy. T. Paul Schultz (1984) recently used cross-national data to examine how societies actually do react. He finds no association between the rate of growth of the school-age population and the rate of per capita enrolment growth. Faster growth does not appear to compromise schooling attainment. He does, however, find a strong inverse association between population growth and school expenditures per child. That finding indicates that the quality of education may suffer in faster-growing populations, although a strong relation between school expenditures per child and output measures (e.g., test scores) has been difficult to demonstrate either in developed or developing countries. An externality produced by subsidized schooling is likely to remain whatever the social reaction to high fertility, and the burden of that externality would be mitigated by reduced fertility.

It is interesting to consider the externalities created by social programmes in socialist countries, where more resources are allocated by the State than in market economies. The size of that type of externality from child-bearing, accordingly, becomes larger, to the point where it almost makes sense to think that Governments are the relevant actor in child-bearing decisions: paternalistic Governments literally taking on the role of parent. That logic may explain why population policies have typically been more vigorous in socialist countries. In the Soviet Union, for example, the main rationale for prohibiting emigration has been the resources that the State has invested in the potential emigré. But while resources invested in individuals by the State are greater, so are resources donated by individuals to the State. The net balance, over the life cycle, is unclear, especially as programmes for the elderly are added to programmes for children. Socialist Governments do not appear on balance to be more pro-natalist or anti-natalist than other Governments; they are simply more active in adopting and implementing population policies, befitting their greater assumption of parental responsibilities.

Common property resources

From the standpoint of welfare economics, the most clear-cut externalities from child-bearing result from the existence of common property resources. Those are resources that, for one reason or another, are not "owned" and, hence, to which access is not effectively limited. The absence of ownership usually results either from the fact that the resource is not very valuable or from the difficulty of policing access. Note that ownership that effectively limits

access need not be private but could be collective, as in the case of national forests in the United States or oil reserves in some countries. Public schooling can be thought of as a special case of a common property resource, because access is not purposefully limited but rather made available upon presentation of a claim.

Natural resources

Let us deal first with natural resources. When a natural resource is owned and effectively managed, its price will reflect supply-and-demand conditions. Added demand that may result from population growth will be expected to increase the price of the resource, a disadvantage to the prospective purchasers but an advantage to resource owners. Many examples can be cited of how natural resource prices respond to changes in supply-and-demand conditions and direct the search for additional deposits and for substitute materials. However, if there is no ownership of the resources, additional claimants resulting from population growth will simply add congestion and represent a net loss to other users, who will have to share the resource more widely. There is no owner whose accounts register the greater scarcity value of the resource and no market to restrict uses to the most highly valued. The problem is that the actual price of the resource—zero—is different from the price that a market would determine to be appropriate for balancing supply and demand. The resulting inefficiency, which produces over-use of the resource, is typically exacerbated by population growth.

The class of common property problems is quite broad. It pertains to land in much of Africa and parts of Asia and Latin America, to air and water resources nearly everywhere, to many forests and species of plants and animals, and, in selected cases, to mineral resources. To some, the earth and all upon it are common property resources; those who take that point of view are typically the most distressed by the prospect of rapid population growth. It is, however, an incorrect view which works only as an attention-getting metaphor. Were access to all the resources of the earth truly unlimited, it would by now be a barren wasteland. Resource ownership promotes conservation. When a resource is unowned, users have no incentive to save it for future use or to avoid its degradation, because they realize only a tiny fraction of the gain from taking such steps. There is simply no way to guarantee themselves access to the resource that is saved or enhanced.

Allowing a resource to remain freely available to any potential user, regardless of the value that he or she places on it, is clearly not efficient social management strategy. But such instances do indeed arise. Sometimes they arise because of the sheer technical difficulty of preventing access. The clearest such instance is probably the siltation of water resources resulting from soil erosion. Policing this process is extremely difficult because it results from thousands or millions of individual actions over a widely dispersed area. According to Pierre Crosson (1983), the cost of such siltation exceeds the cost of erosion on the farmland itself. Policing access to forests is also quite difficult, and it is very likely that population growth is exacerbating externalities in much of the developing world through over-rapid deforestation. In the United States, on the other hand, forest management (chiefly by private companies) has produced a rising trend in wood growth per acre since 1952, and in Puerto Rico deforestation has been effectively reversed through sensible management (Clawson, 1984).

But many resources remain common property simply because their value is low: it is not worth the effort, socially, to establish and enforce rules for access. When the resources become scarcer, it is reasonable to expect that institutions will adapt to promote more efficient use. The possibilities for "institutional adaptation" occupy a lively new branch of study in economics, and population growth has played a major role in much of that work. In particular, the growth of population has been shown to be an important factor—perhaps the dominant one—in establishing property rights to land in preindustrial Europe (North and Thomas, 1973), in tropical Africa today (Binswanger and Pingali, 1984), and in several Asian countries (Hayami and Ruttan, 1985). Population growth is not the only factor capable of promoting ownership rights; Feeny (1984) stresses the importance of the penetration of international markets in explaining the evolution of property rights to land in four Asian countries, for example, although he also reserves a role for population growth. And institutional adaptations are surely not automatic. The Economic Commission for Africa (1984) notes that governmental efforts to establish more secure user rights over agricultural land have met with considerable resistance by ethnic groups and individuals in Burundi, the Comoros and Zaire.

Nevertheless, the possibility that population growth may stimulate the development of property rights, and in the long run promote conservation, is clearly an important qualification to the "tragedy of the commons" reasoning that views population growth as an unmitigated disaster (Hardin, 1968). The link between property rights and soil conservation is clearly recognized by Chinese authorities, who in recent years have promoted long-term contracts for cropland to arrest land degradation (Smil, 1985). An important by-product of establishing property rights is an improvement in capital markets (Rosenzweig and others, 1984; Feeny, 1984). Along with the higher value of land resulting from population growth comes a lower value of labour. While this change is expected to be reflected in lower agricultural wages, it has also apparently had the favourable effect in Europe and Asia of destabilizing institutions of slavery: courvee, indentured servitude, and serfdom (North and Thomas, 1973; Feeny, 1984).

In sum, population growth is likely to exacerbate inefficiencies resulting from common property resources. Where the commonness essentially reflects technological difficulties in restricting access, as in the case of water siltation and, to a lesser extent, deforestation, the disadvantages of population growth are likely to occur over the long term as well as the short term. In instances where institutions are capable of adapting to the greater resource scarcity resulting from population growth, effects may be limited to the short term. Once property rights are established, the losses to one group resulting from greater resource scarcity and higher prices are matched by the gains among resource owners. The process typically would lead to a worsening of income inequality, an important policy concern in many developing countries. But it does not reflect externalities. In theory, at least, taxes on rents paid to resource owners could correct the worsening income inequality.

How important are these common property problems? Relative to many other problems besetting poor countries—lack of skills, poor techniques of production, and shortage of capital—they appear quite minor. Indeed, when technical or institutional means exist to correct the problem, the fact that they are not implemented suggests that the problems are a minor concern. With relatively little expenditure, Chinese industries could treat their waste products before dumping

them into rivers, but most wastes are discharged untreated (Smil, 1984). If the lumber or fuel obtained from forests and bushlands being used for slash-and-burn agriculture in parts of Africa were valued sufficiently highly, it would be sold rather than burned. Such arguments are not appropriate for water siltation, where means for correcting the problem would be very expensive to implement; and in other cases, conflict between groups or a lack of popular participation in government may impede the implementation of appropriate measures. The problems exist, but in most times and places they do not seem to pose major obstacles to economic advance. If the social loss of common property resources resulting from population growth were fully represented (e.g., by taxation) in child-bearing decisions, it seems unlikely that it would raise the private costs of child-bearing by more than a few percentage points. In parts of West Africa, where depletion of common forest resources has raised the price of fuel wood to the point where it represents a quarter of a household's budget, the problem is obviously much more serious (Flavin and Postel, 1984).

Other common property resources

We have spoken so far only of common property natural resources. But there are other resources that are created by man and that turn into common property resources to which access is unlimited. A classic example is national defense. It is virtually impossible to exclude a resident from a country's defense umbrella. More pertinent to economic processes are roads, ports, and other transportation lanes. While such lanes present opportunities for restricting access, they provide no incentives for restriction until congestion occurs, since otherwise the marginal cost of use is nearly zero. In a larger population, the costs of "public goods" like defense, roads, and government-sponsored agricultural research can be spread among more potential users, creating positive externalities to population growth. Research by Julian Simon suggests that some populations have, in fact, responded to the cheaper costs of transportation systems in denser areas by increasing the provision of transport more than proportionally to population size. The greater incentive to create transportation systems in a larger population is probably the most unambiguously positive externality from population growth, although an extra individual's contribution to creating such systems must be weighted against whatever extra congestion costs he or she poses for existing systems. The National Academy of Sciences report (1986) cites research by Simon, Boserup, Evenson and others in support of the claim that infrastructural investments in rural areas are typically (though not invariably) stimulated by population growth.

This discussion would not be complete unless we noted that many valuable social and intellectual achievements also become common property resources: Shakespeare, Mozart, Confucius, the theory of relativity, participatory democracies, yoga, the French language, miracle wheat strains, and moon voyages are more or less freely available to all of us in one form or another. The fact that these boons to happiness are created by people does not mean that there will be more such creations the more people we have. Though entirely plausible where conditions are supportive, such a connection remains undemonstrated. But it is important to recognize that the number of such intellectual and social achievements is not fixed and, unlike the case of poorly managed natural assets, one person's enjoyment of them need not come at the expense of others.

INTERGENERATIONAL RELATIONS

We have already considered the impact of a family's child-bearing on the economic well-being of other families. But fertility levels also have important effects within a particular family, especially upon the children born into it. It is clear that nature does not assign those children much—if any—market power that they could use to influence the child-bearing decision of their parents. So while the "market" may work perfectly well in reflecting the wishes of current participants (the parental generation), one could argue that it fails to give "proper" weight to the wishes of future generations. It is perhaps more straightforward to think of the issue as one of the distribution of income between generations, rather than in the context of the market failure framework that we have been employing.

A substantial literature demonstrates that children from small families tend to enjoy better schooling and better health. While some of the observed effects may reflect greater concern for child quality among those wanting and having fewer births, some of the effects apparently also reflect the greater pressure on resources in homes where unwanted births occur. Gerry Rodgers (1984) reviews scattered evidence showing that child mortality tends to be higher in families where unwanted child-bearing occurs, and Rosenzweig and Wolpin (1980) show that school achievement in India is lower among children in families where twins are born, a special kind of unanticipated child-bearing. Whatever the mechanism that produces the relationship, it is reasonable to believe that a reduction in family size would present advantages for the children who are born.

Most studies of the relations between child mortality and family size reveal U-shaped effects, with death rates typically beginning to increase beyond a family size of three or four. James Trussell and Anne Pebley (1984), for instance, calculate on the basis of World Fertility Survey data that eliminating all births beyond three per family in the typical developing country would reduce infant mortality rates immediately by 8 per cent. While not everyone will consider those effects large, they are persistent across societies. Family planning programmes that enable parents to space births over longer intervals are also likely to be beneficial whatever the completed family size; analyses of World Fertility Survey data by John Hobcraft and others (1985) show extremely large mortality benefits from longer birth spacing, effects that swamp those pertaining to completed family size.

In addition to health and education effects, one could expect greater per-child endowments of other family resources such as land and housing in a lower-fertility population. As noted above, those resources are probably especially important in poor, dense, agrarian countries, where natural resources are most likely to be scarce and, hence, to be owned and passed on from generation to generation in a family.

Let us summarize this discussion. First, family planning programmes can be expected to enhance the welfare of users, who are better able to achieve their child-bearing objectives. Secondly, the programmes are likely to improve the health and educational levels among children users and to result in higher endowments per child of other family assets such as land.

The impact of successful family planning programmes on the well-being of other families, including non-users, is more ambiguous. The most direct effect is that the non-

users of family planning services are typically paying some form of minor tax to subsidize services for the users. On the benefit side of the ledger, the programmes would ease short-term pressures on common property natural resources such as land and forests. However, in the longer run, they reduce the incentives to establish the access rules for such resources that help guarantee their long-term availability. They also raise the per capita cost to non-user families of man-made common property goods such as transportation systems and agricultural research. In regard to social programmes, when the major programme is subsidized education, the net effect on other families of reduced fertility is most likely to be beneficial.

BEYOND FAMILY PLANNING

Few countries have supported policies that would attempt to alter fertility levels other than through voluntary family planning, but many urge support for such policies. Much of the discussion above is also pertinent in assessing programmes that go beyond family planning. Conceptually, the simplest such policies are incentive schemes that would explicitly or implicitly raise the costs of children to parents, and quantity restrictions that would simply place a limit on the number of children parents could have. Singapore and Bangladesh have experimented with the former type of policy, and China with the latter.

The most obvious disadvantage of such programmes relative to family planning is that those whose fertility is reduced by the programme are not necessarily made better off by it. Couples whose fertility is reduced below desired levels by quantity restrictions are obviously made worse off. As Gerry Rodgers (1984) points out, the loss of welfare is likely to be greater for poorer couples, so that inequality in outcomes is likely to be exacerbated. Couples who are induced to reduce fertility through incentive schemes are presumably better off under the new conditions than if they maintained their previous behaviour, but it is not possible to say, in general, whether they are better off than if previous conditions had remained in effect. What can be said is that if a country chooses one of those policies, an incentive scheme results in a smaller loss of parental welfare than does rationing. If parents are induced to avert a birth by a rise in the cost of a child, then it is a reasonable inference that the child was worth less to them than the extra cost imposed or reward given. It is the births least valued by parents that are expected to be averted by an incentive scheme. On the other hand, quantity restrictions avert births without regard to their potential value to parents, and a larger welfare loss can be expected.

Despite those negative or ambiguous effects on parental welfare, such schemes could still be justified if the externalities from child-bearing were sufficiently high. Family planning programmes, after all, simply allow parents to choose the number of children that it is in their self-interest to have. They do not, except for the minor tax or subsidy involved in mounting the programme, reflect the costs and benefits to others of their own child-bearing.

Our review of those externalities suggests that the advantage of fertility reductions for those who are not a party to the child-bearing decision is far more clear-cut for children in the same family than it is for members of other families. There are both positive and negative externalities for other families that work through social programmes and through common property resources. The net balance of these is not clear, and it does not seem likely to be quantitatively large in most circumstances. On the other hand, the advantages for children in the same family of having fewer siblings seem reasonably well documented.

Do these advantages justify a programme that would go beyond family planning? Here, the apparatus of welfare economics offers little guidance. The basic issue is whether the interests of future generations in the same family are "adequately" protected by parental child-bearing decisions. Most parents are obviously concerned with the well-being of their own children. Yet nothing prevents them from choosing family sizes that result in the gradual impoverishment of successive generations or in less rapid advance than would otherwise have occurred. Maybe their altruistic behaviour is not, from a social point of view, strong enough.

The issue basically boils down to one of inter-generational comparisons of welfare. If we wanted to, we could take many social steps to ensure a brighter future for our descendants—e.g., refusing to use any fossil fuels for the rest of the twentieth century or arbitrarily reducing consumption to increase investment. Many economists, such as Paul Samuelson, have argued that such steps will worsen inter-generational income inequality, since our descendants are already very likely to be richer than we are. Complicating this discussion in the case of population policy is the fact that we are simultaneously choosing the number of and conditions among the next generation. How many would prefer that their parents had lived in a society where an incentive scheme succeeded in eliminating half of the births that actually occurred?

In the absence of any compelling logic or evidence to the contrary, Governments and societies have in the main assumed that parents act in the best interest of the family aggregate, including children already born and those who may or may not yet come. Reproductive rights are ceded to the family in nearly all societies, and family sovereignty in reproduction has been repeatedly affirmed in United Nations declarations (e.g., 1984). There are clear instances—child labour laws, compulsory schooling, or vaccination—where the State has intervened in child-rearing practices. Except for China and a brief episode in India, however, the State has not imposed legal or quasi-legal restrictions on child-bearing. That is not to say that it would not do so if the case became compelling; reproductive rights, like other rights, exist at the sufferance of the collectivity that guarantees them. But the main justification for interfering in such rights at present relates to child-bearing effects on descendants in the same family, rather than effects on members of other families. This justification appears to be an unsteady basis for going beyond family planning.

DISCUSSION

Underpinning this account is the notion that couples make decisions about child-bearing. Some would argue that this view is naive, that most couples in poor countries exist in a cultural and institutional context in which child-bearing is under social rather than individual control: couples simply carry out the behaviour expected of them from centuries of accumulated cultural norms. If this were true, then the coercion of government would be little different than the coercion of culture, and the door would be opened to many forms of governmental intervention, including quantity rationing of children.

One must distinguish situations in which culture and institutions play a major role in influencing individual choices from a situation in which child-bearing is not, in any meaningful sense, under individual control. Nothing in our account requires that the prime motivation for child-bearing

be economic; it is obvious that cultural expectations and institutional constraints play a major role in many countries in determining the value of children. Analytically, these values are readily incorporated into the functions that express individuals' tastes and preferences over alternative outcomes. The analytic apparatus is intact as long as individuals want to exert some purposeful control over the child-bearing process, control that reflects the value that they attach to an additional birth.

Do couples make purposeful decisions about child-bearing? I would contend that this is a reasonable assumption in nearly all countries. Cross-sectional variations in fertility levels are usually consistent with our notions of what would be in a couple's self-interest. Fertility is generally lower where the costs of children are higher—e.g., in urban areas or where children contribute less to a family's economic enterprise. Improving the means to control fertility has apparently resulted in fertility declines in Mexico, Indonesia, Thailand and elsewhere—declines that are difficult to interpret if child-bearing simply reflects deeply embedded cultural norms. As Bulatao (1979) has shown, parents in many developing societies are able to provide extensive information about their perceived values and the costs of children. Ethnographic studies in Bangladesh (Cain, 1983) and sub-Saharan Africa (Boserup, 1985) present convincing portraits of how child-bearing responds to the incentives provided by the social structure. Surely we do not understand all of the motives for child-bearing in all societies, and there appear to be interpersonal forces at work in fertility decline, both in developing and developed countries, that do not admit to ready interpretation. But abandoning the assumption that child-bearing reflects self-interested decisions appears unjustified.

Recognition that fertility behaviour is conditioned by culture and institutions does open many possibilities for governmental intervention that we have not discussed. Regarding institutional changes (e.g., land redistribution, improvement in markets, minimum wage laws, compulsory education), the most that can be said is that many of those changes can be expected to influence fertility, and that fertility effects should be borne in mind in framing policies. Welfare economics has nothing to say about the wisdom of governments altering cultural patterns, since it takes as given the tastes and preferences that reflect that culture. It is not possible to compare the relative merits of two outcomes based on different sets of preferences. The prospect of a government altering cultural values will make many people uneasy, since it is difficult to evaluate governmental actions except from the point of view of the values embedded in a particular culture. There are no standards by which to evaluate government as standard-maker, and any action could be justified as a cultural corrective. However, most countries do not have a single, readily identified value system, and the competition among value constructions admits and sometimes even encourages governmental intervention regarding traditional practices (e.g., with respect to female circumcision).

"Couples making decisions" is obviously a shorthand expression for what is likely to be a complicated process in most countries and most families. There can be substantial conflict between spouses, and the outcome of the conflict is likely to reflect their relative power. Programmes that intervene in the fertility process can alter that power balance by giving one spouse, usually the woman, more direct influence in an important area of family life. Thus, population programmes can have some effect on redistributing power between the sexes, and social policy that concerns itself with that distribution should obviously take account of those effects. Finally, when there is concern with the distribution of power and resources between human beings and other species of animals and plants, it is obvious that programmes to affect rates of population growth can be used to alter that balance as well.

SUMMARY

Many intuitions about the economic effects of population growth over-estimate the importance of natural resources in economic processes. The key to advance in rapidly growing economies has been the development of skills, techniques, and institutions. Nevertheless, there remain poor, dense, agrarian countries such as Bangladesh, Rwanda, Burundi, and Haiti where per capita resource endowments are an important element in economic well-being precisely because the development of the other features has been inadequate. Such countries are also expected to have the most acute family-level trade-offs between numbers and quality of children, as well as the least institutional adaptability to added population growth. Especially in such countries, fertility reductions appear likely to speed the growth of per capita income.

This aggregate-level relation does not provide any direct policy guidance. Governments do not bear children; people do. Formulating sensible policies requires that we examine the expected costs and benefits to various groups. In this paper, we distinguish among effects on the couple whose fertility is reduced, effects on their children, and effects on members of other families. The conclusions are shown schematically in table 1.

TABLE 1. LIKELY EFFECT ON WELL-BEING OF DIFFERENT GROUPS FROM IMPLEMENTING POPULATION PROGRAMMES OF DIFFERENT TYPES

Type of programme	*Parents whose fertility is reduced*	*Children of parents whose fertility is reduced*	*Other families*
Family planning	Positive	Positive	Uncertain
Incentives schemes that raise the cost of childbearing	Uncertain	Positive	Uncertain
Quantity restriction ...	Negative	Positive	Uncertain

The economic effects on members of other families do not appear to be a strong basis for anti-natal policy. It is difficult to make the case that other families suffer a net loss or gain from one family's child-bearing, although such effects are surely possible in certain circumstances. Nevertheless, it is generally to be expected that higher fertility will result in higher levels of income inequality because it will depress wages and raise rates of return to other factors of production.

Most policies to reduce rates of child-bearing would probably result in gains in health, education, and family asset endowments for children in the family whose fertility is reduced. It is, however, possible that certain kinds of incentive schemes could wind up withdrawing assets from children by virtue of the penalties attached to large families.

Of the policies considered here, only family planning programmes can be reasonably assumed to increase the well-being of the couples themselves whose fertility is reduced. The case for going beyond family planning would have to rest mainly on the claim that parents are not acting in the best interest of their own children. Governments have

been reluctant to press this claim, perhaps in part because it undermines the entire structure of informal norms and practices under which families carry out their array of critical social functions.

Therefore the present emphasis of population policy on family planning programmes appears well justified. The programmes benefit the users and their children, and they are also likely to reduce income inequalities and poverty levels by raising wages relative to rates of return to other factors of production. They cannot make a poor country rich, but they can help make it less poor and are of special benefit to the poorest classes in poor countries.

Notes

[1] I. Taeuber, *The Population of Japan* (Princeton, Princeton University Press, 1958), p. 371.
[2] *Ibid.*, p. 372.

References

Binswanger, H. P., and P. L. Pingali (1984), "The evolution of farming systems and agricultural technology in sub-Saharan Africa". Discussion paper ARU-23 (Washington, D.C., World Bank).

Birdsall, N. (1977), "Analytical approaches to the relationship of population growth and development", *Population and Development Review*, vol. III, No. 1-2, pp. 63-102.

Boserup, T. C. T. (1985), *The Conditions of Agricultural Growth*, (Chicago, Aldine).

Boserup, Ester (1985), "Economic and demographic interrelationships in sub-Saharan Africa", *Population and Development Review*, vol. II, No. 3 (September), pp. 383-398.

Brokaw, T. C. T. (1985), "Letter from the Chairman", *The Other Side*, No. 44 (Washington, D.C., Environmental Fund).

Bulatao, Rodolfo (1979), "On the nature of the transition in the value of children". Paper No. 60-A (Honolulu, The East-West Population Institute).

Cain, Mead (1983), "Fertility as adjustment to risk", *Population and Development Review*, vol. IX, No. 4 (December), pp. 688-702.

Clawson, M. (1984), "Private forests", in P. R. Portney and R. B. Hass (eds.), *Current Issues in Natural Resources Policy* (Baltimore, Johns Hopkins University Press), pp. 283-292.

Coale, A. J., and E. M. Hoover (1958), *Population Growth and Economic Development in Low-Income Countries* (Princeton, Princeton University Press).

Crosson, P. R. (1983), "Soil erosion in developing countries: amounts, consequences, and policies". Working paper No. 21 (Madison, Center for Resource Policy Studies, School of Natural Resources, University of Wisconsin).

Demeny, P. (1971), "The economics of population control", in National Academy of Sciences, *Rapid Population Growth: Consequences and Policy Implications*, vol. II (Baltimore, Johns Hopkins University Press), pp. 199-221.

Economic Commission for Africa (1984), "Food production and population in Africa", in *Proceedings of the Expert Group on Population, Resources, Environment and Development, Geneva, 25-29 April 1983* (United Nations publication, Sales No. E.84.XIII.12), pp. 241-266.

Evenson, R. E. (1984), "Population growth, infrastructural development, technology and welfare in rural North India", paper prepared for the IUSSP Seminar on Population and Rural Development, New Delhi, India.

Feeny, D. (1984), "The development of property rights in land: a comparative study", Center discussion paper No. 459 (New Haven, Yale University, Economic Growth Center).

Flavin, C., and S. Postel (1984), "Developing renewable energy", in Lester Brown (ed.), *State of the World 1984* (New York, W. W. Norton), pp. 136-174.

Food and Agriculture Organization of the United Nations (1983), "Land, food, and population" (C 83/18).

Ghatak, S., and K. Ingersent (1984), *Agriculture and Economic Development* (Baltimore, Johns Hopkins University Press).

Hardin, Garrett (1968), "The tragedy of the commons", *Science*, vol. 162, pp. 1243-1248.

Hayami, Y., and V. W. Ruttan (1985), *Agricultural Development: An International Perspective* (Baltimore, Johns Hopkins University Press).

Hobcraft, John, J. W. McDonald and S. O. Rubstein (1985), "Demographic determinants of infant and early child mortality: a comparative analysis", *Population Studies*, vol. 39, No. 3 (November), pp. 363-386.

Khan, A. R. (1984), "Population growth and access to land: an Asian perspective", paper prepared for the IUSSP Seminar on Population, Food, and Rural Development, New Delhi, India.

Lee, R. (1980), "A historical perspective on economic aspects of the population explosion: the case of pre-industrial England", in R. E. Easterlin (ed.), *Population and Economic Change in Developing Countries* (Chicago, University of Chicago Press), pp. 517-556.

Menken, Jane (ed.), (1986), *World Population and U.S. Policy: The Choices Ahead* (New York and London, W. W. Norton), pp. 67-95.

National Academy of Sciences (1971), *Rapid Population Growth: Consequences and Policy Implications* (Baltimore, Johns Hopkins University Press).

———— (1986), *Population Growth and Economic Development: Policy Questions* (Washington, D.C., National Academy Press).

Nerlove, M., A. Razin, and E. Sadka (1984), *Household and Economy: Welfare Economics of Endogenous Fertility* (New York, Academic Press).

North, D. D., and R. P. Thomas (1973), *The Rise of the Western World: A New Economic History* (Cambridge, Cambridge University Press).

Rodgers, G. (1984), *Poverty and Population: Approaches and Evidence* (Geneva, International Labour Organisation).

Rosenzweig, Mark and K. I. Wolpin (1980), "Testing the quantity/quality fertility model: the use of twins as a natural experiment", *Econometrica*, vol. 48, No. 1, pp. 227-240.

Rosenzweig, M., H. P. Binswanger, and J. McIntyre (1984), "From land abundance to land scarcity: the effects of population growth on population relations in agrarian economies", paper prepared for the IUSSP Conference on Population, Food, and Rural Development. New Delhi, India.

Schultz, T. P. (1984), "School expenditures and enrollments, 1960-1980: the effects of income, prices and population growth", in Johnson, D. G., and R. Lee (eds.), *Population Growth and Economic Development* (Washington, D.C., National Academy of Sciences).

Simon, J. L. (1981), *The Ultimate Resource* (Princeton, Princeton University Press).

Slicher van Bath, B. H. (1963), *The Agrarian History of Western Europe, A.D. 500-1850* (London, Edward Arnold).

Smil, V. (1984), *The Bad Earth: Environmental Degradation in China* (Armonk, N.Y., Sharpe).

———— (1985), "China's food", *Scientific American* (December 1985), pp. 116-124.

Summers, R. and A. Heston (1984), "Improved international comparisons of real product and its composition", unpublished manuscript, University of Pennsylvania.

Taeuber, I. (1958), *The Population of Japan* (Princeton, Princeton University Press).

Trussell, J., and A. R. Pebley (1984), "The potential impact of changes in fertility on infant, child and maternal mortality", unpublished manuscript, Princeton University.

United Nations (1984), "Mexico City Declaration of Population and Development", in *Report of the International Conference on Population, 1984, Mexico City, 6-14 August 1984* (United Nations publication, Sales No. E.84.XIII.8), Chap. I.A.

Willis, R. J. (1985), "Externalities and population", in Johnson, D. G., and R. Lee (eds.), *Population Growth and Economic Development* (Washington, D.C., National Academy of Sciences).

World Bank (1984), *World Development Report* (Washington, D.C., World Bank).

NEED FOR AND APPROACHES TO INTEGRATED POPULATION, HUMAN RESOURCE AND DEVELOPMENT PLANNING

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SUMMARY

The authors discuss the nature of an integrated approach to the treatment of population variables in the socio-economic planning exercises of developing countries and describe the obstacles that must be overcome in order to achieve meaningful integration. The nature of the system linking demographic and socio-economic processes is described, and a distinction is made between the roles of population-influencing and population-responsive policies. The types of studies needed to provide an effective analytical framework for integrated population and development planning are set forth and discussed in ascending order, from inventories of demographic and related socio-economic data to demographic/economic planning models. The need for establishing some form of a population planning unit within the governmental structure is assessed, and the functions which might be undertaken by such a unit are described. Finally, a classification scheme is proposed which would divide countries into broad categories according to their major characteristics and problems, and a scheme for providing each type of country with technical assistance in population and development planning is proposed. In their concluding remarks, the authors note there is a need to promote a transition from simple awareness of the population problem to functional sensitivity about social, economic and demographic interrelationships and then to integrated planning. This transition, they maintain, will require a continuous and cumulative commitment of countries and an effective co-ordination and collaboration among the agencies which provide technical assistance in this field.

RATIONALE FOR AN INTEGRATED APPROACH

The deliberations at the second intergovernmental International Conference on Population (Mexico City, August 1984) reconfirmed the consensus on the World Population Plan of Action on the importance of interrelationships between population dynamics and social and economic development. Virtually all the participating countries agreed that population should not be treated in isolation but should be taken as an integral part of the social and economic development process. The recommendations adopted by the Conference for the further implementation of the World Population Plan of Action underscored the importance attached to an integrated approach to population and development, both in national policies and at the international level. The very first of the 88 recommendations states:

> "Considering that social and economic development is a central factor in the solution of population and interrelated problems and that population factors are very important in development plans and strategies and have a major impact on the attainment of development objectives, national development policies, plans and programmes, as well as international development strategies, should be formulated on the basis of an integrated approach that takes into account the interrelationships between population, resources, environment and development." (United Nations, 1984a)

In answering the Fifth United Nations Population Inquiry among Governments (United Nations, 1984b), 59 of the 109 respondent Governments reported having a specific unit within the planning organization entrusted with the responsibility of taking into account population variables in the planning process; 45 of them were developing countries. Thirty-seven of those units had been created after 1974, more than doubling the count at the United Nations World Population Conference, held in that year at Bucharest. Eighty-one countries, of which 62 were developing countries, reported having treated population variables as part of socio-economic planning exercises.

In actual practice, however, the treatment of population variables in socio-economic planning exercises in most developing countries remains rudimentary (see United Nations, 1984c, paras. 85–91). Population factors continue to be treated essentially as exogenous planning components. The state of the art seems restricted mostly to an examination of population projections in relation to the demand for social services. In some countries even that relatively simple approach seems to have run into serious problems of application because sectoral programming and target-setting have suffered from inaccurate demographic estimates and analyses. Selection of social and economic policies and programmes, including the countries well advanced in the application of development planning, appears to be largely devoid of the consideration of their implications for demographic variables and processes.[1] Some recent studies provide good reviews of the experiences of developing countries with the integration of population in development

* International Labour Organisation.
** Asian Development Bank.

planning, covering methodological and institutional aspects (Bilsborrow, 1985; Herrin, 1985; Horlacher and others, 1981; Siddiqui, 1985; Uthoff, 1984).

There are several reasons for the enormous gap between the awareness of the need for a comprehensive approach to population and development planning and actual practice. Besides the lack of a workable methodology, a fundamental and practical reason for slow progress in integration is the lack of a critical mass of policy makers and planners with a working understanding of the essence of socio-economic/demographic interrelationships, and hence a functional sensitivity[2] about the need for an integrated approach to planning (Pernia, 1985). Such a critical mass may be seen at three levels: across governmental bodies (ministries and the parliament); within key ministries (such as labour, agriculture, industry and trade, education and health); and within the planning ministry itself where the population unit is usually based.

It is necessary—but not sufficient—for the planning ministry (or a core group therein) to have functional sensitivity about and expertise in integration, because the planning machinery does not operate in a vacuum. Planning can be effective only to the extent that the policies and plans adopted are understood and accepted by the other ministries and the parliament. This is all the more true for "new" population and development policies and plans. Thus, while the highest level of sensitivity and expertise will have to be in the planning ministry, especially in the population (and human resource) unit, some general sensitivity has to extend to at least the principal decision makers in all the other ministries as well. In such ministries as labour, agriculture, education and health, for which population is obviously a significant variable in determining the magnitude of needs, this sensitivity is even more important. In other words, the degree of critical sensitivity (and expertise) would have to exist at all three levels mentioned above.

Another still more basic and practical reason for the slow progress towards an integrated approach has to do with the apparent confusion or misapprehension about the real meaning of "integration". Indeed, in the very documents or reports that have called for the need for integration, not only is there no clear definition of "integration" but the term is used in different senses (Herrin, 1985). For example, the concept has been used for the integration of family planning with health programmes, for integrated area development, and for the simple merger of governmental agencies or activities dealing with family planning and family welfare.[3]

A simple and functional definition of "integration" with respect to population, human resources and development planning might be as follows: the explicit and direct consideration of socio-economic and demographic interrelationships in the design (and implementation) of policies, programmes and projects, with due regard to potential conflicts and complementary factors, to achieve a country's social and economic goals.

In the definition, "the explicit and direct consideration of socio-economic and demographic interrelationships" increases in rigour from mere functional sensitivity about the interrelationships to selective intervention in socio-economic and demographic policies (or corrective planning) to perhaps fuller quantitative economic/demographic modelling. This means that integration is more like a cumulative process than a status that can be achieved in the short run. It is a process not only in terms of the gradual build-up of the substantive elements for integrated planning that eventuates into a full planning model but also in the broader context of increasing appreciation of the significance of social, economic and demographic interrelationships, and hence the need for integration, by the community of researchers, policy planners, legislators, and the public at large. For, unless the larger community develops a sense of the integrated approach, such an approach, even if feasible at the technical level, may not go the distance in becoming an established tradition in the national development planning endeavour.

In sum—the development or evolution of integrated population development planning is a long and slow process. This is because of the lags involved in the recognition of the problem, learning and actual application of the methodology. The aim of intervention from outside, as in the ILO Population, Human Resources and Development Planning programme (International Labour Organisation, 1984a), should then be to help reduce these lags to the minimum. Such intervention should be made not only cautiously but also in a systematic and sustained fashion.

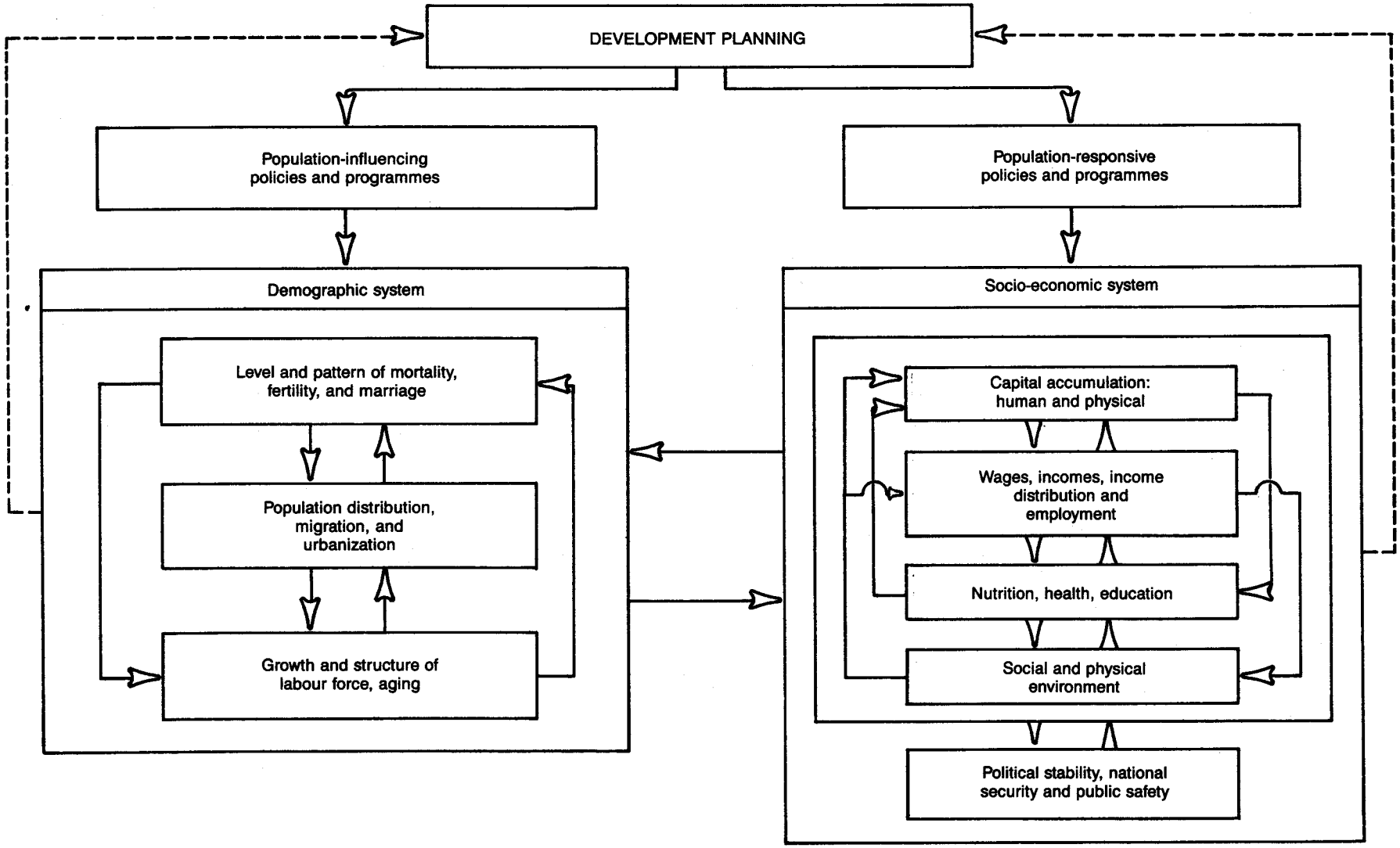
THE SOCIO-ECONOMIC AND DEMOGRAPHIC SYSTEM AND DEVELOPMENT PLANNING

Concerns relating to population and human resource development, utilization, and sectoral/spatial distribution are (or should be) central to overall development planning. This can be seen, for instance, in figure I, in which human resource dimensions clearly pervade both the demographic and socio-economic sub-systems of development planning. Human resource considerations are inherent in practically all aspects of the demographic sub-system, starting from fertility and mortality to labour force growth and structure, population distribution (internal migration and urbanization), international migration and aging. At the same time, they are predominant in the socio-economic sub-system in terms of human capital formation with its necessary nutrition, health and education inputs and its utilization (employment) and corresponding returns in the form of wages, income and income distribution.

It is also clear from figure I that the elements (or concerns) in both the demographic and socio-economic subsystems are interlinked and are interactive processes, including physical capital formation and the general conditions of social and physical environment, political stability, public safety and national security. Moreover, the contribution of labour force quality improvements to economic growth, so well highlighted in the sources-of-growth literature, is implicit in the diagram. Finally, there is a reciprocal relationship between the two sub-systems, clearly indicating that the development planning exercise should be an organic whole.

In terms of policy intervention in a population and development framework, it is useful to distinguish between population-influencing and population-responsive policies and programmes (National Economic and Development Authority, 1983). The former are anticipatory in nature, such as a family planning programme or a broader population programme that includes measures for marriage, mortality, population distribution and aging. Population-responsive policies, on the other hand, are essentially reactive in character, such as food and fuel programmes, health, housing, transport network expansion and employment promotion schemes. These are often implemented to accommodate or adjust to the consequences of unanticipated demographic trends. In figure I population-influencing policies are shown to be normally directed at the demographic sub-system, and population-responsive policies at the socio-economic subsystem.

Figure I. Development planning and the socio-economic and demographic system



Source: National Economic and Development Authority, *An Introductory Guide to Population and Development Planning* (Manila, 1983).

Another useful way of classifying policies is to view them as *explicit* and *implicit*. What often happens is that population and development policies are at cross-purposes and, therefore, tend to offset each other. Common examples are a family planning programme, on the one hand, and tax exemption of dependents, female sex-bias in employment, and lax child-labour legislation, on the other. Likewise, there are many policies and programmes for dispersed regional and rural development (which would have an impact on migration and population distribution) which tend to be countered by industrial and trade policies (e.g., tariff exemptions, credit and foreign exchange subsidies) and infrastructure policies that encourage the concentration of economic activity, population and employment in a country's capital metropolis.

The Government should be able to move in the direction of an optimal population, human resource and development policy if, to begin with, it has a sound understanding of the structure and dynamics of the socio-economic and demographic system, as shown, for example, in figure I. Then it must have a firm grasp of the nature of its various policy levers *vis-à-vis* their specific intents and purposes in the context of the broader social goals. For instance, policy planners should see to it that population-influencing policies are sufficiently robust and that population-responsive ones, where called for, are complementary or at least neutral, rather than conflicting. It may be noted that, in general, to the extent that anticipatory policies are effective, reactive policies and programmes would be less necessary or costly. Population and human resource policies should likewise be formulated (and implemented) with a clear understanding of the implicit (unintended) counter-biases of economic growth and development policies so that conflicts can be minimized.

In short, the efficiency and effectiveness of different types of policies and programmes will depend on the degree of communication and co-ordination among sectoral ministries or agencies dealing with the various economic, social, demographic and human resource concerns shown in figure I. An important mechanism for horizontal (interministerial) and vertical (national-level with local-level) co-ordination is a feedback process, as shown by the broken arrows in figure I, from the socio-economic and demographic sub-systems to development planning for purposes of constant monitoring and evaluation of results.

ANALYTICAL REQUIREMENTS

As discussed above, the evolution of an integrated approach to population, human resources and development planning requires a continuous, cumulative and long-term effort. For a start, a country's demographic, social and economic characteristics and its relevant population and development issues must be identified. Broadly speaking, a basic approach to providing an analytical framework for integrated population-development planning involves, in roughly ascending order of complexity, the types of analytical work described below.[4]

Inventory of data

A thorough inventory of demographic and related socio-economic data, and an assessment of their quality and gaps, must be taken. One purpose of this exercise should be to look into a situation commonly observed wherein the data generated by population censuses and sample surveys are often not adequately analysed. In some cases data analysis goes no further than providing marginals and summary figures.

Inventory and synthesis of research

A detailed inventory and synthesis of research already completed and in progress, particularly for their policy relevance, are necessary. Related to the two inventories, one needs to examine the state of collaboration between data collectors and data users and policy makers; the mechanism for dissemination of data and research findings; and the extent of guidance available from the planning organizations to data collection agencies and national research institutions regarding their specific data needs, and the production of research materials required for planning and policy-making.

Estimates and projections

Preparation of detailed demographic estimates and projections is the next step. For any macro planning exercise, it is essential to have reliable information on population and labour force size, sex/age composition, rural/urban and regional distribution; accurate estimates of fertility, mortality and migration rates; detailed population and labour force projections by sex/age, rural/urban and regional breakdowns, and for specific population groups requiring special development efforts. Where the quality of demographic data is dubious, as appears to be the case in a number of developing countries, methodological studies utilizing the advanced demographic estimation techniques now available are needed in order to obtain robust demographic indicators. The failure to provide sufficient schooling, health, housing and other social services and employment opportunities during the 1950s, 1960s and 1970s was due in part to the use of erroneous demographic estimates; actual population increase, age structure, migratory movements and labour force growth were very different from the projected estimates used in the target setting. It can hardly be repeated too often that non-availability of accurate demographic indicators in statistically less advanced countries remains one of the most important constraints on sound development planning.[5]

Translation of the consequences

The consequences of population and human resource dynamics have to be translated into estimates appropriate for sectoral planning (education, health, housing, employment and training requirements etc.). Population variables influence all the usual planning sectors and are themselves affected by the economic and social changes brought about by sectoral programming.[6] But the fact that many linkages between population and economic and social variables are indirect and may not be very visible over the usual short development plan period (normally five years) may have encouraged planners to exclude population considerations from sectoral planning. The planners should be made aware of the fact that population factors, even over the short term, "reflect the force of their own intrinsic dynamics as well as the effects of their interactions with each other and with a wide variety of other factors" (United Nations, 1979, p. 21).[7]

Thus, the planning exercise should begin by identifying and assessing population needs in different social and economic areas, taking account of the prevailing and projected demographic and socio-economic situation. This would logically lead to fixing priorities by sector, which would in turn

determine the allocation of resources/funds under varying budget constraints. In this way a reliable basis would be obtained for measuring the resource gap, for appraising specific programmes and projects (which needs are to be satisfied and how?), for the necessary monitoring and evaluation, and, more importantly, for ensuring technical complementarities and consistency in sectoral planning from the population and human resource points of view.

Further research

Research must then be undertaken on the more important linkages between demographic, social and economic factors and processes. This would warrant a more advanced level and relatively complex analytical work than that entailed above. One should, however, not take this to imply that the activities outlined above are of lesser importance; in fact, they should be construed as the very minimum required in efforts towards integrating population and development planning. Below are listed some topics illustrating the kinds of more advanced research work needed (adapted from Farooq, 1981).[8]

Manpower and labour market dynamics

This requires the gathering of regular and reliable statistical data on unemployment and underemployment, persons entering the work force and their characteristics, job forecasting, types of skill requirements, etc. In addition, it is important to examine differential labour force participation by sex and age, employment conditions by industry and occupation, and the anatomy of the informal sector and of rural labour markets.

Employment, income distribution and basic needs

It is essential to specify the linkages between employment and income distribution, especially with regard to the poorest groups. Related to this is the need to identify population sub-groups according to their demographic, social and economic characteristics and, especially, their basic needs. Often, the type of employment and other means by which a household earns its livelihood is a crucial factor determining its health, mortality, fertility, labour force participation and migration of various household members.

Population factors and agrarian change

Relevant research questions here might include: the extent to which and how increasing population and labour supply are being absorbed in agriculture; the effects of population dynamics on land ownership patterns, landless labour, rural exodus, incidence of poverty, productivity, income levels and distribution, and technological change; off-farm employment or how alternative non-agricultural activities could be introduced as part of a general rural development programme; and, finally, how all the above will generate changes on the demographic side.

Mortality, morbidity, health, nutrition and labour productivity

Uneven social and economic advancement, which tends to be the norm in developing countries, leads to uneven improvements in nutrition, health and mortality conditions. Mortality and morbidity levels among rural residents, low-income groups, and other disadvantaged (age, sex, ethnic) groups usually remain relatively high. Such differentials are known to have significant demographic and socio-economic consequences, including effects on productivity and human capital potential.

Economics of fertility and fertility limitation

It is important to get a good grasp of the determinants of fertility to be able to identify the key policy levers. Research efforts in this area would contribute significantly to the formulation or improvement of action programmes relating to health and family planning, social policy measures, education and employment policies etc. (Farooq and Simmons, 1985).

Roles of women

There is a need to analyse the effects of changes in the socio-economic and cultural milieu on women's productive activities, marriage patterns, and family size preferences. These may also be associated with particular styles of industrialization, urbanization, agricultural and rural development, labour markets, education and training programmes, and technology (Anker and others, 1981). Research results could then provide guidance in the design of specific policy actions and programmes to improve women's status, which in turn would impinge on marriage and fertility behaviour.

Internal and international migration

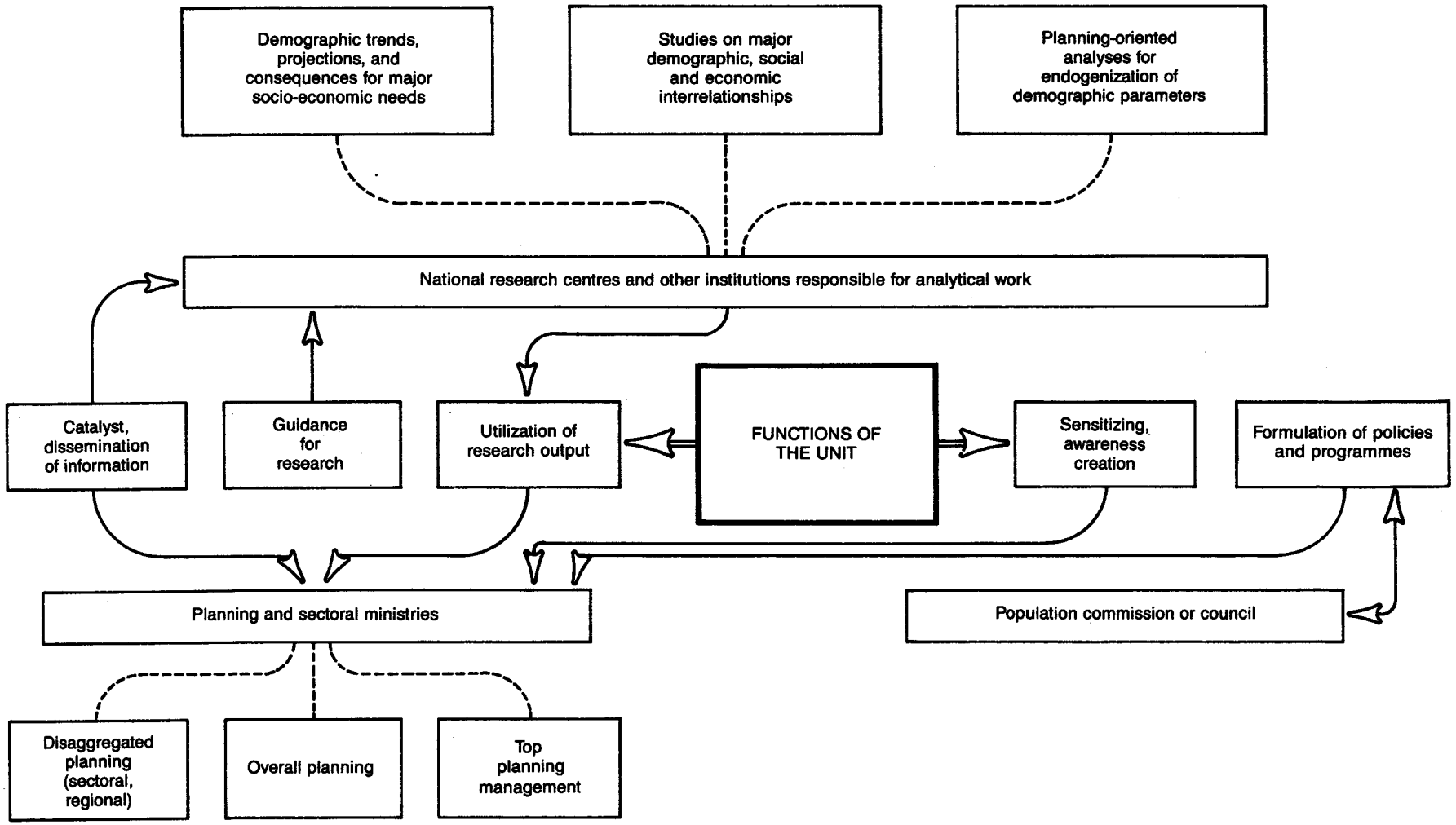
Migration behaviour necessarily results in alternations of the spatial demography. But it is also influenced directly and indirectly by various types of policies and programmes—macro, sectoral, regional, rural and urban. In many cases the unintended spatial effects of the non-spatial (macro and sectoral) policies are stronger than those of the explicit spatial (regional, rural and urban) policies. Insufficient understanding of the side effects and cross effects of policies and programmes is likely to frustrate the development planning effort. For many developing countries, it is, furthermore, important to understand the mechanism underlying external migration, both permanent and temporary. It would be useful to assess, *inter alia*, the economic and social integration of immigrants within host countries, the re-absorption of returning labour migrants, and the extent and uses of remittances at both the national and community levels.

Demographic/economic planning models

The results of the partial equilibrium approach to the demographic, social and economic linkages sketched above could then be integrated into the more general and coherent framework of a demographic/economic planning model of the—for example—BACHUE type (Rodgers and others, 1978). Another possibility could be considered in cases where well-developed economic planning models are already in use. Demographic, labour market and income distribution sub-systems, based on the results of partial studies on specific demographic/economic linkages, could be developed for grafting onto the existing economic models.

Demographic/economic modelling, though potentially a very useful tool for integrated population, human resources and development planning, has a number of pitfalls.[9] Most developing countries still lack an established tradition of collecting and analysing demographic and socio-economic data. For countries where basic demographic/economic re-

Figure II. Functions and role of a population (and human resources) planning unit as part of the integrated approach to population and development planning



lationships are still to be explored or established, conducting in-depth partial studies along the lines indicated above should perhaps be accorded top priority.

In addition to the foregoing analytical requirements, the following complementary tasks are called for.

Formulation of population policies

The analytical work described above should be used in the formulation of population policies and related measures for influencing population variables directly, incorporating specific population-influencing biases into individual programmes and projects, sectoral plans, and the development plan in general.

INSTITUTIONAL ASPECTS

As part of the institutional framework, a long-term commitment is required on the part of Governments in terms of the establishment in the planning organization of a population (and/or human resource) planning unit with high-level permanent status, staffed with qualified social scientists from relevant disciplines. Figure II illustrates in the form of a flow diagram the functioning of such a unit in generating concern for and activities leading to integrated population/development planning. The unit should be entrusted with the primary responsibility for programming, co-ordinating and facilitating relevant data collection and research activities, and for translating them into policy and programme actions.

The functions of the unit might include the following:[10]

(*a*) To act as a catalyst for national and sub-national population and human resource-related policy, research and training activities;

(*b*) To establish a system of information exchange and co-ordination among the research and training institutions and governmental agencies participating in population, family planning, human resources, and related programmes;

(*c*) To co-ordinate and collaborate with the other units in the country's planning machinery with the aim of ensuring that population activities, at both the design and the implementation stages, are in line with economic growth and social development goals and remain an integral part of the development effort;

(*d*) To help evolve and implement population policies and policy instruments that address relevant population and human resource concerns of the country;

(*e*) To make the necessary technical inputs to the work of the planning machinery so that a population-influencing orientation is effectively included in the design of social and economic policies;

(*f*) To identify data gaps and promote the collection of needed data; and, in connection with (*d*) and (*e*), to undertake an inventory and synthesis of research already completed for policy use, and to promote (by collaborating, commissioning or sub-contracting) the types of policy studies profiled above;

(*g*) To furnish other units in the planning organization with population and human resource data and information on demographic/economic linkages and research results needed for their own planning, programming and monitoring.[11] Additionally, the unit should contribute to the development of the necessary consistency checks for ensuring a smooth and efficient operation of sectoral and regional planning in particular and overall development planning in general;

(*h*) To provide technical assistance to sectoral ministries and other governmental and non-governmental institutions, as needed, and to find ways of making population and human resource issues, especially the more important demographic/economic linkages, comprehensible to other professionals for application in their programmes;

(*i*) To draw up, in collaboration with relevant research and training institutions, intermediate and advanced interdisciplinary (short- and long-term) training programmes in order to enhance current staffs and generate a continuous supply of well-trained specialists in the field of population, human resources, and development.

CATEGORIES OF COUNTRIES AND THEIR NEEDS

In table 1, broad categories of countries are identified by their major characteristics and problems and corresponding needs for technical assistance in population and development planning. Although the classification scheme proposed in the table would cover most developing countries, it is by no means exhaustive. There might be some countries which could be characterized as a combination of two types, others which only partially fall under any one category, and still others which do not belong to any of the three categories specified.

TABLE 1. NEED FOR TECHNICAL ASSISTANCE IN POPULATION AND DEVELOPMENT PLANNING, AND SUGGESTED APPROACHES, BY CATEGORIES OF COUNTRIES

Major characteristics and problems	*Needs and approaches*
Type A countries Weak analytical and planning capacity, limited population orientation of public policy (Examples: a number of African countries identified by UNFPA as priority countries)	
(*a*) Relatively weak planning mechanisms (in some cases development planning yet to be established as an effective tool for socio-economic development—rather, planning exercises are largely geared towards individual projects and macro-economic growth targets), particularly so in terms of analytical capacity and institutional set-up for dealing with consideration of population factors in socio-economic planning exercises.	(*a*) Establishment of population units in planning ministries with technical assistance in the first stage to be provided in the framework of country projects of approximately a 3-year duration with provision of resident international expert(s). Set up a system of continuous mutual exchange of information and views, as well as working contacts, with government agencies and other institutions engaged in population and human resources-related development activities.
(*b*) Poor data situation, both in terms of availability as well as analysis and utilization of existing demographic and related socio-economic data for planning purposes.	(*b*.1) Initial efforts to concentrate on developing the analytical capacity of the population units in order to establish the basic elements of an integrated population-development planning approach, namely delineation of the consequences of population dynamics in terms of socio-economic needs for the purpose of sectoral planning.[a] (This work will involve collection and preparation of data on different demographic parameters as required for over-all and sectoral planning exercises, ensuring technical complementarities and consistencies in

TABLE 1 *(continued)*

Major characteristics and problems	*Needs and approaches*
	sectoral planning from the population and human resources point of view, etc.) (*b*.2) Second phase projects might be required for developing analytical activities to provide assessments of direct and indirect impacts of specific socio-economic policies and programmes on demographic behaviour and trends, leading to establishment of complementarity and consistency between socio-economic policies and population policies.
(*c*) Lack of trained population and development specialists and rapid turnover of trained staff. (*d*) Limited awareness of population and development linkages, and of population-related problems.	(*c*) and (*d*) Special emphasis on the organizing of a long-term training programme tailored to the specific needs of the country concerned; provision of fellowships abroad for planning officials associated with the population planning unit to attend specialized training programmes such as the University of Michigan/ILO course on population and development (for description of this programme see ILO, 1984a, pp. 36-37); national seminars and workshops for dissemination of the findings of population policy research work and creating awareness (particularly among policy-making and technical circles) of the importance of population and development interrelationships and problems. Help co-ordinate United Nations and other donor agencies' population-related activities, e.g. in making them aware of the likely demographic consequences of their assistance programmes.
(*e*) Political climate not favourable to population programmes and policies, particularly family planning programmes.	(*e*) Where feasible, establishment of national population commissions or councils to promote a change in the political perception of development planning policies.
Type B countries Analytical and planning capacity stronger than in type A countries, limited population orientation of public policy (Examples: several Middle Eastern countries)	
(*a*) A relatively strong commitment to socio-economic planning, though planning machinery might not be as strong as generally found in some of the more sophisticated Asian and Latin American countries, and perhaps no formal unit or section exists for facilitating population-related work.	(*a*) Establishment of population (and human resources) planning units in planning ministries—technical assistance in the first stage to be provided in the framework of country projects of 2-3-year duration with provision of resident international experts.
(*b*) Emphasis placed by governments on human resources issues, including employment and manpower planning, education and training, labour supply and demand, migration, human settlements, female and child labour,	(*b*) The mandate of the population unit should focus on both population and human resources development issues.

TABLE 1 *(continued)*

Major characteristics and problems	*Needs and approaches*
etc., rather than population growth per se.	
(*c*) Data availability, analysis and utilization situation, though better than type A countries, not adequate.	(*c*) The technical co-operation project's work plan should include analytical activities dealing with two-way relationships between population and development.[b]
(*d*) Availability of trained staff limited.	(*d*) Organizing long-term training programme and seminars/workshops as in the case of type A countries.
Type C countries Relatively strong analytical and planning capacity, varying degree of population orientation to public policy (Examples: several Asian and Latin American countries)	
(*a*) Have well-established traditions of development planning and several have already established population units. Relatively advanced stage of statistical development and possess reasonable demographic data collection/analysis and research set-ups.	(*a*) Like the other two categories, type C countries are also in need of strong population units in the planning ministries. Technical assistance does not necessarily have to be in form of country technical co-operation projects. The role of international *ad hoc* advisory services is more important than for the type A or B countries.
(*b*) Do take into account, to varying degrees, the prevailing and prospective demographic dynamics in planning exercises. The difference between Latin American and Asian countries is that the former, like many Middle Eastern countries, are less concerned with population growth problems per se, and the latter are largely, if not exclusively, preoccupied with reducing fertility. However, even in the case of Asian countries with a strong political commitment to population growth-reducing policies, the means of action remain largely limited to family planning programmes. In all these countries, the selection of socio-economic policies, projects and programmes remains largely independent of their potential impact on demographic behaviours and trends.[c]	(*b*) Need to develop analytical capacity of population units for dealing particularly with the assessment of the effects of prevailing and planned development policies upon demographic factors and for designing population policies as part of comprehensive development strategies.
(*c*) Lack of institutional capacity in sectoral ministries for taking into account adequately the relevant consideration of population factors and issues in developing sectoral plans for respective action programmes and projects.	(*c*) Population units to assist in developing the institutional capacity of sectoral ministries as well as to contribute to the analyses of population dynamics and related problems as required in planning for different sectors; the identification and development of specific methodologies that can be used in sectoral planning operations.
(*d*) Lack of co-ordination among various government institutions, research, data gathering and training organizations participating in population, family planning, human	(*d*.1) Need to generate greater awareness of the facts about current and prospective population levels and trends, what they entail in terms of development efforts policies, etc.

TABLE 1 *(continued)*

Major characteristics and problems	*Needs and approaches*
resources development, employment and related programmes.	(*d*.2) Establish a system for the mutual exchange of information, as well as working contacts, and co-ordination designed to improve the use of resources by reducing the overlap in working programmes of different agencies and by identifying gaps in the existing programmes. Population units might be assigned the primary responsibility for above co-ordination.
(*e*) Availability of trained staff remains insufficient; continuous loss of trained staff due to turnover, emigration, etc.	(*e*) Technical assistance in organizing country-level training courses for different levels of national cadres; provision for fellowships abroad for the staff working in population units and in planning sections of sectoral ministries to attend courses such as the University of Michigan/ILO programme.

[a] Once implications of demographic trends and patterns for the various, ever-growing social and economic needs are understood, the political climate is much more likely to be favourably disposed to considering other population programme activities, to the need for population policy and to the need for having consistency between socio-economic policies/programmes and population policy.

[b] The ILO experience in implementing planning projects in several Middle Eastern countries indicates that with carefully designed policy research and training activities it is possible to make planners at least more amenable to the notion that population variables do indeed play an important role, and that human resources planning and development cannot be undertaken in a vacuum without any consideration of how certain demographic variables and changes therein could affect the development process in general, and important socio-economic indicators in particular.

[c] A large part of the problem is that the introduction of population variables as endogenous to socio-economic planning is much more complicated than accounting for the effects of population dynamics on the demand for public services, employment, etc. The state of the art is not sufficiently advanced. The process of finding an effective package of policies that will help produce desired demographic effects is costly and time-consuming and is often thought to concentrate too much on research and too little on policy formulation. Similarly, one has to confront a widespread feeling on the part of economic planners that within the context of typical five-year national development plans population parameters are likely to change only marginally.

CONCLUSION

Development planning may be defined as an attempt by government to direct the socio-economic/demographic system towards the attainment of social objectives through a consistent and feasible set of policies, strategies, programmes and projects that take into account likely future scenarios. Conventional development planning practice—done thoroughly and methodically—is already a time-consuming, resource-demanding exercise. To integrate population and human resource factors more explicitly into development planning makes the exercise all the more demanding.

Integrated population/development planning in most cases tends to be more illusory than real (International Labour Organisation, 1984b). Given severe time and resource constraints in developing countries and the low sensitivity to or functional awareness of population and development linkages, planners tend to take the short-cut route in planning by concentrating on a relatively narrow range of traditional economic and social concerns. Motivating planners to adopt a more comprehensive approach is difficult. Raising both the sensitivity of planners and their technical skills would increase the likelihood that they will undertake the task. Additionally, integration methodologies need to be made more available in developing countries.

Thus, an important part of the role of the ILO population, human resources and development planning programme has been to help accelerate, in member States, the transition from simple awareness of the "population problem" to functional sensitivity about social, economic and demographic interrelationships complemented by the development of expertise for integrated planning. However, considering limitations of time, technical and administrative skills in developing countries, "comprehensive" planning may well remain a tall order for some time. In the meantime, it is both essential and feasible to promote appropriate selective interventions of corrective planning. For instance, demographic policies and programmes that are at cross-purposes with social and economic goals can be rectified such that policy conflicts are removed, thereby making sectoral and regional policies more efficient and effective.[12] This is an area where technical assistance programmes of the United Nations and other international organizations can make an immediate contribution to planning practice in developing countries.

The evolution of an integrated approach to population and development planning requires a continuous, cumulative effort and commitment. Much difficult work remains in such areas as data collection and analysis, policy research and training. As is apparent from table 1, type A countries in particular remain in need of relatively long-term and extensive technical assistance while countries falling in the other categories may need help in specific areas. The United Nations and international agencies involved in providing technical assistance in this field need to have well-defined, long-term programmes geared towards assisting developing countries in institution-building, training, research, data utilization and so forth. They must also maintain a strong in-house analytical capability in order to contribute to the development of practical population/development planning methodologies and suitable training materials, and to ensure that there is adequate capacity to provide technical assistance in this area.

International technical assistance does not have to be confined within the format of country projects. As it happens, for instance, ILO advisory services have a continuing role to play after completion of country projects in ensuring that the established population units continue to be viable parts of the planning machinery. In the case of Latin America and to some extent Asia, where ILO had only a few country planning projects, *ad hoc* advisory services have been provided to Governments for analysing population and human resource problems and for explicitly considering those problems in the formulation of comprehensive employment-oriented development strategies. In the long run, the provision of adequate training for different levels of national administrative and planning cadres and of specialized advisory services may well become the mainstay of international technical assistance in that area.

Since there will remain for some time a tremendous need for assistance to developing countries in the development of institutional capacity for integrated population and development planning, and since the resources available are rather limited, the United Nations and other agencies (notably the World Bank and the United States Agency for International Development), and university-based centres with technical assistance programmes in that area, can ill afford duplica-

tion of effort. A concerted effort has to be made to establish and maintain a well thought-out and effective programme of co-ordination and collaboration, at least among the major agencies.

Notes

[1] For an elaboration on this in the context of the requirements for a comprehensive approach, see Farooq (1981).

[2] Functional sensitivity or awareness is similar to the notion of functional literacy. Being informed about the existence of economic/demographic interrelationships is not enough. One should understand what important variables are involved, what the practical implications of the interactions are for national, community and individual concerns and so forth.

[3] Among the few exceptions, the United Nations Fund for Population Activities Seminar on Population and Development Planning, held in New York in 1983, brought out a clear definition of the integrated population and development planning approach: "(it) involves considering systematically and taking into account explicitly, in the planning process, population factors insofar as they significantly influence or are influenced by other variables relevant to development plans. The objectives of such integration could be two-fold: (*a*) to improve the general quality of development planning; and (*b*) to promote awareness among both planners and policy makers of the need to adopt population policies consistent with development objectives" (UNFPA, 1983, para. 2).

[4] The elaboration of this approach draws upon the ILO experience in the development, organization and implementation of numerous UNFPA-funded country technical co-operation projects aimed at creating or strengthening national institutional capacities for population and development planning.

[5] Where "no policies or activities are discernible, the chief reason given is that there is insufficient demographic information on which to develop a policy position. Such conditions are reported most frequently in Africa and in a few countries in Asia" (United Nations, 1979, p. 24).

[6] See Robinson (1975). Many Governments of developing countries which are experiencing volatile demographic situations with high population growth, young age structures etc., when asked to identify population-related problems, point to the constraints on development arising from food supply, health, employment and educational problems.

[7] For example, a child born today adds immediately to the quantum of social needs for child/maternal health care. For a discussion of how population growth relates to school, nutrition, health, employment and housing needs, see Bilsborrow (1985, pp. 350–361). He suggests that even in "passive integration" (i.e., when population projections are made independently of the development plan and population factors are assumed to be exogenous), the "roles of population factors can be made much more evident by preparing alternative sets of projections and comparing the costs and/or the ability to achieve plan targets expressed (as is common practice) in terms of population coverage rates" (p. 360).

[8] Not all the studies proposed would require enormous data collection and research efforts; much can be achieved through syntheses, the use of existing data sets and, where relevant data are not available, small, well-designed surveys.

[9] For a discussion on large-scale macro-economic/demographic models and on the value of modelling as a tool for population and development planning, see Anker and Farooq (1978), Bilsborrow (1985), ILO (1984b), and United Nations (1981).

[10] See Farooq (1981), pp. 344–345.

[11] Here, perhaps, it should be pointed out once more that demographic data and demographic/economic interactions permeate the various processes of the entire planning system. The unit should not attempt to duplicate what other substantive units would undertake as a matter of course simply because population variables enter into the calculus. For example, in the planning of health systems, population size, growth, sex/age composition and geographical distribution should naturally be taken into account. However, the responsibility for health planning should clearly rest with the relevant unit.

[12] It bears reiterating that in order for population and development linkages to be effective, integration is required at the sectoral level, along with appropriate resource allocation among different programmes.

References

Anker, R., and G. M. Farooq (1978), "Population and socio-economic development: the new perspective", *International Labour Review* (March-April).

Anker, R., M. Buvinic, and N. H. Youssef (1981), *Interactions between Women's Role and Population Trends in the Third World* (London, Croom Helm).

Bilsborrow, R. E. (1985), "The integration of population in development planning: some methodological issues and suggestions", *Proceedings of the International Population Conference, Florence, 1985*, vol. 3 (Liège, IUSSP).

Economic and Social Commission for Asia and the Pacific (1982), *Report of the Third Asian and Pacific Population Conference, Colombo, 20–29 September.*

Farooq, G. M. (1981), "Population, human resources and development planning: towards an integrated approach", *International Labour Review* (May-June).

_____ (1985), "Teaching and training programmes in population and development: needs, approaches and assessment of effectiveness", paper presented at the International Meeting on Aid and Co-operation in the Field of Population and Development: Issues and Strategies, Florence, 3–4 June.

_____ and G. B. Simmons (eds.) (1985), *Fertility in Developing Countries: An Economic Perspective on Research and Policy Issues* (London, Macmillan).

Herrin, A. N. (1985), "Toward operationalizing the concept of integration of population and development planning: the Philippine experience", *NUPRI Papers Series* (Tokyo, Nihon University).

Horlacher, D., M. Luu, and S.L.N. Rao (1981), "Issues and organizational arrangements for integrating population factors into development planning", *Proceedings of the International Population Conference, Manila, 1981*, vol. 2 (Liège, IUSSP).

International Labour Organisation (1984a), *Population, Human Resources and Development Planning: The ILO Contribution* (Geneva, ILO).

_____ (1984b), *Report of the Informal Inter-Agency Expert Group Meeting on Methodologies for Integrated Population and Development Planning, Geneva, 21–24 May.*

National Economic and Development Authority (1983), *An Introductory Guide to Population and Development Planning* (Manila).

Pernia, E. M. (1985), "Needs of Asian countries in the field of population, human resources and development planning: a perspective", paper presented at the Consultative Meeting on Population, Human Resources and Development Planning, ILO, Geneva, 27–31 May.

Robinson, W. C., ed. (1975), *Population and Development Planning* (New York, Population Council).

Rodgers, G., M. Hopkins, and R. Wéry (1978), *Population, Employment and Inequality: BACHUE-Philippines* (Westmead, Saxon House).

Siddiqui, H. R. (1985), "Population and development planning: a review of UNFPA experience", paper presented at the UNFPA Expert Group Meeting on Population and Development Planning, New York, 22–24 January.

United Nations (1979), *Review and Appraisal of the World Population Plan of Action.* Population Studies No. 7 (United Nations publication, Sales No. E.79.XIII.7).

_____ (1981), *Population and Development Modelling.* Population Studies No. 73 (United Nations publication, Sales No. E.81.XIII.2).

_____ (1984a), *Report of the International Conference on Population, Mexico City, 6–14 August 1984* (United Nations publication, Sales No. E.84.XIII.8 and Corr.1 and 3).

_____ (1984b), "Report on the Fifth Population Inquiry Among Governments: monitoring of governments perceptions and policies on demographic trends and levels in relation to development as of 1982 (ESA/P/WP/83).

_____ (1984c), "Review and appraisal of the World Population Plan of Action: report of the Secretary-General" (E/CONF.76/4).

_____ (1983), "The United Nations Population Training Programme: aspects of technical co-operation" (ST/ESA/SER.E/28).

United Nations Fund for Population Activities (1983), "Report on the Seminar on Population and Development Planning", held in New York, 26–27 September.

Uthoff, A. (1984), "Integrating population and development planning in Latin America", paper presented at the ILO Inter-Agency Expert Group Meeting on Methodologies for Integrated Population and Development Planning, Geneva, 21–24 May.

NEW APPROACHES FOR ESTIMATING THE DEMAND FOR CHILDREN

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SUMMARY

This paper estimates the instantaneous demand for children during each month of the reproductive span. It does so by analysing survey data on the desire to conceive as a function of two variables—namely, parity and months elapsed since entry to each parity. Based on the estimates of the instantaneous demand for children, the paper then develops a unified model for estimating desired conception waits, desired birth intervals, number of births wanted over a lifetime, the desired level of contraceptive prevalence, and the unmet need for contraception. This unified model is applied to Ecuador, Ghana, Malaysia and the Republic of Korea.

A number of population policy implications are derived in the areas of maternal health and child mortality, fertility and family planning. Some of the findings are as follows.

In three of the four countries, substantial numbers of women desire very long birth intervals; if that preference for long birth intervals were realized, fertility would be substantially reduced. In all four countries there is a fraction of women whose desired conception wait is so short as to endanger maternal health and raise child mortality.

In all four countries, the mean number of children that women would bear if they conceived only when they wanted to is very much lower than the contemporaneous total fertility rate and is substantially lower than desired family size. The estimates indicate that if women fully implemented their postponing and terminating preferences, fertility would decline by 58 per cent in Ecuador, 25 per cent in Ghana, 42 per cent in Malaysia and 31 per cent in the Republic of Korea.

The level of contraceptive prevalence that would come into being if women implemented their postponing and terminating preferences is much higher than the actual level of contraceptive prevalence, thus indicating high levels of unmet need for contraceptives.

INTRODUCTION

The measurement of reproductive motivation has long been one of the more controversial areas in demography. The controversy has arisen largely because the questions posed to respondents have not lent themselves to precise and unambiguous answers. The most typical question has been to ask the respondent how many children she wants. The defect here is that large numbers of respondents have no fixed idea about the number of children they want. A substantially better question has been to ask whether the respondent wants to have any more children. The main difficulty with this is that some respondents who say they want no more may at some time in the future shift to wanting additional children.

Recently, much more precise questioning on reproductive motivation has emerged, directed at non-pregnant women. The respondent is first asked whether she wants more children and, if yes, whether she wants her next child as soon as possible, or after some delay. If those two questions are asked in the right way and coded in the right way, we can unambiguously classify the respondent as wishing to avoid conception or as wishing to conceive. There is no difficulty in classifying the respondent if she expresses uncertainty, or says she has no opinion, or declares that she does not really mind whether she conceives soon or later. In such cases it is clear she has no wish to avoid conceiving and that she should be counted as effectively wanting to conceive.

The approach has several advantages. The time referent is much less ambiguous than that of any other preference question we have yet seen, because it is restricted to the immediate short-run future. The respondent is not required to speculate on whether she will ever want another birth or to say exactly how many children she really wants. Neither is she asked to recall how many children she wanted at the time she was married or to think back to the time of her last birth. Nor is she called on to respond to complex questions about her first, second and third choices on the family composition she would like to have, in terms of number of boys and girls. Instead, we rely on capturing the demand for children expressed at the time of the interview, using a much simpler and entirely non-hypothetical question on desire to conceive. It has been argued that the desire to conceive can be measured with precision. But only one method has yet emerged to reduce the resulting data into a form whose demographic implications are readily understood, and the method is limited to estimating the desired contraceptive

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prevalence level (Nortman, 1982a and 1982b). The purpose of this essay is to introduce some additional analytical tools.

Founded upon the method of classifying desire to avoid conception, which has been described above, the essay proposes a model for estimating from cross-sectional survey data the time trajectory of desire to conceive in each month of the reproductive span.

The first section of this paper will use simulations as an aid to identifying the differences and similarities between true underlying preferences to conceive in a cohort of women observed longitudinally and the sometimes very different pattern of desire to conceive we would actually observe in a cross-sectional survey. Based on the simulation results, the first section below develops a model for analysing cross-sectional survey data so that it estimates the underlying cohort schedule of proportions wishing to avoid conception by parity and number of months elapsed since entry to current parity. It then applies that model to data from four countries with very different cultures, and shows that in all four there is an extremely strong and credible functional relationship between desire to avoid conception, time elapsed since entry to current parity, and current parity itself.

The second section will estimate desired conception waits and desired birth intervals based on the functions calculated in the first section.[1] Based on those same functions, the third section will estimate desired number of births, and the fourth section will estimate the level of contraceptive prevalence that would come into existence in the long run, if women were to fully implement their stated desires to conceive and to avoid conception.

THE DESIRE TO AVOID CONCEPTION AS A FUNCTION OF PARITY AND OF MONTHS ELAPSED SINCE ENTRY TO CURRENT PARITY

The response to the question on whether women wish to postpone conception or wish to have the next child as soon as possible in World Fertility Surveys and Contraceptive Prevalence Surveys has indicated massive proportions not wanting to have the next birth as soon as possible among women who declared they wanted additional children. As can be seen in table 1, more than 70 per cent of women in most countries did not want the next birth as soon as possible.

TABLE 1. WOMEN WANTING THEIR NEXT CHILD SOON OR LATER, AMONG EXPOSED WOMEN WHO WANT MORE CHILDREN
(Percentage)

Country and survey	*Want soon*[a]	*Want later*[b]
Bangladesh (CPS)	28	72
Colombia (CPS)	34	66
Costa Rica (CPS)	23	77
Ecuador (WFS)	23	77
Egypt (WFS)	57	43
Ghana (WFS)	40	60
Korea, Republic of (CPS)	64	36
Mexico, rural (CPS)	21	79
Mexico, urban (CPS)	28	72
Paraguay (WFS)	27	73
Thailand (CPS)	25	75

Source: R. E. Lightbourne, "Individual preferences and fertility behaviour", in John Cleland and John Hobcraft (eds.), *Reproductive Change in Developing Countries* (Oxford, Oxford University Press).

[a] "Want soon" in CPS surveys specified "want in next year".

[b] "Want later" in CPS surveys included respondents uncertain about wanting more children and those who failed to answer. These groups averaged 6 per cent in the countries shown.

NOTE: CPS = Contraceptive Prevalence Survey conducted by either the Centers for Disease Control, Atlanta, or Westinghouse Health Systems. WFS = World Fertility Survey.

When the proportion not wanting the next birth as soon as possible is broken down by number of months elapsed since the last birth, as shown in table 2, a systematic relationship is seen to exist in all countries. The proportion wishing to avoid the next birth is seen to be highest among women with 0–11 months elapsed since the last birth and then declines with increasing duration of elapsed time. But the most surprising feature of the table is the finding that there are a number of countries in which quite high proportions of women wanted to postpone having their next child even after 60 months had elapsed since the prior birth. In Ecuador, Paraguay and Portugal, for example, more than half the respondents at durations of 5–7 years since having the last birth said they would prefer to postpone having the next birth.

TABLE 2. WOMEN PREFERRING ANOTHER CHILD LATER RATHER THAN SOON, AMONG EXPOSED WOMEN WHO WANT MORE CHILDREN
(Percentage)

	Months elapsed since last birth						
Country	*0-11*	*12-23*	*24-35*	*36-47*	*48-59*	*60-83*	*84-119*
Ecuador	90	86	82	74	67	63	35
Egypt	55	50	31	22	22	16	5
Ghana	84	71	50	37	38	20	24
Paraguay	88	85	83	71	75	62	40
Portugal	76	71	63	63	59	58	57

Source: R. E. Lightbourne, "Individual preferences and fertility behaviour", in John Cleland and John Hobcraft (eds.), *Reproductive Change in Developing Countries* (Oxford, Oxford University Press).

If the results in table 2 are taken at face value, the interpretation would be that a majority of women have long desired conception waits in excess of five years, in a number of countries. There is, however, one major problem to that kind of interpretation: the use of contraception is likely to select women who want to postpone child-bearing to relatively long birth intervals, thereby inflating the proportions observed wanting to postpone conception at long intervals in a cross-sectional survey. Suppose, for example, that even a small number of women want to postpone for intervals longer than five years and use effective contraception to achieve that aim; those "long postponers" would then be virtually the only women at long intervals, apart from those who were sterile or subfecund.

The consequence of this is that if contraception is used, then the proportion wishing to avoid conception at long intervals in a cross-sectional survey will tend to over-estimate what we really want to know, which is defined here as the "true" life table proportion wanting to avoid conception at each quantum of time elapsed since entry to parity—that is, since the occurrence of the j'th birth; the true underlying proportion wishing to avoid conception is thought of as the

TABLE 3. PROPORTION OF WOMEN WANTING TO AVOID CONCEPTION IN CROSS-SECTION (COL. J), PROPORTION WANTING TO AVOID IN LIFE TABLE OR REAL COHORT (COL. B), CLASSIFIED BY MONTHS ELAPSED SINCE LAST BIRTH (COL. A)

Month				Number of women wanting to:				Total	PP(i)	Total	Grand	Pregnancies	
				Avoid pregnancy		Conceive				preg-	total	Unwanted	Wanted
i	A(i)	C(i)	R(i)	AN(i)	ANS(i)	CN(i)	CNS(i)	(e+f+ g+h)	e+f/i	nant	(i+k)	AP(i)	CP(i)
a	b	c	d	e	f	g	h	i	j	k	l	m	n
0	1 000	0	0.995	970.00	30.00	0.00	0.00	1 000.0	1.000	0.0	1 000.0	0.00	0.00
1	995	5	0.995	965.15	29.85	4.85	0.15	1 000.0	0.995	0.0	1 000.0	0.00	0.00
2	990	10	0.995	941.09	29.70	9.51	0.30	980.6	0.990	19.4	1 000.0	19.21	0.19
3	985	15	0.995	898.89	29.55	13.69	0.45	942.6	0.985	57.4	1 000.0	37.45	0.57
4	980	20	0.995	840.66	29.40	17.16	0.60	887.8	0.980	112.2	1 000.0	53.66	1.10
5	975	25	0.995	769.47	29.25	19.73	0.75	819.2	0.975	180.8	1 000.0	66.91	1.72
6	970	30	0.995	688.97	29.10	21.31	0.90	740.3	0.970	259.7	1 000.0	76.55	2.37
7	965	35	0.969	603.17	28.95	21.88	1.05	655.0	0.965	345.0	1 000.0	82.25	2.98
8	935	65	0.968	502.60	28.05	34.94	1.95	567.5	0.935	432.5	1 000.0	81.82	5.69
9	905	95	0.967	413.50	27.15	43.41	2.85	486.9	0.905	513.1	1 000.0	72.97	7.66
10	875	125	0.966	339.82	26.25	48.55	3.75	418.4	0.875	581.6	1 000.0	59.97	8.57
11	845	155	0.964	278.95	25.35	51.17	4.65	360.1	0.845	639.9	1 000.0	49.23	9.03
12	815	185	0.963	228.69	24.45	51.91	5.55	310.6	0.815	689.4	1 000.0	40.36	9.16
13	785	215	0.962	187.23	23.55	51.28	6.45	268.5	0.785	731.5	1 000.0	33.04	9.05
14	755	245	0.960	153.06	22.65	49.67	7.35	232.7	0.755	767.3	1 000.0	27.01	8.77
15	725	275	0.959	124.93	21.75	47.39	8.25	202.3	0.725	797.7	1 000.0	22.05	8.36
16	695	305	0.957	101.80	20.85	44.67	9.15	176.5	0.695	823.5	1 000.0	17.96	7.88
17	665	335	0.955	82.79	19.95	41.71	10.05	154.5	0.665	845.5	1 000.0	14.61	7.36
18	635	365	0.953	67.20	19.05	38.63	10.95	135.8	0.635	864.2	1 000.0	11.86	6.82
19	605	395	0.950	54.42	18.15	35.53	11.85	120.0	0.605	880.0	1 000.0	9.60	6.27
20	575	425	0.948	43.96	17.25	32.50	12.75	106.5	0.575	893.5	1 000.0	7.76	5.73
21	545	455	0.945	35.42	16.35	29.57	13.65	95.0	0.545	905.0	1 000.0	6.25	5.22
22	515	485	0.971	28.45	15.45	26.79	14.55	85.2	0.515	914.8	1 000.0	5.02	4.73
23	500	500	1.000	23.48	15.00	23.48	15.00	77.0	0.500	923.0	1 000.0	4.14	4.14
24	500	500	1.000	19.96	15.00	19.96	15.00	69.9	0.500	930.1	1 000.0	3.52	3.52
25	500	500	1.000	16.96	15.00	16.96	15.00	63.9	0.500	936.1	1 000.0	2.99	2.99
26	500	500	1.000	14.42	15.00	14.42	15.00	58.8	0.500	941.2	1 000.0	2.54	2.54
27	500	500	1.000	12.26	15.00	12.26	15.00	54.5	0.500	945.5	1 000.0	2.16	2.16
28	500	500	1.000	10.42	15.00	10.42	15.00	50.8	0.500	949.2	1 000.0	1.84	1.84
29	500	500	1.000	8.85	15.00	8.85	15.00	47.7	0.500	952.3	1 000.0	1.56	1.56
30	500	500	1.000	7.53	15.00	7.53	15.00	45.1	0.500	954.9	1 000.0	1.33	1.33
35	500	500	1.000	3.34	15.00	3.34	15.00	36.7	0.500	963.3	1 000.0	0.59	0.59
40	500	500	1.000	1.48	15.00	1.48	15.00	33.0	0.500	967.0	1 000.0	0.26	0.26
45	500	500	1.000	0.66	15.00	0.66	15.00	31.3	0.500	968.7	1 000.0	0.12	0.12
50	500	500	1.000	0.29	15.00	0.29	15.00	30.6	0.500	969.4	1 000.0	0.05	0.05
55	500	500	1.000	0.13	15.00	0.13	15.00	30.3	0.500	969.7	1 000.0	0.02	0.02
60	500	500	1.000	0.06	15.00	0.06	15.00	30.1	0.500	969.9	1 000.0	0.01	0.01

NOTES: Contraception: No one uses contraception. Sterility: 3 per cent of women are sterile.

Key to column heads:

a: i = number of months elapsed since last birth.

b: A(i) = true number in underlying real cohort who want to avoid conception at month i.

c: C(i) = true number in real cohort who want to conceive.

d: R(i) = A(i)/A(i+1) = proportion in real cohort who want to continue avoiding conception from month i to month i+1.

e: AN(i) = Number of non-sterile women in population who want to avoid conceiving:
AN(0) = A(0) * proportion non-sterile = A(0) * .97;
AN(i) = AN(i – 1) * R(i – 1) * (1.0 – PCON(i – 1)) (for i=1,2,..,60), where:
PCON(i) = probability of conceiving among contraceptors.
PCON(i) = PC(i) * (1.0 – EFF) where PC(i) = probability of conceiving among non-contraceptors, and EFF=1.0 represents perfect contraception and EFF=.5 represents halving of probability of conceiving and EFF=0.0 represents totally ineffective contraception.

f: ANS(i) = Number of sterile women in population who want to avoid conception;
ANS(0) = A(0)*proportion sterile; ANS(i) = ANS(i – 1) * R(i – 1), for i=1,2,..,60.

g: CN(i) = Number of non-sterile women in population who want to conceive.
CN(0) = C(0) * Proportion non-sterile.
CN(i) = AN(i – 1)*(1 – R(i – 1))*(1 – PCON(i – 1) + CN(i – 1)*(1 – PC(i – 1)).

h: CNS(i) = Number of sterile women in population who want to conceive.
CNS(0) = C(0) * Proportion sterile.
CNS(i+1) = CNS(i) + ANS(i) * (1 – R(i)).

i: Total of non-pregnant women in population; T(i) = sum of columns e, f, g and h.

TABLE 3 *(continued)*

j: Of non-pregnant women in population with i months elapsed since last birth, the proportion who want to avoid conceiving; PP(i) = (AN(i)+ANS(i))/(AN(i)+ANS(i)+CN(i)+CNS(i)).

k: Cumulative number pregnant; PG(i+1)=PG(i)+AN(i)*IMP*PC(i)+CN(i)*PC(i).

l: Check-total of all women; GT(i) = T(i) + PG(i).

m: Number of unwanted pregnancies in month i, including pregnancies that came too soon; AP(i) = AN(i – 1) * R(i – 1) * PCONC(i – 1).

n: Number of wanted pregnancies in month i; CP(i) = CN(i – 1) * PC(i – 1) + AN(i – 1) * (1.0 – R(i – 1)) * PCONC(i – 1).

1(x) column of the life table, where "survivors" are women who wish to avoid pregnancy, and where the decrements of fundamental interest occur in the form of shifts into the status of wishing to conceive in the near future, though such shifts will in practice be potentially obscured by the competing risk of becoming pregnant. This definition is further clarified below in the discussion of the simulation model illustrated in table 3.

We note that the proportion wishing to avoid conception as a function of time elapsed since entry to current parity could best be observed directly in a proper longitudinal study where a group of women are followed from the time of their last birth either to menopause or to the time when they wish to conceive the next birth, with due allowance made for proper allocation of women who become pregnant before they wish to do so.

It is with this problem in mind that we chose to use simulations to contrast the proportions wanting to avoid conception that would be observed in a longitudinal life-table study with those that would be observed in a cross-sectional survey, with the objective of finding out how better to analyse data from real surveys.

SIMULATING CROSS-SECTIONAL PROPORTIONS OF WOMEN WISHING TO AVOID CONCEPTION FROM INFORMATION ON THE REAL COHORT

The starting point of the simulation is to assume omnisciently a known life-table in which we know the true underlying proportion of parity j women wanting to avoid conception as a function of the number of months elapsed since entry to parity j, among a cohort of—say—1,000 women entering parity j. The next step is then to generate from the known values the proportions wishing to avoid conception that would be observed in a cross-sectional survey.

The arbitrarily chosen "true" life table proportions wishing to avoid conception which underlie all the simulations to be described here are given in column b of table 3 and are repeated in column b of table 4. As can be seen, among women with 0 months elapsed since the j'th birth, 1,000 wish to avoid conception and none wish to conceive. With increasing duration of open interval (i.e., months elapsed since last birth) the number who wish to avoid conceiving decreases slowly at first between months 0 and 7, then more rapidly between months 8 and 22, until month 23, where the number stabilizes at 500 and remains at 500 in all subsequent months. The true proportion wanting additional children at parity j is thus 50 per cent and the mean desired conception wait among women who wish to have more children is 13.97 months and the mean desired birth interval is thus about 28 months; this assumes it takes 5 months for conception and 9 months for gestation.

After adopting the "true" schedule of proportions wishing to avoid, the next step is to simulate the numbers of non-pregnant women we would expect to find in the cross-section in the state of wanting to avoid conception and in the state of wanting to conceive at various durations of open interval, under various different régimes of contraceptive use. To do this with a reasonable degree of realism, we used an increment/decrement life table whose detailed workings are described in the key to table 3.

It is important to note one critical assumption made in the simulation—namely, that 3 per cent of couples are infecund at each parity and are incapable of progressing to the next parity for reasons of biological incapacity. Not only is this infecundity assumption reasonably realistic, it is also crucial to the estimation process described below. As will become apparent, the infecunds basically serve as a control group among whom selection effects of contraception do not operate, and who preserve the least biased record of changes in reproductive motivation as the open interval lengthens.

The case of a population where no one implements her reproductive preferences by adopting contraception is simulated in table 3, and the proportions wishing to avoid conception that would be observed in a cross-sectional survey are presented in column j of table 3. In such a "no implementation" case, pregnancy rates are identical among women who wish to avoid and among those who wish to conceive. The consequence of this is that the proportion wanting to avoid conception that would be observed in a cross-sectional survey (column j) is identical to the true underlying proportion (column b).

In the case where no one implements her preference to avoid conceiving by adopting contraception, illustrated in table 3, we see that the true underlying proportion wanting to avoid conceiving can be recovered using the observed cross-sectional proportions in column j, purely and simply because no one implements her preference. A further consequence of non-implementation, however, is that the actual numbers remaining non-pregnant and not advancing to the next parity declines from 1,000 at duration 0 to 30 at duration 60 months, as shown in column i of table 3. This raises the obvious point that, for analysis of actual survey data, there will be severe sample size problems in calculating proportions wanting to avoid conception at the long intervals. To deal with the problem in practice, it will be necessary to consider various forms of aggregation.

While table 3 assumed that no one uses contraception, table 4 assumes that reproductive motives are fully implemented and that 100 per cent of the women who wish to avoid conception use perfect contraceptives. The proportion wanting to avoid conception that would be observed in the cross-section, illustrated in column j, becomes radically larger than the true underlying proportion shown in column b at all durations beyond 12 months elapsed since the last birth. It becomes clear that in the presence of effective contraception, the cross-section does not provide a reliable guide from which desired durations of birth intervals can be calculated.

To examine the likely effects of contraceptive régimes intermediate between full implementation of perfect contraception by all avoiders and no implementation whatever, a number of alternative scenarios were calculated. Figure I compares the results of four alternative contraceptive régimes: the top line, marked "A", illustrates the proportions wishing to avoid conception from column j of table 4, in

TABLE 4. PROPORTION OF WOMEN WANTING TO AVOID CONCEPTION IN CROSS-SECTION (COL. J), PROPORTION WANTING TO AVOID IN LIFE TABLE OR REAL COHORT (COL. B), CLASSIFIED BY MONTHS ELAPSED SINCE LAST BIRTH (COL. A)

Month i	A(i)	C(i)	R(i)	Number of women wanting to: Avoid pregnancy AN(i)	Avoid pregnancy ANS(i)	Conceive CN(i)	Conceive CNS(i)	Total (e+f+g+h)	PP(i) e+f/i	Total pregnant	Grand total (i+k)	Pregnancies Unwanted AP(i)	Pregnancies Wanted CP(i)
a	b	c	d	e	f	g	h	i	j	k	l	m	n
0	1 000	0	0.995	970.00	30.00	0.00	0.00	1000.0	1.000	0.0	1 000.0	0.00	0.00
1	995	5	0.995	965.15	29.85	4.85	0.15	1000.0	0.995	0.0	1 000.0	0.00	0.00
2	990	10	0.995	960.30	29.70	9.60	0.30	999.9	0.990	0.1	1 000.0	0.00	0.10
3	985	15	0.995	955.45	29.55	14.07	0.45	999.5	0.985	0.5	1 000.0	0.00	0.38
4	980	20	0.995	950.60	29.40	18.07	0.60	998.7	0.981	1.3	1 000.0	0.00	0.84
5	975	25	0.995	945.75	29.25	21.48	0.75	997.2	0.978	2.8	1 000.0	0.00	1.45
6	970	30	0.995	940.90	29.10	24.18	0.90	995.1	0.975	4.9	1 000.0	0.00	2.15
7	965	35	0.969	936.05	28.95	26.13	1.05	992.2	0.973	7.8	1 000.0	0.00	2.90
8	935	65	0.968	906.95	28.05	51.57	1.95	988.5	0.946	11.5	1 000.0	0.00	3.66
9	905	95	0.967	877.85	27.15	72.94	2.85	980.8	0.923	19.2	1 000.0	0.00	7.74
10	875	125	0.966	848.75	26.25	91.10	3.75	969.8	0.902	30.2	1 000.0	0.00	10.94
11	845	155	0.964	819.65	25.35	106.53	4.65	956.2	0.884	43.8	1 000.0	0.00	13.66
12	815	185	0.963	790.55	24.45	119.65	5.55	940.2	0.867	59.8	1 000.0	0.00	15.98
13	785	215	0.962	761.45	23.55	130.80	6.45	922.3	0.851	77.7	1 000.0	0.00	17.95
14	755	245	0.960	732.35	22.65	140.28	7.35	902.6	0.836	97.4	1 000.0	0.00	19.62
15	725	275	0.959	703.25	21.75	148.34	8.25	881.6	0.822	118.4	1 000.0	0.00	21.04
16	695	305	0.957	674.15	20.85	155.19	9.15	859.3	0.809	140.7	1 000.0	0.00	22.25
17	665	335	0.955	645.05	19.95	161.01	10.05	836.1	0.795	163.9	1 000.0	0.00	23.28
18	635	365	0.953	615.95	19.05	165.96	10.95	811.9	0.782	188.1	1 000.0	0.00	24.15
19	605	395	0.950	586.85	18.15	170.17	11.85	787.0	0.769	213.0	1 000.0	0.00	24.89
20	575	425	0.948	557.75	17.25	173.74	12.75	761.5	0.755	238.5	1 000.0	0.00	25.52
21	545	455	0.945	528.65	16.35	176.78	13.65	735.4	0.741	264.6	1 000.0	0.00	26.06
22	515	485	0.971	499.55	15.45	179.36	14.55	708.9	0.726	291.1	1 000.0	0.00	26.52
23	500	500	1.000	485.00	15.00	167.01	15.00	682.0	0.733	318.0	1 000.0	0.00	26.90
24	500	500	1.000	485.00	15.00	141.96	15.00	657.0	0.761	343.0	1 000.0	0.00	25.05
25	500	500	1.000	485.00	15.00	120.66	15.00	635.7	0.787	364.3	1 000.0	0.00	21.29
26	500	500	1.000	485.00	15.00	102.56	15.00	617.6	0.810	382.4	1 000.0	0.00	18.10
27	500	500	1.000	485.00	15.00	87.18	15.00	602.2	0.830	397.8	1 000.0	0.00	15.38
28	500	500	1.000	485.00	15.00	74.10	15.00	589.1	0.849	410.9	1 000.0	0.00	13.08
29	500	500	1.000	485.00	15.00	62.99	15.00	578.0	0.865	422.0	1 000.0	0.00	11.12
30	500	500	1.000	485.00	15.00	53.54	15.00	568.5	0.879	431.5	1 000.0	0.00	9.45
35	500	500	1.000	485.00	15.00	23.76	15.00	538.8	0.928	461.2	1 000.0	0.00	4.19
40	500	500	1.000	485.00	15.00	10.54	15.00	525.5	0.951	474.5	1 000.0	0.00	1.86
45	500	500	1.000	485.00	15.00	4.68	15.00	519.7	0.962	480.3	1 000.0	0.00	0.83
50	500	500	1.000	485.00	15.00	2.08	15.00	517.1	0.967	482.9	1 000.0	0.00	0.37
55	500	500	1.000	485.00	15.00	0.92	15.00	515.9	0.969	484.1	1 000.0	0.00	0.16
60	500	500	1.000	485.00	15.00	0.41	15.00	515.4	0.970	484.6	1 000.0	0.00	0.07

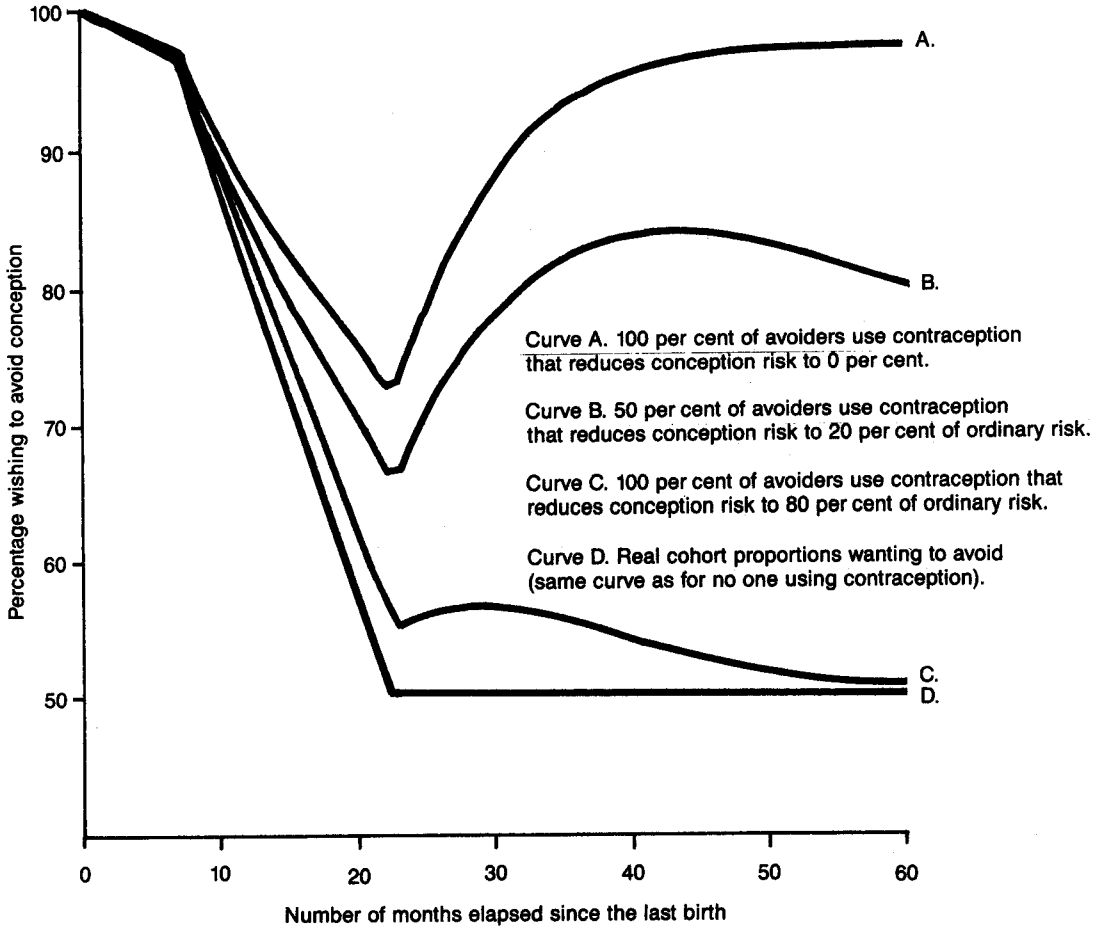
NOTES: Contraception: 100 per cent of avoiders use 100 per cent effective contraception. Sterility: 3 per cent of women are sterile. For key to column heads, see table 3.

which 100 per cent of avoiders use perfect contraception; the line second from top, marked "B", illustrates the case in which 50 per cent of avoiders use contraception that reduces conception risk to 20 per cent of uncontracepted risk, while the remaining 50 per cent use contraception that reduces risk of conceiving to 80 per cent of uncontracepted risk; the line third from top, marked "C", shows what happens when 100 per cent of avoiders use very ineffective contraception with 80 per cent of normal conception risk. The bottom line, marked "D", illustrates the case shown in table 3, in which no one uses any contraception and, simultaneously, illustrates the graph of the true life-table proportion wishing to avoid conception. The conclusion that clearly emerges is that even with very ineffective contraceptive use, the cross-sectional survey proportion wanting to avoid conception is likely to be upwardly biased relative to the true underlying cohort proportion at the longer intervals.

ESTIMATING THE PROPORTIONS WANTING TO AVOID CONCEPTION IN THE REAL COHORT FROM CROSS-SECTIONAL DATA

The central strategy for estimating the true underlying life-table cohort pattern of desire to avoid conception by duration of the open interval since the last birth has already been suggested. In any population where significant proportions of women fail to implement their desire to avoid conception by using contraceptives, it is possible, in theory—though with caveats noted below—to obtain a minimum estimate of the true underlying proportion wishing to avoid conception for each duration of time elapsed since the last birth by restricting the analysis to the sub-population of women who have not used contraception after having their last birth. Since nearly all developing country populations contain significant fractions of respondents who do not implement their preferences, it is thus possible to apply the

Figure I. Results of four simulations with identical real cohort proportions wishing to avoid conception as a function of time, showing effects of differing contraceptive régimes upon cross-sectional proportions wanting to avoid conception



strategy just described to the majority of developing countries.

Certain caveats should be emphasized. First, from the simulations it is evident that any factor that slows conception equally among women who wish to avoid conception and those who wish to conceive will tend to reduce bias in the proportion wanting to avoid, and to give larger denominators at longer intervals, thereby permitting more trustworthy estimates; higher infecundity and sub-fecundity should thus reduce bias. Similarly, lower coital frequency, more prolonged breast-feeding and more prolonged post-partum abstinence should also function to reduce bias, provided that those factors affecting conception are unrelated to reproductive motivation. Secondly, from the practical standpoint of using sample survey data to estimate the proportions wishing to avoid conception by duration of open interval, it may be necessary to engage in a good deal of "data massage" to overcome the difficulties raised by small numbers of respondents at longer durations. And thirdly, in countries with significant proportions using contraception, the exclusion of contraceptors may lead to some downward bias in the estimates of proportions wishing to avoid conceiving, since by excluding all contraceptors, one excludes representation of a potentially large number of women. In such an instance, the estimates of desired conception waits, desired number of births and potential demand for contraception will be correspondingly downwardly biased.

Finally, a methodological point: rather than calculating proportions wanting to postpone, by restricting analysis to women who want additional children, the model described here increases sample size by including women who want no more children, and becomes a unified model because it simultaneously considers the desire to postpone and the desire to terminate.

Fitting a curve to proportions wanting to avoid conception in four countries as a function of time elapsed since last birth

Having briefly outlined the results of simulations and a strategy for estimating quasi life-table proportions wanting to avoid conception as a function of time elapsed since the last birth, we now turn to empirical estimation of those proportions, using data from four countries included in the World Fertility Survey—namely, Ecuador, Ghana, Malaysia and the Republic of Korea.

The surveys in the Republic of Korea and Malaysia asked what we regard as a reasonably good proxy for the instantaneous desire to conceive, using a question that was worded thus: "Would you prefer your (first/next) child to be born as soon as possible or after some delay?" The Ecuador survey asked a somewhat less precise question along the same lines: "Do you want to have your next child more or less soon, or to wait a few years?" As can be seen, the time

horizon is much less exact in the case of Ecuador; a response of "soon" includes not only respondents with a desire to conceive right now and in the next few months but also respondents who do not wish to conceive right now but who think they may wish to have a birth in the next year or the year after. From the standpoint of measuring instantaneous desire to conceive, this is a needless loss of precision; it vitiates the question by calling on the respondent to speculate whether she might want a birth in the next year or the year after.

The wording used in the Ghana survey paralleled that of Ecuador; it was phrased thus: "Would you rather have a baby in the next year or so, or would you prefer to wait for several years?" As with Ecuador, this question would elicit a "yes" response both from respondents wanting to conceive immediately and also from some of those who might prefer to delay conception for the next year. In consequence of this blurring of the time horizon, desired conception waits are liable to be particularly under-estimated for Ghana and Ecuador.

The analysis of data for the four countries can be described in terms of three steps. First, respondents were classified in a binary classification best resembling (0) "wish to conceive" and (1) "wish to avoid conceiving," using responses to the questions on whether another birth was wanted soon and whether additional children were wanted. In the present analysis, respondents who replied they were uncertain whether they wanted another birth were classified as wanting the next birth soon. This will make the estimates conservative in the direction of under-estimating desired conception waits, especially in the case of Ghana, as will be explained below. Future surveys should clarify orientation towards conceiving among respondents who are uncertain whether they want additional children, since many are likely to wish to avoid conceiving within the next few months.

The second step was to construct a very detailed cross-tabulation which classified respondents along three dimensions—namely, (*a*) whether or not they wanted to conceive, (*b*) number of births, for separate parities 0, 1, 2, . . . , 7, 8, 9+, (*c*) by single months elapsed since the last birth, for months 0, 1, 2, . . . , 178, 179, 180+.

The third step was to collapse the distribution by single months at each parity in order to calculate proportions wishing to avoid conception with adequately sized denominators. For the purpose of the present analysis, simple proportions wanting to avoid conception were calculated with minimum denominators of 30. The results of the procedure are shown in table 5 for Ecuador, which displays observed proportions wanting to avoid at various durations of open interval. The object here was to reduce the data to a form that is readily understandable.

TABLE 5. OBSERVED AND FITTED PERCENTAGES WANTING TO AVOID CONCEPTION, BY MONTHS ELAPSED SINCE LAST BIRTH AND BY PARITY, FOR ECUADOR WFS SURVEY

Parity	Months since last birth	Percentage wanting to avoid conception		Percentage wanting no more children		Sample size number
		Observed	Fitted	Observed	Fitted	
0	3.2	65.6	64.8	6.3	6.3	32.0
0	21.4	40.0	41.5	0.0	1.7	30.0
0	107.2	10.0	9.4	3.3	1.6	30.0
1	1.1	87.5	93.8	10.0	9.6	40.0
1	4.4	88.9	90.7	8.3	9.6	36.0
1	8.6	97.1	86.8	14.3	9.6	35.0
1	14.7	82.4	81.1	2.9	9.6	34.0
1	27.3	67.7	69.9	12.9	9.9	31.0
1	114.9	26.5	27.1	14.7	14.8	34.0
2	1.7	89.2	96.8	43.2	43.5	37.0
2	5.0	93.5	95.1	38.7	41.4	31.0
2	7.9	100.0	93.5	38.9	40.0	36.0
2	12.7	94.1	91.0	50.0	38.2	34.0
2	23.4	87.1	85.6	25.8	35.6	31.0
2	69.1	66.7	67.9	30.0	31.5	30.0
2	174.5	54.5	56.2	36.4	29.4	11.0
3	1.8	89.2	91.8	43.2	42.4	37.0
3	6.3	97.0	86.8	54.5	42.4	33.0
3	10.8	85.3	84.0	47.1	42.4	34.0
3	16.2	68.8	81.9	37.5	42.4	32.0
3	27.9	83.3	79.3	26.7	42.6	30.0
3	73.5	66.7	76.2	46.7	45.1	30.0
3	168.2	100.0	74.9	75.0	75.1	12.0
4	2.3	97.0	93.9	48.5	47.2	33.0
4	6.7	75.0	86.0	43.8	48.3	32.0
4	13.5	86.7	80.7	53.3	49.1	30.0
4	30.8	80.0	74.6	50.0	50.0	30.0
4	117.6	61.8	64.5	50.0	50.8	34.0
5	2.5	96.7	98.3	56.7	63.0	30.0
5	10.2	97.0	92.3	75.8	61.6	33.0
5	22.4	80.6	86.5	48.4	59.4	31.0
5	70.3	76.7	72.7	53.3	50.7	30.0
5	153.8	50.0	57.6	33.3	35.6	6.0
6	10.8	93.8	89.1	62.5	62.4	32.0
6	3.7	93.3	92.7	76.7	76.6	30.0

TABLE 5 *(continued)*

Parity	Months since last birth	Percentage wanting to avoid conception		Percentage wanting no more children		Sample size number
		Observed	Fitted	Observed	Fitted	
6	21.0	75.0	85.8	56.3	60.9	32.0
6	51.9	86.7	79.1	70.0	60.5	30.0
6	132.1	64.3	68.0	50.0	60.4	14.0
7	4.0	90.0	89.7	66.7	66.7	30.0
7	15.6	80.0	84.6	66.7	66.7	30.0
7	45.5	90.0	84.3	66.7	66.8	30.0
7	146.5	80.0	84.2	80.0	80.0	10.0
8	5.5	79.4	86.0	58.8	62.1	34.0
8	17.3	93.5	83.3	71.0	62.1	31.0
8	68.5	70.0	74.5	56.7	62.4	30.0
8	163.0	75.0	69.5	75.0	74.3	8.0
9+	2.2	88.6	89.5	77.1	75.6	35.0
9+	6.8	90.6	89.5	71.9	75.6	32.0
9+	12.5	80.0	89.5	63.3	75.6	30.0
9+	20.8	86.7	89.5	80.0	75.6	30.0
9+	30.6	90.3	89.5	74.2	75.5	31.0
9+	53.9	93.8	89.0	84.4	75.0	32.0
9+	88.2	93.3	85.6	73.3	71.2	30.0
9+	134.0	62.5	68.5	50.0	52.4	8.0

As can be seen from the observed proportions wishing to avoid conception in table 5, there is a systematic relationship between duration of open interval and the proportion of women wishing to avoid child-bearing. As the duration since the most recent birth increases, the proportion wishing to avoid conception decreases, at all parities. Consistent with what we might expect, the proportion wishing to avoid at parity 0 is markedly lower than at any other parity.

In the interest of further reducing the data and capturing the overall trend at each parity in a form that is easily graphed and analysed, ordinary least squares regression was used on the tabulated values in table 5 to fit a curve to the proportion wishing to avoid child-bearing at each parity as a function of i, the number of months elapsed since entry to that parity. The regressor variables consisted of 17 different transformations of i, including i, i^2, i^3, i^4, natural logarithm of i, and several logistic curves. The results of the regression analysis of the Ecuadorian data are shown in table 6, which contains raw regression coefficients and values of R-squared and the standard errors of estimate; a footnote to table 6 provides a complete list of regressors. As can be seen from the table, a step-wise model was used which was constrained to select the best single function, there being only two non-0 regression coefficients for each parity, one being the constant. The aim of that particular regression design was to select the single function that best characterized the data, while offering a reasonably comprehensive delicatessen of functions to choose from. As can be seen from the high values of R-squared at most parities in table 6, and also from the fitted values in table 5, the fit was usually quite good, especially at parities below 6.

TABLE 6. REGRESSION COEFFICIENTS FOR THE PROPORTION OF WOMEN WANTING TO AVOID CONCEPTION, ECUADOR WFS

Coefficients	Parity 0	1	2	3	4
B1 ..	−0.13656E+02	0.17083E+03	0.14035E+03	0.73685E+02	0.10017E+03
B2 ..	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B3 ..	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B4 ..	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B5 ..	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B6 ..	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	−0.74729E+01
B7 ..	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B8 ..	0.00000E+00	−0.15190E+01	−0.85273E+00	0.00000E+00	0.00000E+00
B9 ..	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B10 .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B11 .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B12 .	0.00000E+00	0.00000E+00	0.00000E+00	0.21406E+00	0.00000E+00
B13 .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B14 .	0.84701E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B15 .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B16 .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B17 .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
RSQ	0.99781E+00	0.94964E+00	0.87303E+00	0.22706E+00	0.72076E+00
SEE.	0.10746E+01	0.52340E+01	0.44953E+01	0.98449E+01	0.63680E+01

TABLE 6 (*continued*)

	Parity				
	5	6	7	8	9
B1 . .	0.10428E+03	0.97617E+02	0.84219E+02	0.10554E+03	0.89508E+02
B2 . .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B3 . .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B4 . .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B5 . .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	−0.65291E−07
B6 . .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B7 . .	−0.37645E+01	−0.25772E+01	0.00000E+00	0.00000E+00	0.00000E+00
B8 . .	0.00000E+00	0.00000E+00	0.00000E+00	−0.36623E+00	0.00000E+00
B9 . .	0.00000E+00	0.00000E+00	0.93615E+00	0.00000E+00	0.00000E+00
B10 .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B11 .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B12 .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B13 .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B14 .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B15 .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B16 .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
B17 .	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
RSQ	0.85396E+00	0.53446E+00	0.24109E+00	0.36793E+00	0.37817E+00
SEE .	0.46009E+01	0.68540E+00	0.42893E+01	0.73968E+01	0.50956E+01

NOTES:

(1) Estimated $Y = B_1 + B_2 X_2 + B_3 X_3 + \ldots + B_{17} X_{17}$; B_1 is the constant
Actual Y = Per cent wanting to avoid child-bearing among women with X_2 months elapsed since the last birth

(2) Transformations:

X_2 = months since last birth
$X_3 = X_2^2$
$X_4 = X_2^3$
$X_5 = X_2^4$
$X_6 = \ln X_2$
$X_7 = X_2^{1/2}$
$X_8 = 100/(1 + e^{-X_2/40})$
$X_9 = 100/(1 + X_2^2)$
$X_{10} = e^{X_2/40}$
$X_{11} = 100/(1 + (X_2/5))$
$X_{12} = 100/(1 + (X_2/10))$
$X_{13} = 100/(1 + (X_2/20))$
$X_{14} = 100/(1 + (X_2/40))$
$X_{15} = 100/(1 + (X_2/60))$
$X_{16} = 100/(1 + (X_2/100))$
$X_{17} = 100/(1 + (X_2/200))$
SEE = Standard Error of Estimate

Our attention now turns to the curves fitted for all four countries, based on the same general methodology used for Ecuador. To evaluate goodness of fit for curves fitted at all parities, R-squared values are shown in table 7. As can be seen, R-squared is typically high, exceeding .70 in 24 out of 38 comparisons, indicating generally good fit. In order to identify parities with hazardously few points and to indicate sample size at each parity, table 7 also shows the number of points fitted; this added information establishes that the high R-squared values obtained cannot be explained away by cases with insufficient points.

Besides allowing evaluation of goodness of fit, table 7 contains indicators helpful in describing the direction and vertical travel of each fitted curve. Rows marked A(min) in table 7 show the fitted proportion wanting to avoid child-bearing, calculated for the minimum observed duration of the open interval, while rows marked A(max) show the fitted proportion wanting to avoid at the maximum observed duration of the open interval. Comparing A(min) and A(max) at each parity, we find that the proportion wishing to avoid conception is generally highest among women who have just had a birth, and then generally declines as time elapses after each birth, in 35 out of 38 possible comparisons. That represents a remarkable regularity both across parities within each country and across a particularly wide spectrum of cultures and levels of economic development. The A(min) results in table 7 at parities higher than zero indicate that in general, women in all the countries observed are very unlikely to want to conceive in the 1–3 months directly after they have had a birth. That finding is consistent with the fact that having a birth is an exhausting and physically depleting experience.

The results at parity zero, however, are rather surprising. One might expect that in most countries women who have just married would be eager to conceive their first child as soon as possible, but in Ecuador only 35 per cent want to conceive immediately and in Malaysia only 46 per cent want to conceive immediately. In the Republic of Korea a majority of 59 per cent of the just-married women indicate they would prefer to postpone conceiving. In Ghana, the most pro-natalist of all the countries considered, where one might expect universal desire for immediate conception of the first child, nearly 20 per cent of the most recently married women are estimated as wanting to avoid an immediate conception. However, the reluctance among new brides to conceive immediately ultimately gives way to the great majority of women wishing to conceive: by duration 180

TABLE 7. REGRESSION ON PROPORTION OF WOMEN WANTING TO AVOID CONCEPTION, FOR FOUR COUNTRIES, SHOWING DIRECTION OF RELATIONSHIP AND R-SQUARED AND NUMBER OF POINTS FITTED, BY PARITY

	Parity									
	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9+*
Ecuador										
A(min)	65	94	97	92	94	98	93	90	86	90
A(max)	9	27	56	75	65	58	68	84	70	69
R-SQ	.99	.95	.87	.23	.72	.85	.53	.24	.37	.38
No. of points	3	6	7	7	5	5	5	4	4	8
Ghana										
A(min)	17	90	88	96	87	83	77	83	66	79
A(max)	6	5	9	20	15	25	38	37	85	55
R-SQ	.37	.89	.88	.83	.88	.78	.50	.93	.66	.36
No. of points	5	15	15	11	11	8	7	5	4	5
Republic of Korea										
A(min)	59	93	86	92	86	88	94	100	..	..
A(max)	2	21	52	73	88	100	88	86	..	..
R-SQ	.77	.74	.81	.81	.61	.80	.76	.81	..	..
No. of points	4	11	9	9	7	6	4	3	2	2
Malaysia										
A(min)	54	92	102	99	96	99	95	94	94	101
A(max)	8	11	43	59	58	63	78	82	87	93
R-SQ	.85	.97	.96	.91	.81	.79	.42	.27	.56	.47
No. of points	6	8	10	10	8	8	6	6	5	7

NOTES:
"A(min)" refers to the fitted proportion of women wanting to avoid child-bearing at the lowest observed value of the open interval.
"A(max)" refers to the fitted proportion of women wishing to avoid child-bearing at the highest observed value of the open interval.
R-SQ for Ecuador is taken from table 6. R-SQ for other countries is taken from analogous tables (not shown).
"No. of points" indicates how many points the curve was fitted to. Obviously R-SQ is spuriously high when there are—say—only three points.
See table 5 for source of Ecuadorian R-SQ and values of A(max), A(min) and number of points.

months, the fitted proportion wishing to conceive rises to 98 per cent in Ecuador, 95 per cent in Ghana (surprisingly low), 100 per cent in the Republic of Korea, and 93 per cent in Malaysia (again, surprisingly low).

THE GRAPHS

To provide much more comprehensive detail, the fitted curves of proportions wanting to avoid conception are graphed for each country in figures II–V. Comparing across the graphs, one is struck by the orderliness and regularity of the way in which the desire to avoid conceiving behaves at varying durations of open interval, in all the countries considered.

There are nevertheless a few seeming anomalies in need of discussion. While it is plausible that substantial numbers of childless women may wish to avoid pregnancy for a few months or even years just after marriage, it may seem implausible that—based on the fitted values shown in the graphs at open interval 180 months—the proportion wishing to remain permanently childless is as high as 7 per cent in Malaysia, 5 per cent in Ghana, and 2 per cent in Ecuador. There are several possible explanations for the apparent anomaly: first, genuine motivation to avoid conceiving a first birth could arise in strained marriages or when the respondent has experienced a series of unsuccessful or difficult pregnancies; secondly, the results may represent errors of curve-fitting and the fact that the estimated proportion wanting to avoid conception at duration 180 months is extrapolated in all cases.

A similar but lesser anomaly is the large number of parity-1 women who, based on the fitted proportion for 180 months after the first birth, still do not want to conceive a second birth in the near future and thus appear to want only one child; in Ecuador the number is 21 per cent and in the Republic of Korea, 19 per cent; the number who do not seem to want a second birth is smaller in Malaysia (9 per cent) and is negligible in Ghana (3 per cent). Those results imply a considerably higher proportion wanting just one child than is obtained from desired family size distributions for Ecuador and the Republic of Korea. Since the question on desire to conceive is so much more precise and, unlike the question on total number of children desired, involves no speculation, there are at least some grounds for giving it greater credence.

Information on the intensity of the desire to avoid conceiving would greatly aid in assessing whether or not to believe prolonged desire to avoid conception at parities 0 and 1, through helping us to judge the quality of motivation and the likelihood of contraceptive adoption. It is therefore hoped that future demographic surveys will incorporate questions that elucidate and more precisely establish the meaning of the stated desire to avoid child-bearing.

Certain non-universalities should be noted at the cross-societal level. In Malaysia and the Republic of Korea, there is a reasonably orderly separation between the curves for each parity, with a rise in the proportion wanting to avoid conception at most successive parities at every point along the open interval. In Ecuador, however, the curves are clearly distinguishable from one another only at parities 0 and 1, with little difference evident between the curves at parities above 2, and in Ghana there is little apparent difference between the curves at parities 4–7.

There are several possible explanations for that lack of differentiation. First, it may reflect populations in which there is surprisingly little real difference in the desire to avoid child-bearing at those parities. On the other hand, lack of differentiation occurs largely in the extrapolated regions of the graphs, at the longer intervals. At an interval of, say, 30 months, which involves no extrapolation, there is

a more consistent relationship between parity and the proportion wanting to avoid conception, with a steady rise in the proportion wanting to avoid as parity increases; the lack of differentiation may thus be explained by inadequacies in sample size and insufficiently refined curve-fitting procedures.

To conclude the examination of figures II–V, it is my view that the regularities far outweigh the anomalies. While the proportion wanting to avoid conception rises with parity in a somewhat erratic fashion, it declines with duration of open interval in an astonishingly regular manner.

ESTIMATING DESIRED CONCEPTION WAITS

To estimate desired conception waits among women who want additional children, let $A_{i,j}$ denote the proportion wanting to avoid conception among non-pregnant parity j women with i months elapsed since the j'th birth. So long as the $A_{i,j}$ function does not increase in value as i increases, the proportion of parity j women with a desired conception wait of between i and i + n months can be estimated, using:

$$ {}_nC_i = \frac{A_{i,j} - A_{i+n,j}}{M_j} \qquad (1) $$

where the numerator calculates the decrement in the proportion wanting to avoid between months i and i + n and where the denominator M_j is our estimate of the true underlying proportion wanting more children at parity j, which is estimated using

$$ M_j = 1.0 - A_{k,j} \qquad (2) $$

where k is the highest value of i for which it is practicable to estimate $A_{i,j}$. Both equations (1) and (2) assume the $A_{i,j}$ function is downward sloping or horizontal. Whenever that assumption is met, $A_{k,j}$ will be the minimum proportion wishing to avoid conception and $1.0 - A_{k,j}$ will be the maximum proportion wishing to have additional children at parity j. To show how equations (1) and (2) are intended to operate in practice, let us apply them to the $A_{i,j}$ function in column b of table 3. The proportion wishing to avoid conception is 1.0 at month 0 and declines to a minimum of 0.50 at month 23, and remains at 0.50 at all subsequent months. In that context, k = 23; under equation (2) the proportion wanting more children then becomes $1.0 - A_{23,j} = 0.50$. To estimate the proportion wanting a conception wait of—say—0–10 months via equation (1), we would use $(A_{0,j} - A_{10,j})/M$, which equals (1.00 - .875)/.500, or 25 per cent.

The mean desired conception wait at parity j, denoted DCW_j, can then be calculated in months, using

$$ DCW_j = \frac{\sum_{i=0}^{i=k} i \cdot (A_{i,j} - A_{i+1,j})}{M_j} \qquad (3) $$

To show how equation (3) operates in practice, let us provide a simple illustration. Suppose all parity=2 women want to avoid conceiving in months 0–40 following their second birth, so that $A_{0,2}, A_{1,2}, \ldots, A_{40,2} = 1.00$; suppose also that half the parity=2 women wish to conceive at month 41, with no further switching from wishing to avoid conception to wishing to conceive, so that $A_{41,2}, A_{42,2}, \ldots, A_{k,2} = 0.50$. In such a case, the numerator is 0 for all values of i except at i = 40, so that $DCW_2 = 40 \cdot (A_{40,2} - A_{41,2})/M_2 = 40(1.00 - .50)/.50 = 40$ months.

The above equations estimate desired conception waits. The desired birth interval can also be estimated, and is equal to DCW_j plus the average time it takes to conceive plus the average pregnancy duration, or approximately $DCW_j + 14$ months.

EMPIRICAL ESTIMATES OF MEAN DESIRED CONCEPTION WAITS

Attention shifts now to examining empirical estimates of the mean desired conception wait at each parity, as shown in table 8, which are obtained through applying two variants of equation (3) to the fitted values depicted in figures II-V.

TABLE 8. ESTIMATES OF MEAN DESIRED CONCEPTION WAITS IN MONTHS FOR FOUR COUNTRIES, BY PARITY

	Parity (number of births)									
	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9+*
Ecuador										
Variant 1	30.8	48.5	49.1	17.2	34.5	65.5	56.4	4.5	30.6	124.9
Variant 2	21.3	39.4	38.1	32.5	35.0	40.8	40.9	28.7	38.5	66.6
Ghana										
Variant 1	5.2	34.9	33.6	31.9	38.4	31.2	25.4	41.9	—	61.4
Variant 2	4.7	33.0	31.4	32.0	30.1	29.2	24.3	—	—	25.4
Malaysia										
Variant 1	17.0	47.8	39.7	38.8	36.2	39.6	27.6	27.7	27.2	19.6
Variant 2	14.8	44.5	41.5	37.7	37.3	33.8	31.4	24.0	23.4	17.8
Republic of Korea										
Variant 1	23.3	29.5	75.5	33.3	..	..	6.6	10.9	..	..
Variant 2	17.5	27.0	27.5	..	..	..	..	..	..	..

NOTES:
(1) Variant 1 estimates of mean DCW (desired conception wait) are based on fitted values for each parity, and include extrapolated points for unobserved values of the open interval duration *i*, except where $A_{i,j}$ exceeds 100 or is less than 0.
(2) Variant 2 estimates of mean DCW excludes all extrapolated points for unobserved values of duration of open interval *i*. Estimates for parities 0 and 1 are based on fitted values for those parities; estimates for parities 2-8 are based on averaging the fitted values for adjacent parities. For example, values for parity 2 are based on averaging fitted $A_{i,j}$ values across parities 1, 2, 3. This was done as a preliminary effort at reducing effects of sampling variability and yields more stable values.

Variant 1 (rows marked Variant 1 in table 8) is calculated using equation (3) without alteration. As can be seen, however, the mean desired conception waits estimated using equation (3) have a tendency to jump about erratically and implausibly across successive parities in the instances of Ecuador and the Republic of Korea. The reason for that becomes clear on inspection of the graphs for those countries in figures II and IV, which indicate inconsistently large divergences in the shape of the curve of fitted values at adjacent parities.

Variant 2 (rows marked Variant 2 in table 8) is a first approximation at coping with those difficulties. The variant differs in two respects. First, the limits in equation (3) are changed to exclude extrapolated fitted values since those lie outside the range for which the equation was fitted. Secondly, with the object of reducing sampling error in the estimates of $A_{i,j}$, variant 2 re-estimates $A_{i,j}$ at parities 2–8 by averaging across the fitted values at adjacent parities.

In table 8 there is relatively little difference between variant 1 and variant 2 estimates of desired conception waits in Malaysia or Ghana, where the patterning was orderly to begin with, but there are quite large differences between the two variants in the Republic of Korea and Ecuador. Somewhat different interpretations emerge for the two latter countries, depending on which variant is chosen. In interpreting results here, attention is confined to variant 2.

First, focusing at the country-specific level of analysis, we see that in Ghana, just-married women have a short mean desired conception wait of about six months; those with one or more births, however, have mean desired conception waits typically between 29 and 33 months, except beyond parity 6, where the estimated desired waiting time is 25 months or less. In Malaysia, newly married respondents have a desired average wait of 15 months before wishing to conceive the first birth, and somewhat longer desired waits at the higher parities, ranging between 37 and 45 months at parities 1–4, and then substantially shorter desired waits at parities above 5, declining to 18 months at parity 9. In the Republic of Korea, nulliparous women appear to want to wait an average of 18 months before conceiving their first child, while at parities 1–3, the mean wait is estimated at 24–28 months; the results for higher parities are omitted because of insufficient cases at parities 8 and 9 and because of upward sloping curves at parities 4 and 5. In Ecuador, parity = 0 women wish to wait a relatively long time before conceiving the first birth, averaging 21 months; at parities 1–6 the mean wait ranges between 33 and 41 months; at parities 7 and higher the results are somewhat disorderly, ranging between 29 and 66 months.

Shifting from the country specific to the comparative level, several generalizations are possible across countries. It is apparent that the mean desired conception wait is relatively short at parity 0, then rises very markedly at parity 1, then reaches a plateau, and then declines gradually as parity increases. The desired conception wait at the higher parities (7 and above) is, except for Ecuador, surprisingly short. That quite possibly reflects a realization by high-parity women—who are older—that they had better have another child quickly if they want to have any more. It may also reflect ease of child-bearing and efficient accommodation of additional births within the family economy. It thus may indicate family economies or local settings particularly well adapted to child-rearing. It presumably also reflects an acceptance in the short run of lower standards of material

Figure II. Proportions wanting to avoid conception by number of months elapsed since last birth and by parity, for Ecuador

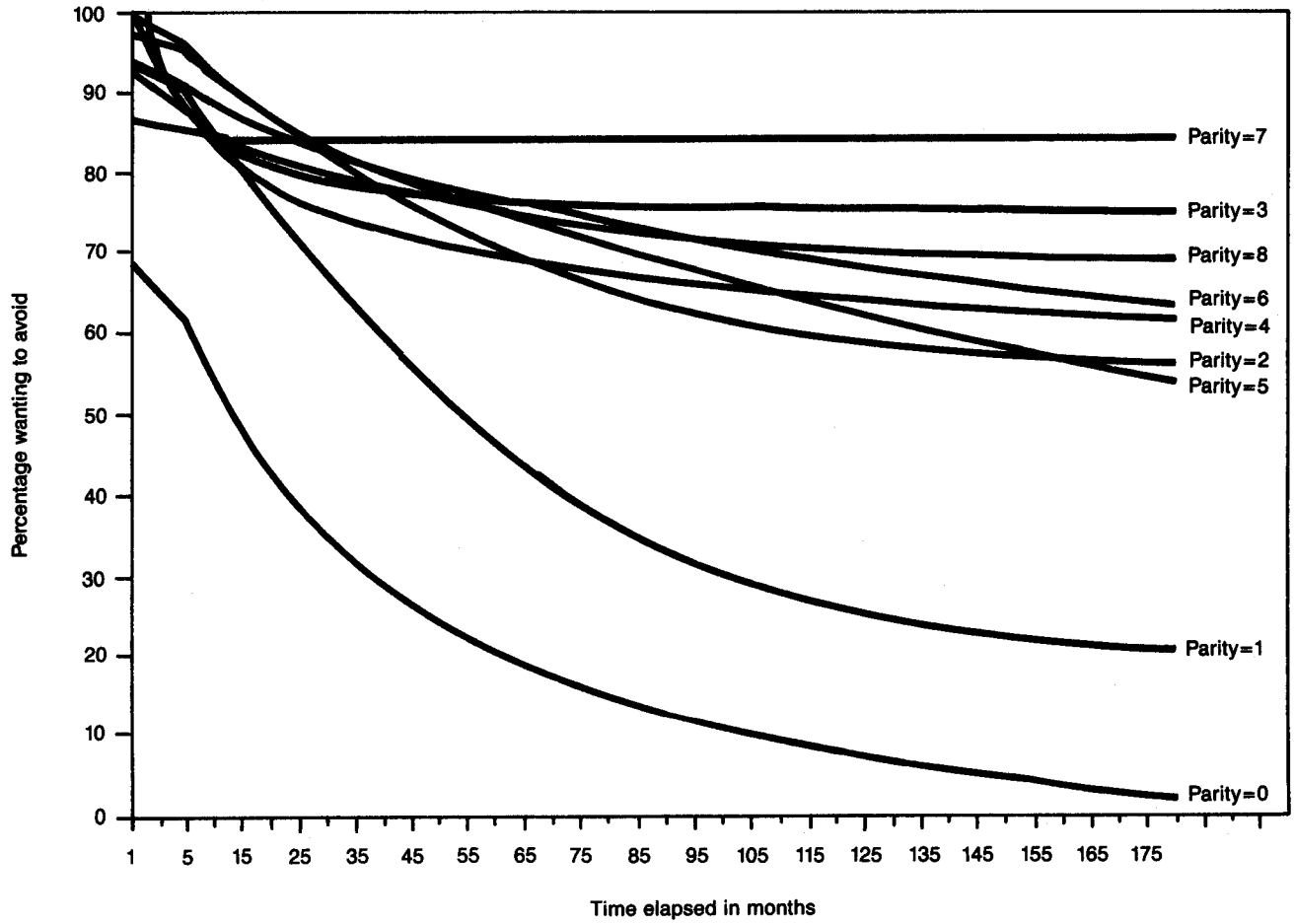
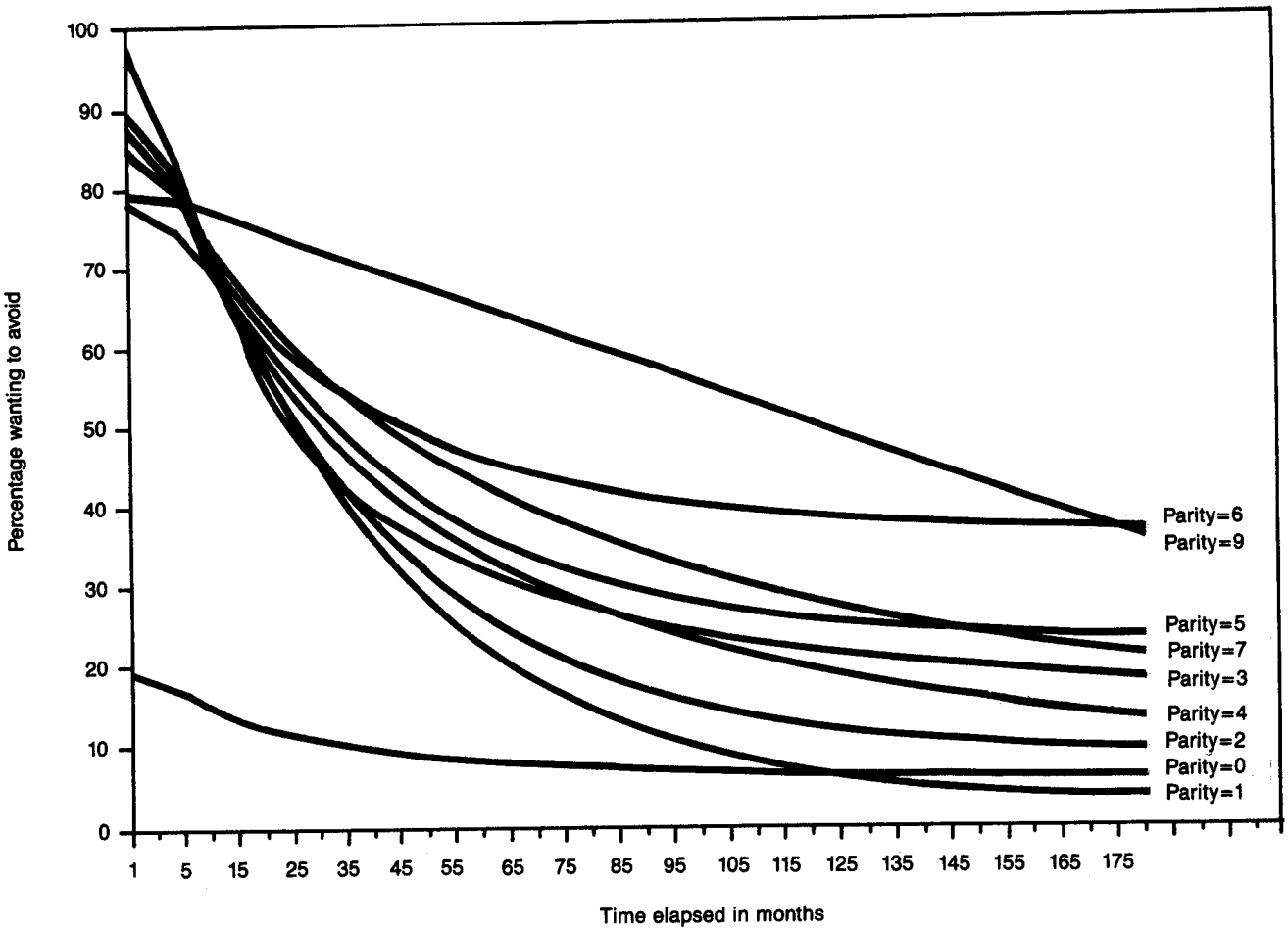


Figure III. Proportions wanting to avoid conception by number of months elapsed since last birth and by parity, for Ghana



existence, less expenditure per child, and more physically crowded households. One speculates that analysis of differentials in the desire to conceive at high parities by occupation, female labour force participation, degree of urbanization, regional location and community characteristics may shed some light on those issues.

THE DISTRIBUTION OF DESIRED CONCEPTION WAITS

The discussion so far has been limited to the mean desired conception wait. The mean is a useful summary indicator, but nevertheless hides a great deal. With the object of providing more detailed information, table 9 presents distributions of desired conception waits among women who want additional children, showing the percentages wanting to wait for specified time periods. The results are calculated using equation (1) on the fitted distributions at single parities, without averaging across parities, and without excluding extrapolated percentages except when they fall outside the 0–100 range.

Before the results displayed in table 9 are discussed, it should be emphasized that the percentage distributions are to be viewed as preliminary estimates that should not be interpreted too literally. More conclusive interpretation will have to wait until a greater variety of alternative curves are fitted and until a wider number of countries are included in order to obtain the insights of a larger scale comparative analysis. The distributions for Ghana and Malaysia in table 9 appear to be reasonably orderly and consistent, while those for Ecuador and the Republic of Korea are not. We now conduct a country-by-country review of the results.

Figure IV. Proportions wanting to avoid conception by number of months elapsed since last birth and by parity, for Republic of Korea

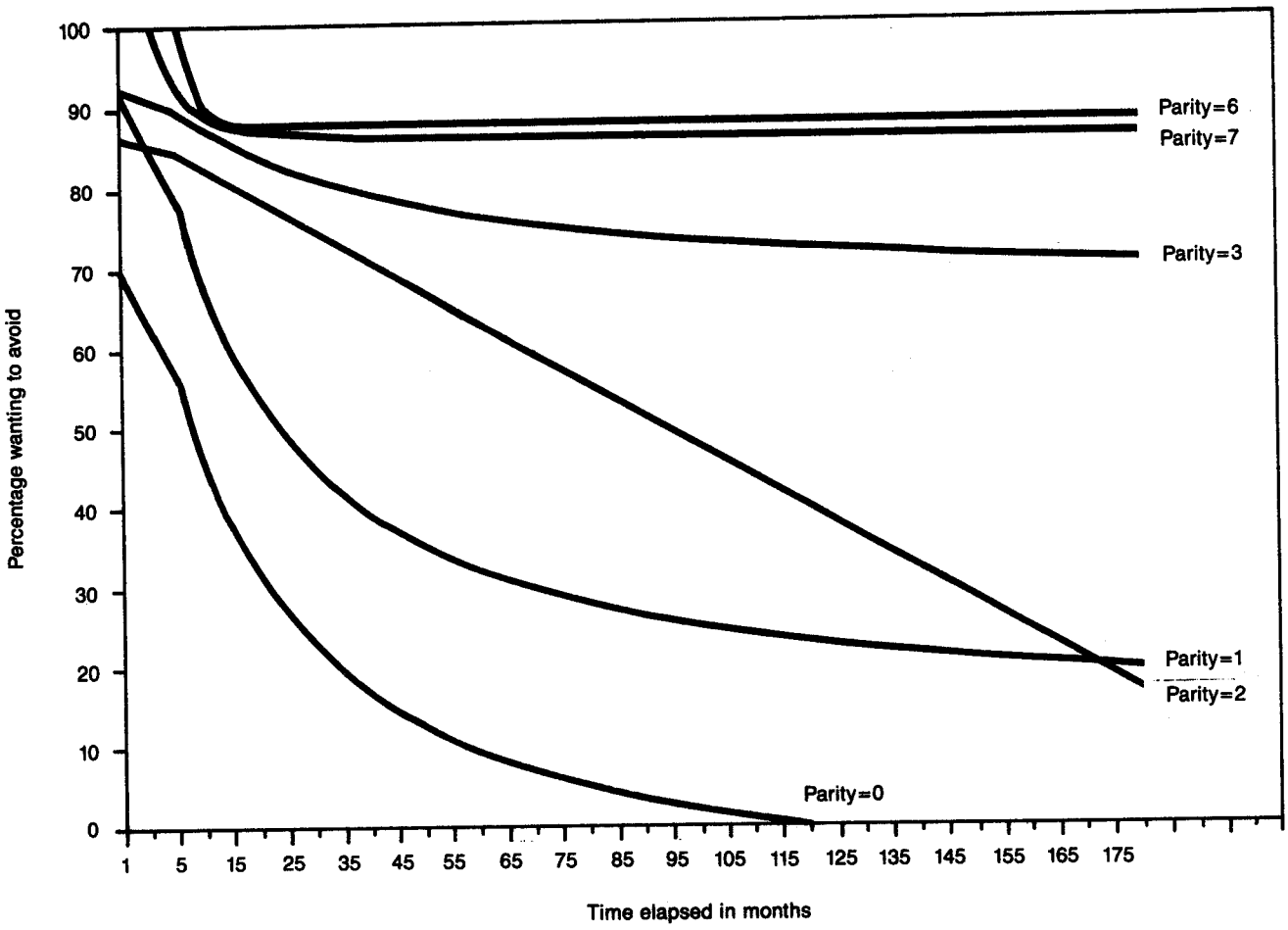
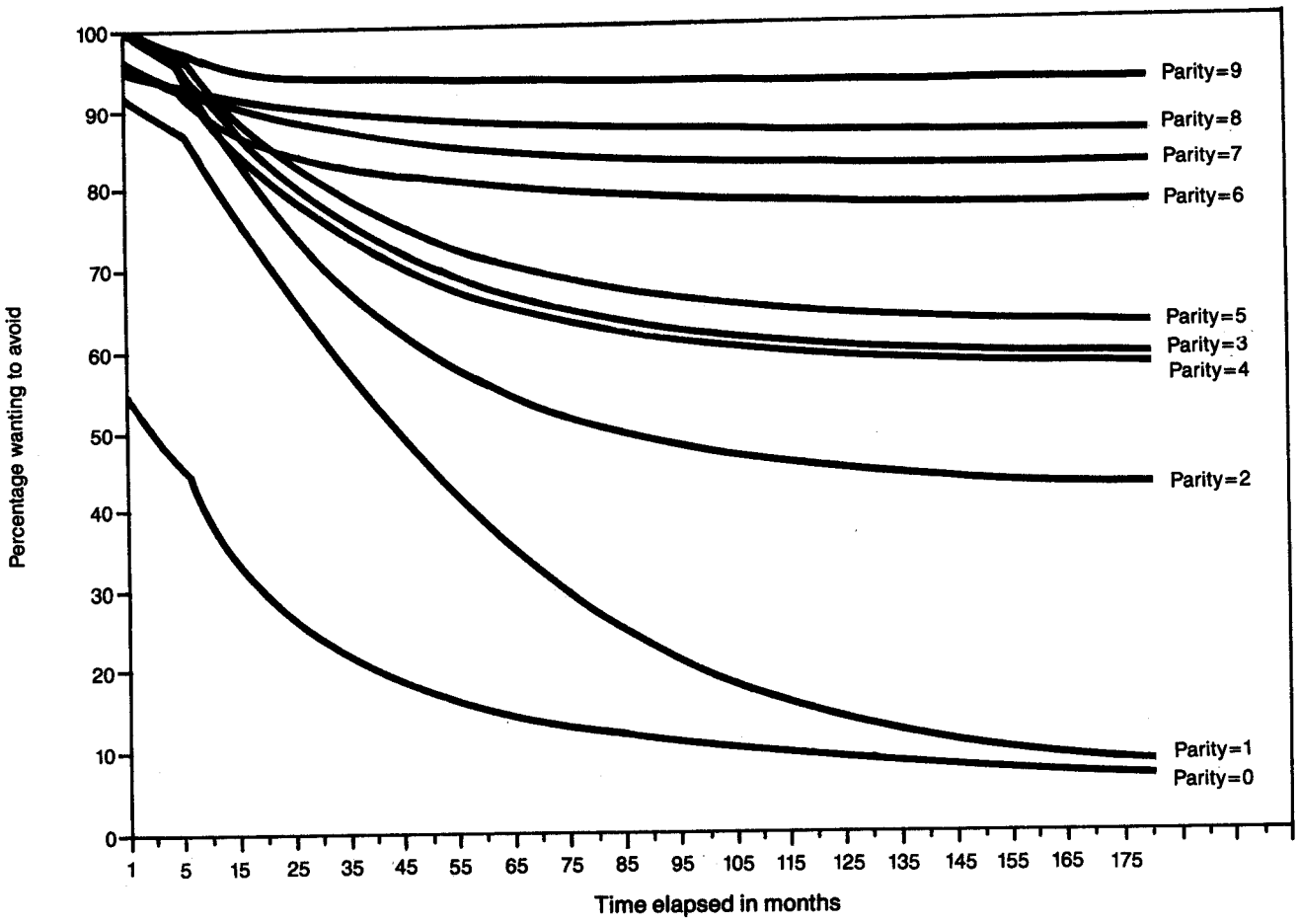


Figure V. Proportions wanting to avoid conception by number of months elapsed since last birth and by parity, for Malaysia



In the instance of Ghana, which best fulfils the model's assumption that there are significant numbers of non-contraceptors in the society, table 9 indicates that about 90 per cent of newly wed women wish to conceive within the first 10 months of marriage. At higher parities, among women who want additional children, between 30 and 40 per cent of the respondents appear to wish to conceive within the first 10 months immediately following a birth, and between 25 and 40 per cent wish intervals in excess of 40 months. If taken at face value, the estimate of between 30 and 40 per cent wanting to conceive again within 10 months of parturition indicates a need for educating Ghanaian couples on the dangers of narrow birth intervals to maternal and child health.

There are, however, two reasons for thinking that the estimates in table 9 probably overstate the proportion wishing to conceive quickly and understate the desired conception wait in Ghana: first, as noted above, the Ghana questionnaire was inappropriately vague for our purposes here, asking "Would you rather have a baby in the next year or so, or would you prefer to wait for several years?", thus probably overcounting the number of women wishing to conceive in the immediate future. The second reason is that very large numbers of high-parity Ghanaian women declared themselves as undecided whether they wanted to have any more children at all[1] and those women are in the present estimation counted as wanting another birth as soon as possible, which in our view further over-estimates the short-run desire to conceive. It is hoped that future surveys will ask women undecided as to whether they want additional children how they would feel about conceiving in the near future, establishing whether they are strongly opposed, only slightly opposed, or whether they would not really mind. It thus seems highly likely that the desire for postponement of conception among Ghanaian women is under-estimated in table 9. In spite of that probable under-estimation, the results do clearly suggest that there is substantial potential demand for contraception for postponing reasons in Ghana, with well over 60 per cent of the women having desired conception waits in excess of 10 months at parities 1 and higher.

In the instance of Malaysia, table 9 indicates that nearly 70 per cent want to conceive within the first 10 months of marriage, though there is a significant minority wanting to postpone conception for longer periods, with more than 20 per cent wishing to postpone their first conception for at least 20 months. At parities 1–5, between 18 and 27 per cent wish to conceive again within the first 10 months after the prior birth, and between 25 and 45 per cent wish to wait

TABLE 9. ESTIMATED DISTRIBUTION OF DESIRED CONCEPTION WAITS AMONG WOMEN WHO WANT ADDITIONAL CHILDREN
(Percentage)

	Parity									
Months since last birth	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9+*
Ecuador										
0-10	46.7	18.4	17.3	61.9	44.0	16.5	28.4	94.3	48.9	13.3
10-20	11.5	11.5	11.6	14.3	13.5	10.8	9.2	3.8	7.5	0.0
20-30	8.2	10.8	11.1	7.1	7.8	8.0	7.0	1.3	6.5	0.0
30-40	6.1	9.9	10.0	4.0	5.7	6.9	5.9	0.0	6.2	0.3
40-60	8.6	16.6	16.8	5.2	7.8	11.7	9.7	0.6	10.4	0.8
60-90	7.9	16.6	16.8	3.6	8.0	14.1	12.2	0.0	10.4	4.4
90-180	10.9	16.1	16.4	4.0	13.2	32.0	27.6	0.0	10.1	81.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ghana										
0-10	90.4	28.9	31.3	35.8	33.3	36.5	48.3	33.5	..	35.7
10-20	2.9	15.9	15.5	18.8	14.4	14.2	11.6	11.6	..	3.9
20-30	1.7	12.5	12.0	11.4	10.3	11.2	9.2	9.1	..	3.7
30-40	1.1	9.6	9.3	7.5	7.7	8.7	7.0	7.3	..	3.7
40-60	1.5	13.4	13.0	9.5	10.8	11.9	9.8	11.0	..	7.6
60-90	1.2	11.0	10.5	7.6	9.9	9.7	7.9	10.9	..	11.4
90-180	1.4	8.7	8.4	9.3	13.7	7.8	6.3	16.5	..	34.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	..	100.0
Malaysia										
0-10	66.3	19.6	18.6	21.2	26.7	19.1	44.1	43.3	52.6	52.9
10-20	9.9	11.4	18.3	17.8	16.3	18.3	16.6	12.8	10.2	20.0
20-30	5.9	10.7	14.3	13.7	12.8	14.0	9.6	10.0	7.3	10.0
30-40	4.0	9.7	11.0	10.6	10.2	11.0	6.6	7.8	5.8	4.3
40-60	4.9	16.3	15.3	14.9	13.7	15.3	8.3	10.6	7.3	5.7
60-90	4.0	16.4	12.5	12.0	11.1	12.4	7.0	8.9	7.3	2.9
90-180	4.9	16.0	9.9	9.9	9.2	9.9	7.9	6.7	9.5	4.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Republic of Korea										
0-10	55.1	40.6	20.8	41.9	..	..	89.5	73.0	..	..
10-20	14.2	17.5	4.7	12.5	..	..	8.1	20.4	..	..
20-30	8.6	10.4	4.7	9.1	..	..	1.6	3.6	..	..
30-40	5.7	7.1	4.7	6.8	..	..	0.0	1.5	..	..
40-60	7.1	8.7	9.2	9.5	..	..	0.8	0.7	..	..
60-90	5.8	7.2	14.0	8.4	..	..	0.0	0.0	..	..
90-180	3.5	8.6	41.9	11.8	..	..	0.0	0.7	..	..
TOTAL	100.0	100.0	100.0	100.0	..	..	100.0	100.0	..	..

NOTE: Estimated using equation (1) upon fitted values, including extrapolated values.

more than 40 months, with a significant minority, in the neighbourhood of 20–30 per cent, wanting conception waits in excess of five years. At parities 6 and above, it appears that while very low proportions of women wish to have more children (see figure V), a relatively high proportion (ranging between 40 and 50 per cent) wish to conceive within the first 10 months following parturition, indicating a potential maternal child health problem; on the other hand, about 20 per cent are estimated to desire waits of at least 40 months before conceiving again. In the case of Malaysia, one recalls that the question on whether the next birth is desired sooner or later is fairly well worded for the purpose of the present analytical frame, asking whether the next birth is wanted as soon as possible, and overall the Malaysia data appear to be both consistent and of good quality.

In the instance of Ecuador at parity 0, a massive number of just-married women—more than half—do not seem to want to conceive within the first 10 months of marriage, and over 25 per cent want to delay the first birth for at least 40 months. At parities 1–5 the pattern is irregular, however; at parities 1, 2 and 5, slightly less than 20 per cent are estimated to want to conceive in the first 10 months after a new birth, and about 50 per cent wish to wait at least 40 months before conceiving again; at parities 3 and 4, however, a much higher proportion wishes to conceive in the first 10 months, between 44 and 66 per cent, while a much lower proportion wishes to postpone for longer than 40 months. Beyond parity 5 the pattern remains irregular. To better evaluate the credibility of those results, there is a need to extend the estimation to other Latin American countries, while also applying alternative modelling procedures to the Ecuadorian data. It nevertheless seems clear that large numbers of Ecuadorian women wish to postpone births for quite long periods, despite data that probably under-counts the desire to postpone because of question wording that probably over-estimates the desire to conceive.

In examining results for the Republic of Korea in table 9, attention should focus solely on parities 0–3 because so few women wish additional children at the higher parities. More than half the newly married women wish to conceive within 10 months of marriage, but a substantial minority—45 per cent—want to postpone for longer than that. At parities 1–3, somewhere between 20 and 40 per cent wish to conceive within 10 months of the last birth, and between 25 and 65 per cent are estimated to want conception waits of 40 months or longer. In the World Fertility Survey of 1974, the Republic of Korea had particularly low proportions using contraception for postponing reasons, though the results in table 9 suggest that there were indeed sizeable numbers of parity 2 women wishing to postpone for quite long periods.

Before concluding the interpretation of findings, several points of a methodological nature need to be stressed. First, the exclusion of contraceptors in estimating proportions wanting to avoid conception is, under the present method, indispensable, but at the same time it introduces some potential bias in the direction of under-estimating desired conception waits, so that the estimates presented above should be regarded as minimum estimates of desired conception waits. Also, there is most probably some downward bias in the desired conception waits for Ecuador and Ghana as a result of question wording that was inopportune from the standpoint of trying to measure the instantaneous desire to conceive or avoid conception.

Secondly, even from the potentially downwardly biased estimates presented here, it seems clear that in several countries the mean desired conception wait is quite long.

Thirdly, the results must be regarded as somewhat preliminary. The estimate of the mean desired conception wait and its distribution is very sensitive to the shape of the curve fitted. It will be desirable to experiment with alternative curve fittings and to expand the number of countries analysed, in order to arrive at more definitive interpretations, and to see whether the conclusions derived above are sustained in a wider comparative analysis.

Fourthly, a question not resolved here is whether the estimates presented are different from the estimates of desired conception waits resulting from direct questions asking how long respondents want to wait before having another child. Despite the large number of surveys asking the direct question, there has been very little published analysis of the results.

Policy implications of information on desired conception waits

The findings on desired conception waits, while requiring cautious interpretation, nevertheless have several implications for population policy. Recent analyses have indicated that infant mortality rates are much higher among children who have been born after an interval of less than two years, and have suggested that use of contraception for spacing purposes is likely to have a substantial impact in reducing child mortality.[1] According to the findings presented above, there are far too many women wanting to conceive in the first 10 months after a birth, and there thus seems to be a corresponding need to educate women on the advantages of postponing the next conception for at least 15 months.

Secondly, for countries that wish to reduce fertility and that have very high desired family size, conception waits in excess of five years are likely to be of some significance in slowing fertility, if implemented. A desired conception wait of five years implies a birth interval of about six years, and a birth interval of six years implies an upper limit of perhaps five wanted births for women having their first birth at age 20, with subsequent births at ages 26, 32, 38 and 44; after accounting for fecundity impairments that accelerate in the mid-30s, there is implied an upper limit of perhaps 4–4.5 births, even in a population where all women want more than five births. These observations seem particularly relevant to the Ghanaian case, where nearly 20 per cent of higher parity women appear to want a desired conception wait in excess of five years, and where the proportions wanting to postpone for long periods is probably understated, because we have classified women uncertain as to whether they want more children as wanting the next birth as soon as possible.

Thirdly, women who learn to postpone successfully are much less likely to have births in excess of their desired stopping point. The earlier in the reproductive career that successful contraceptive behaviour is learned, the more likely that failure to control fertility will be avoided and the more likely that motivation for abortion will be reduced.

Fourthly, the results presented here imply very substantial numbers of women with desired conception waits in excess of 10 months, who are hence in need of contraception.

Fifthly, it seems appealing to hypothesize that substantial numbers of women who initially adopt contraception with the intention of postponing the next birth will switch to wishing to stop child-bearing before actually having another birth, if they are successful in implementing the desire to postpone. There is a need to test this thesis with existing

data. If it proves true, then the demographic impact of contraception for postponing purposes is likely to be very much greater than has hitherto been believed.

ESTIMATING THE NUMBER OF BIRTHS WANTED OVER A LIFETIME

Once one has obtained schedules of proportions wanting to avoid conception by the number of months elapsed since the last birth, with a separate schedule for each parity, as described above, it then becomes possible to estimate the average number of births women would have over a lifetime if they were to implement fully their desires to avoid conception. Such an approach would have the advantage of fully accounting for desires to postpone and terminate conception. A model for making such estimates is outlined here and then applied to the data at hand.

Let:

- m = earliest age at marriage, in calendar months (e.g., m = 180 months implies earliest marriages at age 15.0);
- x = age in calendar months;
- j = parity, or number of live births;
- i = months elapsed since entry to parity j;
- n = number of months it takes to have a birth after initiation of the desire to conceive; n will be taken as being 15 months, representing 9 months pregnancy and 6 months conception wait, except during the 10 months following a birth, in which case $n = 24 - i$, where i number of months elapsed since the birth;
- $A_{i,j}$ = proportion wanting to conceive among women with i months elapsed since the occurrence of the jth birth;
- $C_{i,j}$ = proportion wanting to conceive among women with i months elapsed since entry to parity j, calculated using $C_{i,j} = A_{i,j} - A_{i-1,j}$, where $A_{i,j}$ is the proportion wanting to avoid conception among women with i months elapsed since the last birth, whose estimation has been discussed above;
- $B_{x,j}$ = the array of births by parity and by calendar month of age, with age ranging from age m to age 50 years or 600 months, and with j ranging from 1 to the highest desired parity;
- $B_{x,0}$ = the number of women entering parity 0 at age x, which is equivalent to the number marrying at age x;
- $F_{x,j}$ = the proportion fecund at age x and parity j, capable of progressing to parity $j + 1$.

Using this terminology, the number of desired births at age x and parity j can then be estimated using

$$B_{x,j} = \sum_{i=0}^{i=x-m-n} C_{i,j-1} \cdot B_{x-i-n,j-1} \cdot F_{x-i-n,j-1} \quad (4)$$

For example, suppose the earliest age of marriage is 180 months, and that all newlyweds are fecund. Then the number of wanted births at parity 1 and age 194 months will equal the number of women marrying at age 180 months times the proportion of parity 0 women wishing to conceive 0 months after marrying, so that $B_{194,1} = C_{0,0} \cdot B_{180,0}$. By the same token, the number of wanted parity 1 births at 196 months is calculated using $B_{196,1} = B_{182,0} \cdot C_{0,0} + B_{181,0} \cdot C_{1,0} + B_{180,0} \cdot C_{2,0}$.

To factor marriage into the model, the number of entrants to marriage at age x, denoted $B_{x,0}$, was calculated by assuming a total cohort of 1,000 single women at risk of marriage, and then estimating the number from this cohort marrying at age x from country-specific data showing cumulative life-table proportions married by single years of age, taken from Smith and from Ebanks and Singh.

In the absence of a satisfactory set of country-specific schedules giving survivorship in fecundity status by age and parity, we were constrained to ignore age, and to rely instead upon parity-specific proportions progressing from parity j to parity $j + 1$, based on the distribution by parity of rural never-divorced women aged 45–49 who had never used contraception, using data from the 1977 Kenya Fertility Survey to represent fecundity in Ghana, Malaysia and the Republic of Korea, and using data from the 1976 Colombia Fertility Survey to represent fecundity in Ecuador. This will tend to over-estimate parity progression among women who wait for substantial periods at each parity, and thus to over-estimate the number of wanted births.

The model as specified above thus estimates the number of wanted births that a cohort of women would have over a lifetime were they subject to infecundity and to the estimated schedules of proportions wishing to avoid conception as a function of parity and of time elapsed since the last birth.

EMPIRICAL ESTIMATES: NUMBER OF WANTED BIRTHS

In order to give a closer view of the way that equation (4) operates, the upper half of table 10 gives the detailed breakdown of desired births by age and parity for Ecuador, under two differing assumptions concerning fecundity. The reason that only 92.5 per cent of the women have a first birth under the "no infecundity" assumption of the lower half of table 10 is that only 92.5 per cent of women ever marry, under the cumulative life table proportions ever marrying calculated for Ecuador.

In table 11, the number of wanted births calculated by the avoidance model described above is contrasted with total fertility rates, for all four countries.

Subject to cautions discussed below, those results suggest that if women fully implement their postponing and terminating preferences, fertility would fall very sharply in all the countries at hand. The result for Ghana is especially striking, with a decline in births from 6.1 to 4.6. In Ecuador, the total fertility rate would be more than halved, from 5.2 births to 2.2. In the Republic of Korea it would decline from 3.9 births to 2.7 births. In Malaysia, it would decline from 4.5 births to 2.6.

Another contrast provided in table 11 is that between desired family size based on asking women how many children they want in all, and total number of births wanted under the instantaneous-demand-for-children model, based on whether women want to conceive or to avoid conceiving. The contrast implies that if women were to implement fully their postponing preferences and their terminating preferences, the number of births actually wanted would be far lower than is implied by statements of desired family size.

The estimates based on implementation of desires to postpone and to terminate are more philosophically appealing than those based on the question on total number of children desired, since there is no reason to believe that most women adopt fixed target numbers of children, and much more reason to suppose that desired number of births in a cohort is

TABLE 10. WANTED BIRTHS UNDER DIFFERING FECUNDITY ASSUMPTIONS: ECUADOR

Age	Parity j 1	2	3	4	5	6	7	8	9	10	All
Assuming Colombian pattern of parity-specific fecundity represented by F_j											
15-19	206.8	17.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	224.1
20-24	312.6	156.9	15.3	0.9	0.0	0.0	0.0	0.0	0.0	0.0	485.8
25-29	206.1	235.3	59.3	8.2	1.0	0.0	0.0	0.0	0.0	0.0	510.0
30-34	108.5	200.6	88.0	17.2	3.6	0.4	0.0	0.0	0.0	0.0	418.3
35-39	37.9	133.1	83.6	20.1	5.8	1.1	0.1	0.0	0.0	0.0	281.9
40-44	10.0	66.1	60.6	17.1	6.4	1.9	0.3	0.0	0.0	0.0	162.5
45-49	2.1	25.9	34.8	11.6	5.7	2.4	0.5	0.1	0.0	0.0	83.2
15-49	884.1	835.2	341.7	75.2	22.6	5.9	1.0	0.1	0.0	0.0	2 165.8
F_j	0.956	0.961	0.968	0.925	0.903	0.860	0.850	0.838	0.789	0.733	
	Parity										
Age	1	2	3	4	5	6	7	8	9	10	All
Assuming no infecundity (100 per cent parity progression: F_j = 1.000)											
15-19	216.3	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	235.1
20-24	327.0	170.8	17.2	1.1	0.0	0.0	0.0	0.0	0.0	0.0	516.2
25-29	215.6	256.1	66.7	9.9	1.4	0.1	0.0	0.0	0.0	0.0	549.8
30-34	113.5	218.4	98.9	20.9	4.9	0.6	0.1	0.0	0.0	0.0	457.2
35-39	39.7	144.9	94.1	24.4	7.9	1.8	0.3	0.0	0.0	0.0	312.9
40-44	10.4	71.9	68.2	20.8	8.7	3.0	0.6	0.1	0.0	0.0	183.7
45-49	2.2	28.2	39.1	14.2	7.6	3.8	1.0	0.1	0.0	0.0	96.3
15-49	924.8	909.1	384.2	91.4	30.4	9.2	1.9	0.2	0.0	0.0	2 351.3
F_j	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	

NOTES:

The fecundity schedule shown in row marked F_j is based on the proportion progressing from parity j to parity j + 1. The Colombian pattern is derived from the distribution by live births of Colombian rural never-divorced women in the WFS survey of Colombia. F_j for Ghana, Republic of Korea and Malaysia are based on the analogous distribution from the WFS survey of Kenya.

The "representative marriage schedule" is obtained through life-table proportions marrying at each single year of age; the schedule for ages x to x + 4 is based on women aged x + 5 to x + 9 at the time of the survey. The source for Ecuador and Ghana is G. E. Ebanks and S. Singh, "Socio-economic differentials in age at marriage", *WFS Comparative Studies*, preliminary tables distributed at the World Fertility Symposium, April 1984, held at the International Statistical Institute, Voorburg, Netherlands. The source for the Republic of Korea and Malaysia is D. P. Smith, "Age at marriage", *WFS Comparative Studies, No. 7* (Voorburg, Netherlands, International Statistical Institute, 1980).

achieved by satisfying the short-run demand for children in that cohort over the succession of short-run periods that encompass the cohort's reproductive lifetime, subject to the supply-side constraints raised by fecundity impairments.

One other noteworthy feature of table 11 is the comparison between the number of wanted births as presented in column 1 and the wanted total fertility rate (TFR) as presented in column 4. It has been previously argued that the wanted TFR is a much better measure of total demand for births than is desired family size. On the other hand, it has also been argued that wanted total fertility rates nevertheless have an unfortunate in-built tendency to over-estimate the total number of births desired over a lifetime because they do not fully account for preferences to postpone births.[1] The comparison between columns 1 and 4 supports that argument in the cases of Ecuador, Ghana and Malaysia, where wanted births as estimated in column 1 are substantially lower than the wanted TFR as estimated in column 4. For the Republic of Korea, however, the 2.7 wanted births estimated in column 1 is somewhat higher than the wanted TFR of 2.5 births estimated in column 4. We are disinclined to reject the wanted TFR in this instance, and instead believe from inspection of the data underlying the estimate in column 1 that there may be under-estimation of desire to avoid child-bearing at parity 2 and hence too many parity 3 births; indeed, the plotted curve for parity 2 for the Republic of Korea in figure IV shows markedly higher demand for children than is consistent with the other curves for that country. This may be the result of exclusion of contraceptors or just of imperfections in the approach used for curve-fitting. It is nevertheless very clear that the recorded total fertility rate of 3.9 for 1972–1974 was much higher than either the wanted TFR or the wanted births estimate in column 1.

Certain general cautions need to be emphasized here. While it is philosophically attractive to regard the number of wanted births as being the outcome of a lifetime spent satis-

TABLE 11. NUMBER OF BIRTHS WANTED, CONTRASTED WITH TOTAL FERTILITY RATE, DESIRED FAMILY SIZE AND WANTED TOTAL FERTILITY RATE

	Number of births wanted (1)	Total fertility rate 0-2 years before survey (2)	Desired family size (3)	Wanted total fertility rate 0-2 years before survey (4)
Ecuador	2.2	5.2	4.1	3.1
Ghana.....	4.6	6.1	6.0	5.6
Republic of Korea	2.7	3.9	3.1	2.5
Malaysia.....	2.6	4.5	4.3	3.1

Sources:

Column 1: Calculated using equation (4).

Columns 2, 3, 4: R. E. Lightbourne, "Desired number of births and prospects for fertility decline in 40 countries", *International Family Planning Perspectives*, vol. 11, No. 2 (1985), p. 37. Estimates of wanted total fertility rates for Ghana and Malaysia used an indirect estimation technique described in that paper.

NOTE: In calculating number of births wanted using equation (4), it was necessary to adopt a convention for handling cases where the $A_{i,j}$ function was increasing. In instances where the function was increasing at parity j, values from parity j − 1 were used. This introduces bias in the direction of over-estimating the number of wanted births.

fying instantaneous demand for children at successive parities, it should be emphasized that the estimates given above represent just a "first cut" at the problem, and are based on a less than exhaustive search for best fit in estimating the functional relationships between the desire to avoid conception, parity, and duration of open interval. It should be recognized also that the model in its present form affords considerable opportunity for propagation of error. If the demand for children is under-estimated at just one parity, the under-estimate is propagated to all subsequent parities. The estimates of wanted births from wanted total fertility rates are not subject to any such propagation of error and are therefore more robust, and at present provide what we feel to be a reliable upper-bound estimate of the number of wanted births.

There are several ways in which the reliability of the instantaneous-demand-for-children model may be substantially improved and its current defects overcome, through investment of research effort. One way is to improve the collection of data helpful in more robustly estimating the time trajectory of the proportion wanting to conceive at each parity: in particular, it may be helpful to question pregnant respondents so that their pregnancies could be classified as either (*a*) wanted at time of conception, or (*b*) occurring at a time when the respondent wanted to postpone, or (*c*) occurring at a time when the respondent wanted to terminate. Such data would be helpful in avoiding the potential bias inherent in ignoring the motives of currently pregnant women and would effectively bolster sample size.

A second way of improving the model would be to advance beyond the present exclusion of contraceptors in estimating proportions wishing to avoid conception. That can probably best be achieved through converting the real data into a simulacrum of a "no pregnancies" model. If no one were allowed to get pregnant in the model, then the selection biases of contraception are overcome. Information on the "wantedness" status of pregnancies observed at survey time could be particularly helpful in that regard. A third way would be by securing proper estimates of proportions remaining fecund by both age and parity, to avoid the crudities of basing infecundity on parity progression, which upwardly biases the number of additional births for women who postpone for long periods. A fourth way is by incorporating questions on reproductive desires to conceive, postpone, and terminate into longitudinal studies where respondents are repeatedly interviewed for a period of perhaps 3–5 years. The aim would be to study the test/retest reliability of the data and also to test whether the method described here for cross-sectional estimation of proportions wanting to avoid conception is supported by observations over time.

THE POTENTIAL DEMAND AND UNMET NEED FOR CONTRACEPTION

Once one has information on proportions wanting to avoid conception by parity and time elapsed since the last birth, it becomes possible to estimate the proportion of currently married women who would be using contraception if all were to implement their desires to postpone and to terminate child-bearing.

Conceptually, this is equivalent to the idea of "potential demand for contraception", as described by Nortman. To operationalize the concept here, we will calculate as numerator the number of person-months spent in the reproductive years wanting to avoid conception while being at risk of becoming pregnant, and will calculate as denominator the total number of person-months lived by married women over the reproductive span. Many fine tunings are possible, but in the interests of simplicity we make certain assumptions. At parity 0 it is assumed that all the months lived in the state of wanting to avoid conception should be counted as months in need of contraception. At parities 1 and higher, it is assumed that months lived in the state of wishing to avoid conception should be counted as implying potential demand for contraception only when more than 10 months have elapsed since the prior birth; women who want to avoid conceiving are thus not counted as being potential users during months 0–10 following a birth, on the grounds that they are breast-feeding or abstaining from intercourse or are post-partum infecund. This introduces an easily corrected bias in the direction of under-estimation of potential demand for contraception, in countries where substantial proportions do not breast-feed or breast-feed for only short periods, or have short post-partum abstinence.

To count number of person-months that would be spent using contraception at parity j we used the equation

$$PM_j = \sum_{x=m}^{x=M} \sum_{i=I^*}^{i=M-m} B_{x,j} \cdot A_{i,j} \qquad (5)$$

where M = age at menopause (taken as 45 years), m = age at entry to marriage, in calendar months, PM_j is number of person-months spent in the state of wishing to avoid pregnancy at parity j, and $B_{x,j}$ is number of entrants to parity j at age x as defined above in equation (4). The starting value of i in the second summation, shown above as I*, is 0 at parity 0, and will be taken as being 10 at parities 1 and higher, following the convention of excluding breast-feeding women when counting potential demand for contraception.

$$D = \sum_{j=0}^{j=9} PM_j / 12.0 \qquad (6)$$

Thus the long-run steady-state total potential demand for contraception among currently married women, denoted T, becomes

$$T = D/YM \qquad (7)$$

where YM denotes total person-years married that are lived between initial age of marriage and age 45.0. Since the model does not allow for widowhood or divorce and remarriage, equation (7) estimates the potential demand for contraceptive prevalence among currently married women.

This method estimates the long-run potential demand for contraception, which is higher than the short-run potential demand. In the short run there were some individuals who wished to avoid conception, did nothing about it, and discovered they were infecund; they should not be counted as potentially demanding contraception. Such women will persist in the population for at least 20 years. In the very short run, at the time of the survey, some women were pregnant with an unwanted child or had just had an unwanted birth and had not resumed intercourse or were breast-feeding, and are thus excluded from some calculations of "unmet need" for conception. In the broader sense, there is much evidence that, in the short run, there are a number of women who do not know enough about contraception, or who distrust it, or have poor access to it, or who are weakly motivated to avoid conception, or who have husbands who

TABLE 12. PERSON-YEARS LIVED IN THE STATE OF WANTING TO AVOID CONCEPTION AND TOTAL YEARS LIVED IN THE EVER-MARRIED STATE, BY A COHORT OF 1,000 WOMEN SUBJECT TO INFECUNDITY AND A REPRESENTATIVE MARRIAGE SCHEDULE: ECUADOR

Age	Parity											Total years
	1	2	3	4	5	6	7	8	9	10	All	
15-19	608	123	1	0	0	0	0	0	0	0	732	1 474
20-24	925	845	229	9	0	0	0	0	0	0	2 008	3 376
25-29	658	1 141	924	118	10	1	0	0	0	0	2 852	4 289
30-34	318	885	1 642	389	50	8	1	0	0	0	3 292	4 576
35-39	101	508	2 106	724	113	24	3	0	0	0	3 578	4 625
40-44	21	220	2 318	1 012	175	45	8	1	0	0	3 800	4 625
45-49	4	85	2 367	1 187	216	61	15	2	0	0	3 937	4 625
15-49	2 635	3 806	9 587	3 438	564	139	26	4	0	0	20 200	27 590
15-44	2 631	3 721	7 220	2 251	348	78	11	2	0	0	16 263	22 965
F_j	0.956	0.961	0.968	0.925	0.903	0.860	0.850	0.838	0.789	0.733		

NOTES:

The fecundity schedule shown in row marked F_j is based on the proportion progressing from parity j to parity j+1. The Colombian pattern is derived from the distribution by live births of Colombian rural never-divorced women in the WFS survey of Ecuador. F_j for Ghana, the Republic of Korea and Malaysia are based on the analogous distribution from the WFS survey of Kenya.

The "representative marriage schedule" is obtained through life-table proportions marrying at each single year of age; the schedule for ages x to x+4 is based on women aged x+5 to x+9 at the time of the survey. The source for Ecuador and Ghana is G. E. Ebanks and S. Singh, "Socio-economic differentials in age at marriage", *WFS Comparative Studies*, preliminary tables distributed at the World Fertility Symposium, April 1984, held at the International Statistical Institute, Voorburg, Netherlands. The source for the Republic of Korea and Malaysia is D. P. Smith, "Age at marriage", *WFS Comparative Studies, No. 7* (Voorburg, Netherlands, International Statistical Institute).

TABLE 13. LONG-RUN POTENTIAL DEMAND AND UNMET NEED FOR CONTRACEPTION AMONG WOMEN AGED 15-44

	Ecuador	Ghana	Republic of Korea	Malaysia
Potential demand for contraception				
A. Currently married women (adjusted for age structure)	69	53	69	67
B. Currently married, fecund women	75	59	79	75
C. Exposed women (married, fecund, non-pregnant).....	89	69	90	86
Alternative estimate of potential demand				
D. Nortman estimate of potential demand for contraception for postponing and terminating purposes among currently married, fecund women (comparable with line B)..	..	..	81	..
Current contraceptive use				
E. Percentage of currently married women using contraception among women aged 15-44	35	10	37	35
Unmet need for contraception, for postponing and terminating child-bearing				
F. Among currently married women =A-E	34	43	32	32
G. Among currently married, fecund women	37	47	37	36
Unmet need for contraception, for terminating child-bearing, Westoff and Pebley measure 8				
H. Among currently married, fecund women (comparable with line G)..	..	..	14	10

NOTES:

In adjusting for age structure for Ecuador, the Republic of Korea and Malaysia, a rate of natural increase of 2 per cent was assumed; for Ghana, a rate of 3 per cent was assumed.

To estimate potential level of contraceptive prevalence among currently married fecund women in row B, row A was multiplied by the ratio b1/b2, where b1 = number of currently married women in the survey and b2 = number of currently married fecund women in the survey. Similarly, to estimate potential prevalence among exposed women, row A was multiplied by the ratio b1/b3, where b3 = number of exposed women in the survey.

Sources:

Line D: D. L. Nortman, "Measuring the unmet need for contraception to space and limit births", *International Family Planning Perspectives*, vol. 8, No. 4 (1982), page 132; line H: C. F. Westoff and A. R. Pebley, "Alternative measures of unmet need for family planning in developing countries", *International Family Planning Perspectives*, vol. 7, No. 4 (1981), page 128.

do not want them to use contraception: such women are unlikely to adopt contraception unless these barriers are overcome or the salience of their motivation is increased. The model refers to what would happen in the long run if all those barriers to contraceptive use were overcome, and if unwanted pregnancies were to be avoided.

EMPIRICAL ESTIMATES OF POTENTIAL DEMAND FOR CONTRACEPTION

Table 12 provides a detailed picture of the number of person-years spent wishing to avoid conception at each age and each parity, for Ecuador. The final two columns of the table show total years lived wanting to avoid conceiving while at risk of conception at each age, and total years lived in the state of marriage at each age. As can be seen, the cohort lived a total of 16,263 person-years in the state of wanting to avoid conception and being at risk of conceiving, and 22,965 person-years in the state of being ever-married, so that the cohort will have spent 71 per cent of its ever-married time in the state of wishing to avoid conception, between ages 15–44. In table 11, the calculation gives each age group a weight of 1.0 and thus slightly over-estimates the potential demand in a real population where there are substantially more younger women than older women. When re-weighted, assuming annual population growth of 2 per cent, the potential demand figure declines slightly, to 69 per cent.

Table 13 provides summary estimates of potential demand for contraception in all four countries, calculated for three different denominators – namely, currently married women, currently married and fecund women, and "exposed" women (i.e., currently married, fecund and non-pregnant). As can be seen, the choice of denominator greatly affects the apparent magnitude of potential demand for contraceptives.

The findings for Ghana are of particular interest. Fifty-three per cent of currently married Ghanaian women would

in the steady state be current users of contraception if they were to fully implement their postponing and terminating preferences, which contrasts sharply with the 10 per cent observed as using contraception at the time of the survey, and implies that, with no change in the preference structure observed at the time of the 1979 survey in Ghana, contraceptive prevalence would in the long run rise very steeply under full implementation of reported preferences. Since substantial proportions of higher-parity Ghanaian women indicated they were uncertain whether they wanted additional children, the contraceptive prevalence level would be substantially higher if women who are uncertain whether they want additional children were also to adopt contraception.

The case of the Republic of Korea is also of particular interest. The proportion using contraception at the time of the survey was 37 per cent, with widespread simultaneous use of abortion. Under full implementation of postponing and terminating preferences, however, the contraceptive prevalence level among currently married women would rise to about 69 per cent, which would presumably sharply reduce the demand for abortion. When potential demand for contraception in the Republic of Korea is calculated for the group of currently married and fecund women, we see a potential demand of 79 per cent, which is just a little lower than the potential demand figure of 81 per cent independently calculated by Nortman for the Republic of Korea using a very different, though quite detailed, method, based on a later survey. While this provides some cross-validation for both methods, suggesting that they both produce fairly similar answers, it will be necessary to apply the two methods to the same surveys for a number of countries before any firm conclusions can be drawn. If it is found that the two methods repeatedly produce very similar results, it will strengthen confidence in the estimates.

The case of Ecuador indicates the possibility of a massive increase in contraceptive prevalence, from 35 per cent to 69 per cent of currently married women, if couples implement female reproductive preferences for postponing and terminating child-bearing. The case of Malaysia, similarly, indicates a potentially massive rise in contraceptive use, from 35 per cent to 67 per cent of currently married women.

One other feature of table 13 is its comparison between the unmet need for contraception for postponing and terminating child-bearing, on line G, and an estimate of the unmet need for contraception for terminating child-bearing, on line H. The measure on line G is based on a calculation that counts women as needing contraception only if:

(*a*) They wish to postpone or terminate child-bearing;

(*b*) They are not pregnant;

(*c*) More than 10 months has elapsed since the last birth; or

(*d*) They are fecund as estimated by the parity progression method indicated above in equation (4).

The measure on line G, devised by Westoff and Pebley, counts a woman as needing contraception if four conditions are met:

(*a*) She does not wish to have additional children;

(*b*) She is not pregnant;

(*c*) If she is breast-feeding, more than 12 months must have elapsed since her last birth (breast-feeding respondents with fewer than 12 months since the last birth are counted as not needing contraception);

(*d*) She is both self-reportedly fecund and also behaviourally fecund in the sense that, if she has not used contraception in the past five years, she is counted as fecund only if she has had a birth during that period.

Comparing lines G and H in table 13, it is evident that the unmet need for contraceptives for purposes of terminating and postponing child-bearing is very much greater than the unmet need for terminating purposes. It is more than twice as high in the Republic of Korea (37 per cent versus 14 per cent), and is more than three times as high in Malaysia (36 per cent versus 10 per cent). Those findings support Nortman's conclusion that the potential demand for contraception for postponing and terminating reasons is much higher than the demand solely for terminating reasons, and that the unmet need for contraception is much higher when contraception needed for postponing reasons is added in.

The most important conclusion to be derived from the analysis of the potential demand for contraception if women fully implement their desires to postpone and to terminate child-bearing is that, in all four countries, prevalence levels can be expected to rise sharply in the long run if contraceptives are made both physically and psychologically accessible. Those estimates do not suffer from the problem of propagation of error and should thus be relatively robust, although of course they will be affected somewhat by different curve fittings and by assumptions concerning the need for contraception among women with 0–10 months elapsed since the last birth.

SUMMARY AND CONCLUSIONS

The estimates given in this paper represent a first effort at applying a unified model for estimating various indicators of reproductive preference, based upon analysing the demand for children as represented by fitted schedules of proportions wishing to avoid child-bearing, specific to parity and to months elapsed since entry to the current parity.

The first section explained how the schedules are fitted, and reveals an impressive orderliness in the relationship between the demand for children and the amount of time elapsed since entry to the current parity.

The estimates in the second section, of desired conception waits, have several policy implications. In several countries substantial numbers of women desire very long conception waits, so long that if they were to implement their preference to postpone child-bearing, many would be likely to switch to desiring no more children without having an additional birth, or to become infecund before desiring the next conception. Expenditure on contraception for women who wish to postpone child-bearing is thus likely to have a greater impact in reducing fertility than has hitherto been believed. From the standpoint of maternal and child health policy aimed at reducing child mortality, the results indicate there is need to educate a substantial fraction of couples about the danger of having births too closely spaced. In Ghana, between 30 and 40 per cent of mothers wish to conceive within 10 months of having had a birth, while in Ecuador, Malaysia and the Republic of Korea, more than 20 per cent of mothers wish to conceive within 10 months of having had a birth.

The estimates in the third section, of number of births desired, suggest that the successful implementation of desires to conceive and to avoid child-bearing would typically result in a much lower desired number of births over a lifetime than is implied by reports on desired family size. Those findings support earlier estimates of wanted number of births calculated by a totally different method, which relied on computing the "wanted total fertility rate" that would come into being if unwanted last births were avoided.

The chief policy implication of those findings is that in many countries contraceptive information and education programmes are likely to have a much greater long-run effect in reducing fertility than was believed on the basis of traditional estimates of desired family size.

As might be expected, the estimates in the last section, of contraceptive prevalence levels implied by full implementation of desires to postpone and to terminate, indicate much higher levels than those based solely on the desire to terminate child-bearing. The long-run potential demand for contraception in Ghana among currently married women was substantially higher than expected, in the neighbourhood of just over 50 per cent of currently married women adopting contraception if all Ghanaian women were to implement their terminating and postponing preferences. The long-run potential demand for contraception in Ecuador, the Republic of Korea and Malaysia was estimated as being in the range of 67–69 per cent.

Note

[1] There is considerable literature on the subject—for example:

C. De Sweemer, "The influence of child spacing on child survival", *Population Studies*, vol. 38, No. 1 (1984), pp. 41–72.

J. Trussell and A. Pebley, "The potential impact of changes in fertility on infant, child and maternal mortality", *Studies in Family Planning*, vol. 15, No. 6, part 1 (1984), pp. 267–280.

J. A. Fortney and J. E. Higgins, "The effect of birth interval on perinatal survival and birth weight", in M. Potts, B. Janowitz and J. Fortney (eds.), *Childbirth in Developing Countries* (Boston, MIP Press, 1983), pp. 112–126.

J. N. Hobcraft, J. W. McDonald and S. Rutstein, "Child-spacing effects on infant and early mortality", *Population Index*, vol. 49, No. 4 (1983), pp. 585–618; and

_____, _____ and _____, "Socio-economic factors in infant and child mortality: a cross national comparison", *Population Studies*, vol. 38, No. 2, pp. 193–223.

R. MacNamara, "Birth intervals and mortality in infancy and childhood: a study of relative risk in Indonesia and Mexico", doctoral dissertation, Columbia University, 1985.

B. Winikoff, "The effects of birth spacing on child and maternal health", *Studies in Family Planning*, vol. 14, No. 10 (1983), pp. 231–245.

D. Wolfers and S. Scrimshaw, "The effects of birth spacing on maternal and child health", *Population Studies*, vol. 23, No. 3 (1975).

References

Ebanks, G. E. and S. Singh (1984), "Socio-economic differentials in age at marriage", *WFS Comparative Studies*, preliminary tables distributed at World Fertility Survey Symposium, April 1984, International Statistical Institute, Voorburg, Netherlands; D. P. Smith (1980), "Age at marriage", *WFS Comparative Studies No. 7* (Voorburg, Netherlands, International Statistical Institute).

Lightbourne, R. E. (1987), "Reproductive preferences and behaviour", in V. Cleland and C. Scott (eds.), *Assessment of the World Fertility Survey Experience* (New York, Oxford University Press).

_____ (1985a), "Individual preferences and fertility behaviour", in J. G. Cleland and J. N. Hobcraft (eds.), *Reproductive Change in Developing Countries: Insights from the World Fertility Survey* (Oxford, Oxford University Press), chap. 8.

_____ (1985b), "Desired number of births and prospects for fertility decline in 40 countries", *International Family Planning Perspectives*, vol. 7, No. 2, pp. 34–39.

Nortman, D. L. (1982a), "Estimating potential contraceptive demand: an improved method of measurement", Center for Population Studies Working Papers No. 82 (April) (New York, Population Council).

_____ (1982b), "Measuring the unmet need for contraception to space and limit births", *International Family Planning Perspectives*, vol. 8, No. 4, pp. 125–134.

Smith, D. P. (1980), "Age at marriage", *WFS Comparative Studies No. 7* (Voorburg, Netherlands, International Statistics Institute).

Westoff, C. F. and A. R. Pebley (1981), "Alternative measures of unmet need for family planning in developing countries", *International Family Planning Perspectives*, vol. 7, No. 4, pp. 126–135.

THE EFFECT OF SEX PREFERENCE ON FERTILITY AND FAMILY PLANNING: EMPIRICAL EVIDENCE*

*Fred Arnold***

SUMMARY

This paper addresses the issue of whether the prevalence of a strong desire for children of a particular sex would be a significant obstacle to the success of family planning programmes in achieving rapid fertility declines. The author used a recently developed method to produce more precise quantitative estimates of sex preference, based on data from demographic surveys for 27 countries. Estimates were derived which indicate that a preference for sons has a smaller impact on fertility than is generally expected, since the random biological processes insure that most couples will bear their desired minimum number of sons and daughters at a relatively low parity.

Possible extensions of the method were described. They include changing the dependent variable, taking into account the order of birth, introducing statistical controls, and estimating the effect of alternative rates of fertility decline. When the effect of a preference for sons on family planning in China was projected under alternative assumptions about the future course of fertility, it was found to be insensitive to the rate of fertility decline. The analysis found little to support the hypothesis that sex preference is likely to have a greater impact on family planning effectiveness as the overall level of fertility declines.

INTRODUCTION

The existence of parental preferences for children of a particular sex has been well documented in many parts of the world (Williamson, 1976; Arnold and Kuo, 1984; Cleland, Verrall and Vaessen, 1983; Freedman and Coombs, 1974). A preference for sons over daughters is most common, although many couples prefer to have at least one child of each sex. A preference for sons is pervasive in many less developed countries, particularly in rural areas. Sons are often prized as productive assets for work on the family farm or in a family business, as providers of security in emergencies and in the parents' old age, and as conduits to carry on the family name and to perform various rites of ancestor worship.

It is often argued that the prevalence of sex preference attitudes is likely to blunt the success of family planning programmes and to act as an important barrier to rapid fertility declines. According to that argument, couples who have an abiding preference for sons or for a balanced number of sons and daughters will continue bearing children after they have reached their ideal family size if they have not yet satisfied their sex preferences. The implication is that fertility will necessarily be inflated above the level that would be observed in the absence of any sex preference. In the past, however, there has been little empirical evidence to support that contention. In fact, a number of studies in Asia have reached the conclusion that even in countries in which a preference for sons is strong, its effect on fertility and family planning is only weak or at most moderately strong (De Tray, 1980; Arnold, 1985; Repetto, 1972; Arnold and Liu, 1986). That conclusion is further buttressed by the observation that in recent years fertility has dropped precipitously in several geographical areas where the preference for sons is still pronounced (for example, the Republic of Korea, and China).

Since previous analyses of the relationship between sex preference and fertility have been fraught with methodological problems, it is not surprising that they have yielded conflicting results. The present article attempts to remedy the situation by applying a recently developed quantitative method to data from a wide variety of countries at different points in time. Data on the sex composition of children, which are widely available from demographic surveys, are used to examine the effect of sex preference on contraceptive prevalence, desired fertility, abortion ratios, and other fertility-related measures.

The estimates that are derived from that quantitative method demonstrate that sex preference generally does not have as strong an impact on fertility and family planning as has been previously suggested. Even in countries in which a preference for boys is extremely strong, its impact on fertility is currently no more than moderately strong. This is true because random biological processes insure that most couples will bear their desired minimum number of sons and daughters at a relatively low parity. Moreover, our data suggest that sex preference will not necessarily have a more powerful influence on fertility as the average family size in a country declines.

In the first section of this paper, the new quantitative method is described, evaluated according to its strengths and weaknesses, and then applied to recent data from Egypt. In the next sections it is applied to data from a large number of sample surveys in 27 countries, and then dis-

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cussed in terms of how it might be used to inform the current population policy debate in China. Various possible extensions of the method are considered, and the paper concludes with a discussion of the findings and their policy implications.

THE QUANTITATIVE METHOD

The quantitative method used in this paper is described in detail in Arnold (1985). The following description briefly outlines the estimation procedure:

Basically the measure answers the question, "What would happen to fertility if all sex preferences were to disappear suddenly?" Since the sex of children would no longer be important, the measure assumes that all couples at each parity will act in the same manner as those couples at the same parity who are currently most satisfied with the sex composition of their children. In general, the measure is defined as

$$\Sigma C^*_i P_i / \Sigma P_i,$$

where C^*_i equals the maximum rate of contraceptive use at each parity i, and P_i equals the number of persons at each parity i.[1]

When the dependent variable is some measure of fertility (such as the number of additional children desired), rather than family planning, then C^*_i would be the *minimum* number of additional children desired at each parity, since respondents with the smallest desired family size are presumably the ones who are most satisfied with the sex composition of their existing children.

The use of the method will become more clear if it is applied to a specific example. Table 1 shows the per cent of currently married women aged 15–44 who were using modern contraceptives before the pill distribution programme began in Menoufia Governorate, Egypt. The data were collected in 1977 by the Social Research Center of the American University in Cairo. The survey covered over 36,000 households in 38 villages in rural areas of the Nile delta in Lower Egypt (Gadalla, McCarthy, and Campbell, 1985). The data indicate a fairly strong preference for sons in Menoufia Governorate. With only one minor exception, at each parity the percentage of women using modern contraceptives increases monotonically as the number of sons increases. The differences are relatively small for couples with one child, but they tend to increase with larger family sizes. Overall, there is a strong desire to have at least one son, together with a substantial desire to have at least two sons. There appears to be little, if any, desire to have at least one girl or to have a balanced number of boys and girls.

The strength of the preference for boys is most obvious if one looks at the contraceptive use patterns of couples all of whose children are of one sex. At parity two and higher parities, couples with all boys are between two and six times more likely to be using modern contraception as couples with all girls. Even though contraceptive use overall at the time of the survey was rather modest (17.8 per cent) and it is likely that contraception was even less prevalent previously, it is clear that sex preference has had a considerable effect on fertility in the past. The third column of table 1 shows that there are many fewer all-girl families than would be expected on the basis of random biological processes. For example, there are 38 per cent more couples with exactly two boys than there are couples with exactly two girls, and there are 66 per cent more couples with exactly three boys as with exactly three girls. This indicates that couples with all boys are more likely to stop bearing children, while couples with all girls are more likely to continue having children in the hope of getting a boy.

TABLE 1. CURRENTLY MARRIED WOMEN 15-44 YEARS OF AGE USING MODERN CONTRACEPTIVES, BY NUMBER AND SEX COMPOSITION OF LIVING CHILDREN: MENOUFIA GOVERNORATE, EGYPT, 1977
(Percentage)

	Percentage using modern contraceptives		*Number of cases*
	Actual	*In the absence of sex preference*	
No children	0.0	0.0	2 436
One child			
One girl	3.6	5.4	1 563
One boy	5.4	5.4	1 598
Two children			
Two girls	7.4	15.5	744
One girl, one boy	13.0	15.5	1 875
Two boys	15.5	15.5	1 026
Three children			
Three girls	10.7	24.6	328
Two girls, one boy	17.4	24.6	1 161
One girl, two boys	22.2	24.6	1 515
Three boys	24.6	24.6	544
Four children			
Four girls	5.2	32.0	154
Three girls, one boy	14.9	32.0	738
Two girls, two boys	25.8	32.0	1 343
One girl, three boys	30.0	32.0	984
Four boys	32.0	32.0	247
Five or more children			
No boy	8.3	32.5	84
One boy	23.1	32.5	585
Two boys	27.3	32.5	1 464
Three boys	32.5	32.5	1 968
Four or more boys	29.9	32.5	2 442
TOTAL	17.8	21.3	22 799

Source: Saad Gadalla, James McCarthy, and Oona Campbell, "How the number of living sons influences contraceptive use in Menoufia Governorate, Egypt", *Studies in Family Planning*, vol. 16, No. 3 (1985), pp. 164-169.

The middle column of table 1 estimates contraceptive prevalence in the complete absence of any sex preference. The assumption is that at each parity the contraceptive prevalence rate for all couples would be the same as the maximum rate at that same parity for couples with any combination of boys and girls. We estimate that in the complete absence of any sex preference the proportion of couples using modern contraceptive methods would rise to 21.3 per cent, a fairly small increase, of 3.5 percentage points. Since it is unlikely that sex preference for children could be completely eliminated in the near future, it does not appear that major improvements in contraceptive prevalence can be expected to result from even substantial changes in sex preference attitudes in Menoufia Governorate. That result does not support the conclusion reached by Gadalla, McCarthy, and Campbell (1985) that the family planning programme is likely to reach a plateau at a relatively low prevalence level largely because of the strong preference for sons.

There are basically two reasons for the above finding. First, although differentials in contraceptive use by the sex composition of children in the family are pronounced in many cases, the large majority of respondents have one or two boys fairly early in their child-bearing years by sheer biological chance. Therefore, even though those couples may have a strong preference for sons, that preference will not have a substantial effect on their family planning beha-

viour. Secondly, nearly one quarter of the married women in the sample had either no children or only one child at the time of the survey. Since sex preference has no effect on the family planning behaviour of nulliparous women and only a minor effect for women with one child, the overall effect of sex preference on family planning is attenuated. Those two factors together explain why sex preference plays only a relatively minor role in determining family planning acceptance in Menoufia Governorate, despite the very distinct preference for boys that is evident from the data set. Previous studies have erred by emphasizing only the differentials by sex composition in such cases, without taking into account the number of respondents with each combination of daughters and sons.

Advantages and disadvantages of the quantitative method

The method described above gives a precise quantitative estimate of the effect of sex preference on fertility and family planning. It can be applied to data from nearly any demographic survey. The only requirement is that the survey includes data on the current number of living daughters and sons plus any fertility-related variable. Almost all of the data used in this paper are from published sources. In only a few cases has it been necessary to produce special tabulations.

A major strength of the method is that it is entirely flexible. It can handle any kind of sex preference (for boys, for girls, for balance, or for any combination) and it does not rely on linear relationships among the variables. For example, the method can be used to measure the effect of sex preference in a country which is characterized by both a preference for sons and a desire to have at least one child of each sex. The method is also flexible in that it can be applied to a wide variety of behavioural and attitudinal dependent variables. Finally, the method takes into account the number of couples at each parity and sex composition of children and, hence, it contains implicit weights that are used in the calculations.

The method is especially relevant in cases in which sex preferences in a population are homogeneous. This is typically the case in situations in which a preference for boys is widespread—for example, in countries with strong Confucian traditions. When sex preferences are particularly heterogeneous, individual differences in sex preferences may cancel each other out when the data are aggregated (McClelland, 1979). That effect would artificially depress differences in fertility and family planning among couples at the same parity with different numbers of daughters and sons. In such cases, the effect of sex preference on fertility might be under-estimated by the method used in this paper. On the other hand, several authors have suggested that there may be an offsetting effect which is due to the inherent riskiness of fertility outcomes (McClelland, 1979; Bulatao and Fawcett, 1981; Freedman and Coombs, 1974). They argue that some couples may actually avoid having more children because they are concerned about bearing a child of the "wrong" sex. If that is the case, then fertility could potentially rise in the absence of sex preference and the method employed in this paper would over-estimate the fertility impact of sex preference. It is not known, however, whether such a phenomenon actually exists or whether it is quantitatively important.

Another limitation of the method is that the necessary input data are not always available in the most desirable form. Published tables may not include all combinations of the sex composition of living children in the family or they may not show the number of respondents in each cell. In the latter case, it would be possible to substitute a standard distribution of the number and sex of children from an independent source, but that is clearly not as desirable as having the actual number of cases from the same source.

Because the measure we are using covers all parities and sex combinations of children, the number of cases in certain cells may be quite small, particularly if the overall sample size is not large. The problem can be remedied, however, without much effect on the results by combining adjacent cells with a small number of cases.

A final data limitation arises from the fact that relatively few demographic surveys include male respondents. The primary reliance on female respondents for attitudinal data may bias the results because a preference for boys is usually stronger among men than among women (Williamson, 1978). That problem does not exist in the case of behavioural data on fertility and family planning, however, because actual fertility and contraceptive use are characteristics shared by both husband and wife.

EMPIRICAL RESULTS

In this section, the quantitative method described above is applied to data from 27 countries throughout the world. The data were collected in sample surveys conducted between 1965 and 1984 (primarily during the 1970s). About half of the surveys were conducted as part of the World Fertility Survey. The sample sizes (for married women in their childbearing years) ranged between 739 and 169,812 respondents, with a median size of about 3,000 respondents. The patterns of sex preference exhibited by the countries were quite diverse. A preference for sons was most common, but balance preference was also evident in the majority of countries. A preference for daughters was observed at early parities in a few countries (such as Costa Rica and Trinidad and Tobago), but that preference was neither strong nor consistent. The strength of sex preferences varied substantially across parities in almost all cases, providing further support for the view that the effect of sex preference cannot be estimated accurately without considering the entire distribution of family sizes.

The effect of sex preference on both attitudinal and behavioural measures of fertility and family planning is shown in tables 2–6. Table 2 estimates the impact of sex preference on contraceptive use. Overall, the effect is small. If sex preferences were to disappear completely, it is estimated that contraceptive use would increase by 3.7 percentage points, on the average. While most administrators of family planning programmes would be pleased to find a way of increasing the contraceptive use rate by several percentage points, it must be admitted that programmes to decrease sex preferences for children would be of rather limited value by themselves. Even the modest increases in contraceptive use estimated in table 2 would not occur unless sex preferences were to disappear entirely, which is an unlikely eventuality.

The effect of sex preference is strongest in Asia (with an average increase of 4.1 percentage points), but that is entirely due to the above-average effect of sex preference in the Republic of Korea and Taiwan Province, both of which exhibit an extremely high degree of preference for boys. The effect of sex preference is also relatively high in Latin America (outside of the Caribbean). The average increase in contraceptive use in the absence of sex preference would average only 2.9 percentage points in Africa and 2.1 percentage points in Europe (Italy and Portugal). The smallest

TABLE 2. THE EFFECT OF SEX PREFERENCE ON CONTRACEPTIVE USE

	Percentage currently using contraception			
	Actual (1)	In the absence of sex preference (2)	Difference (col. 2 - col. 1) (3)	Number of cases (4)
Africa				
Egypt[a]—1983	24.9	32.0	7.1	3 079
1977	17.8	21.3	3.5	22 799
Ghana—1979/80	12.4	13.7	1.3	3 414
Kenya—1977/78	9.2	11.3	2.1	4 212
Lesotho—1977	7.2	9.0	1.8	2 321
Sudan—1979	6.4	8.0	1.6	2 032
Asia				
Bangladesh—1975	9.6	11.2	1.6	4 647
China—1982	70.9	72.7	1.8	169 812
India—1970	12.2	15.9	3.7	10 246
Indonesia—1976	31.9	34.7	2.8	5 628
Jordan—1976	37.3	40.6	3.3	2 339
Nepal—1976	2.9	4.0	1.1	4 325
Philippines—1978	47.7	49.6	1.9	6 686
Republic of South Korea—1974	45.8	54.8	9.0	3 837
1970 (rural villages)	26.3	33.1	6.8	739
1968 (Seoul)	41.1	47.6	6.5	1 758
1966 (Seoul)	24.5	31.2	6.7	1 170
Syrian Arab Republic—1978	29.5	31.8	2.3	2 898
Taiwan, Province of China—1980	70	75	5	3 554
1976	63	69	6	1 661
1973	57	63	6	5 250
1970	44.0	46.7	2.7	2 491
1967	34.1	37.4	3.3	4 145
1965	24.4	27.8	3.4	3 049
Thailand—1984	63.2	67.9	4.7	6 848
1975	36.9	40.4	3.5	3 125
1973 (urban)	45.1	49.7	4.6	1 387
1972 (rural)	22.9	27.8	4.9	1 083
1970 (urban)	32.6	37.3	4.7	1 472
1969 (rural)	11.0	14.3	3.3	960
Turkey—1978	50.3	52.5	2.2	3 217
Europe				
Italy—1979	84.3	86.8	2.5	4 105
Portugal—1979/80	76.3	78.0	1.7	4 253
Latin America and the Caribbean				
Costa Rica—1976	77.8	81.5	3.7	2 222
Guyana—1975	38.1	43.2	5.1	2 651
Haiti—1977	24.8	28.9	4.1	1 408
Jamaica—1975/76	45.4	47.7	2.3	1 939
Mexico—1976/77	41.5	45.3	3.8	4 107
Paraguay—1979	47.3	51.1	3.8	2 010
Peru—1977/78	41.3	45.7	4.4	13 877
Trinidad and Tobago 1977	60.2	62.9	2.7	2 665

NOTE: See the list of sources for tables 2-6 at the end of this article.
[a] Menoufia Governorate—Modern contraceptives only.

estimated effect (1.1 percentage points) is registered for Nepal in 1976. That is not surprising since overall contraceptive use in Nepal was relatively rare at that time. The largest estimated effect (9.0 percentage points in 1974) is recorded for the Republic of Korea, a country with a strong Confucian tradition which supports one of the highest levels of preference for sons in the world (Cho, Arnold, and Kwon, 1982).

For countries that have conducted a series of similar surveys at several points in time, there is no consistent pattern of change in the effect of sex preference on family planning over time. In some cases, there is a tendency for the effect to strengthen over time, but in other cases there is no discernible trend. Another way of exploring that issue is to examine the effect of sex preference on fertility at different levels of overall contraceptive use. Once again, there is no consistent trend in the data. The average increase in contraceptive use in the absence of sex preference is estimated to be 3.3 percentage points when the rate of overall contraceptive use is under 25 per cent, 4.2 percentage points when the rate is 25–49 per cent, and 3.6 percentage points when the rate is 50 per cent or more. That implies that there is no solid evidence to support the hypothesis that sex preference for children is likely to have a greater impact on family planning as the overall level of fertility declines.

The effect of sex preference on the desire for additional children is shown in table 3. It is estimated that the proportion of respondents who do not want any more children would increase by an average of 4.5 percentage points in the absence of sex preference. Once again, the effect is strongest in Asia and weaker in other regions of the world. The difference translates into a uniformly small increase in the average number of children wanted. The average number of additional children wanted would increase by no more than 0.2 children in any country and by only 0.1 children on the

TABLE 3. THE EFFECT OF SEX PREFERENCE ON THE DESIRE FOR ADDITIONAL CHILDREN

	Percentage wanting no more children			
	Actual (1)	In the absence of sex preference (2)	Difference (col. 2 - col. 1) (3)	Number of cases (4)
Africa				
Ghana—1979/80	11.6	13.4	1.8	3 414
Kenya—1977/78	16.4	17.9	1.5	4 214
Lesotho—1977	13.8	16.0	3.2	2 331
Sudan—1979	15.0	16.8	1.8	2 032
Asia				
Bangladesh—1979	51.5	56.2	4.7	13 736
1975	63.6	68.1	4.5	4 533
India—1970	50.7	59.6	8.9	10 246
Indonesia—1976	39.6	43.1	3.5	5 628
Jordan—1976	42.0	46.8	4.8	2 339
Nepal—1976	29.8	36.3	6.5	4 310
Philippines—1978	54.3	58.2	3.9	6 686
Republic of South Korea—1974	74.6	80.4	5.8	3 839
Syrian Arab Republic—1978	37.7	41.8	4.1	2 898
Taiwan, Province of China—1980	73	78	5	3 554
1976	74	78	4	1 661
1973	70	77	7	5 250
1970	61.1	70.0	8.9	2 491
1967	55.6	62.8	7.2	4 145
1965	57.3	65.0	7.7	3 049
Thailand—1984	64.2	68.3	4.1	6 848
1973 (urban women)	55.0	59.7	4.7	1 368
1973 (urban male heads)	66.5	70.8	4.3	953
1972 (rural women)	63.0	67.8	4.8	1 081
1972 (rural male heads)	66.5	72.5	6.0	810
1970 (urban women)	62.9	67.7	4.8	959
1969 (rural women)	53.3	56.8	3.5	1 473
Turkey—1978	57.6	63.1	5.5	3 217
Europe				
Italy—1979	71.6	74.8	3.2	3 093
Portugal—1979/80	69.4	71.9	2.5	4 253
Latin America				
Costa Rica—1976	52.1	55.0	2.9	2 222
Haiti—1977	41.5	44.7	3.2	1 408
Mexico—1976/77	56.4	59.4	3.0	4 064
Paraguay—1979	32.5	34.0	1.5	2 010
Peru—1977/78	60.9	63.8	2.9	13 841

NOTE: See the list of sources for tables 2-6 at the end of this article.

TABLE 4. THE EFFECT OF SEX PREFERENCE ON NUMBER OF ADDITIONAL CHILDREN WANTED

	Average number of additional children wanted			
	Actual (1)	In the absence of sex preference (2)	Difference (col. 1 - col. 2) (3)	Number of cases (4)
Africa				
Ghana—1979/80	2.7	2.5	0.2	2 696
Kenya—1977/78	3.3	3.1	0.2	3 219
Sudan—1979	3.0	2.9	0.1	1 781
Asia				
Bangladesh—1975	0.2	0.1	0.1	3 947
India—1970	1.2	1.0	0.2	10 246
Jordan—1976	1.5	1.3	0.2	2 280
Nepal—1976	1.9	1.7	0.2	3 941
Philippines—1978	0.3	0.2	0.1	5 965
Republic of South Korea—1974	0.4	0.3	0.1	3 823
Syrian Arab Republic—1978	2.2	2.1	0.1	2 628
Taiwan, Province of China—1970	0.7	0.6	0.1	2 491
1967	0.8	0.7	0.1	4 145
1965	0.8	0.7	0.1	3 049
Europe				
Italy—1979	0.3	0.3	0.0	4 033
Portugal—1979/80	0.3	0.3	0.0	4 218
Latin America				
Haiti—1977	1.1	1.0	0.1	1 178
Mexico—1976/77	0.8	0.8	0.0	3 963
Paraguay—1979	1.4	1.3	0.1	1 985
Peru—1977/78	0.2	0.1	0.1	13 734

NOTE: See the list of sources for tables 2-6 at the end of this article.

TABLE 5. THE EFFECT OF SEX PREFERENCE ON THE TOTAL NUMBER OF CHILDREN WANTED

	Average number of children wanted			
	Actual (1)	In the absence of sex preference (2)	Difference (col. 1 - col. 2) (3)	Number of cases (4)
Africa				
Ghana—1979/80	6.1	6.0	0.1	3 871
Kenya—1977/78	7.3	7.2	0.1	3 905
Lesotho—1977	6.0	5.9	0.1	2 682
Sudan—1979	6.3	6.1	0.2	1 956
Asia				
Bangladesh—1975	4.1	4.0	0.1	3 428
Indonesia—1976	4.2	4.0	0.2	6 603
Jordan—1976	6.3	6.2	0.1	2 724
Nepal—1976	4.0	3.9	0.1	4 908
Philippines—1978	4.5	4.2	0.3	7 647
Republic of South Korea—1974	3.2	3.0	0.2	3 816
Syrian Arab Republic—1978	6.1	5.8	0.3	3 189
Turkey—1978	3.0	3.0	0.0	3 478
Europe				
Italy—1979	2.2	2.1	0.1	4 869
Portugal—1979/80	2.4	2.4	0.0	4 556
Latin America				
Costa Rica—1976	4.7	4.3	0.4	2 222
Haiti—1977	3.6	3.4	0.2	1 543
Mexico—1976/77	4.5	4.2	0.3	4 709
Paraguay—1979	5.3	5.2	0.1	2 229
Peru—1977/78	3.9	3.8	0.1	15 199

NOTE: See the list of sources for tables 2-6 at the end of this article.

TABLE 6. THE EFFECT OF SEX PREFERENCE ON SELECTED FERTILITY VARIABLES

	Actual (1)	In the absence of sex preference (2)	Difference (col. 2-col. 1) (3)	Number of cases (4)
Percentage who expect more children than their ideal				
Taiwan, Province of China—				
1970	21.7	17.8	3.9	2 491
1967	21.4	17.6	3.8	4 145
1965	25.6	21.6	4.0	3 049
Average expected number of children				
Thailand—1984	3.3	3.2	0.1	6 848
Average ideal number of children				
Taiwan, Province of China—				
1970	3.8	3.6	0.2	2 491
1967	3.8	3.6	0.2	4 145
1965	4.0	3.8	0.2	3 049
Percentage of eligible non-contractors accepting the pill at first interview				
Egypt—1977 (Menoufia Governorate)	31.5	35.0	3.5	11 790
Percentage of new pill acceptors continuing pill use at second interview				
Egypt—1977 (Menoufia Governorate)	37.5	41.0	3.5	3 711
Contraceptive continuation rate				
Egypt—1977 (Menoufia Governorate—9 months)	25.1	28.7	3.6	22 799
Thailand—1971 (12 months)	72	75	3	2 556
Percentage pregnant				
Thailand—1984	7.9	6.8	1.1	6 848
Average open birth interval				
Thailand—1984	64.3	67.2	2.9	6 848
Percentage sterilized				
Thailand—1984	27.8	30.8	3.0	6 848
China—1982	25.1	27.5	2.4	169 812

NOTE: See the list of sources for tables 2-6 at the end of this article.

average (table 4). Similarly, in the absence of sex preference, the total desired number of children is estimated to increase by only 0.2 children on the average (table 5).

The same methodology is used to estimate the effect of sex preference on a number of miscellaneous fertility and family planning variables in table 6. The effects of sex preference on those measures are similar in magnitude to the effects calculated above for contraceptive use and desired fertility. As in the case of the other variables, the overall effect of sex preference is muted by the fact that relatively few respondents fall in the parities and sex compositions in which sex preference is an important consideration.

CHINA: A SPECIAL CASE

A preference for sons has been institutionalized in China for several centuries. Confucian traditions, which are based on a patriarchal, patrilocal, and patrilineal social structure, provide the foundation for a strong preference for male off-

TABLE 7. PERCENTAGE OF CURRENTLY MARRIED COUPLES USING CONTRACEPTION, BY NUMBER AND SEX OF CHILDREN: CHINA, 1982

Number and sex of children	*Percentage using contraception*	*Percentage sterilized*	*Number of cases*
No living children	2.4	0.6	17 271
One child			
Girl	63.1	1.8	14 855
Boy	69.3	2.7	18 150
Two children			
2 girls	75.0	16.8	6 456
1 girl, 1 boy	84.7	26.7	20 102
2 boys	85.8	30.5	10 304
Three children			
3 girls	78.4	28.3	2 693
2 girls, 1 boy	86.3	40.7	11 984
1 girl, 2 boys	87.9	45.2	13 529
3 boys	87.8	46.6	4 403
Four children			
4 girls	77.2	30.5	1 132
3 girls, 1 boy	84.1	40.2	5 819
2 girls, 2 boys	84.2	43.7	9 615
1 girl, 3 boys	83.5	43.0	5 986
4 boys	83.6	43.1	1 441
Five children			
5 girls	69.5	28.0	429
4 girls, 1 boy	79.0	34.2	2 381
3 girls, 2 boys	79.2	37.3	4 552
2 girls, 2 boys	76.8	35.6	4 279
1 girl, 4 boys	78.2	37.8	2 135
5 boys	77.3	32.0	490
Six children			
6 girls	63.4	26.7	161
5 girls, 1 boy	76.5	33.5	878
4 girls, 2 boys	71.4	29.6	1 820
3 girls, 3 boys	70.1	28.4	2 116
2 girls, 4 boys	69.8	28.9	1 524
1 girl, 5 boys	72.0	32.4	636
6 boys	72.7	28.8	132
Seven or more children			
Girls > boys	62.5	22.3	2 285
Girl = boys	60.4	16.7	293
Girls < boys	60.5	20.5	1 961
TOTAL	70.9	25.1	169 812

Source: Fred Arnold and Liu Zhaoxiang, "Sex preferences for children in China", *Population and Development Review*, Vol. 15, No. 2 (1984), pp. 299-318.

NOTE: This table is based on currently married women under 50 years old.

spring. Despite efforts on the part of the Government of China to eliminate the preference, it is still pronounced (Arnold and Liu, 1986). Although women in China have made great strides in recent years, significant gender inequalities persist (Greenhalgh, 1985; Taylor, 1985; Hooper, 1984; Wolf, 1985).

The strength of the preference for sons in China and its impact on Chinese society have become important issues because of the recent debate about the prevalence of abortion, the extent of coercion in the Chinese family planning programme and allegations of widespread female infanticide. Until recently, however, almost no hard evidence was available on sex preference in China. The 1982 One-Per-Thousand National Fertility Sample Survey provides for the first time both national- and provincial-level data on the prevalence of the preference for sons. The survey questionnaire was administered to 1,017,574 respondents, including 310,485 women aged 15–67. The response rate was 99 per cent, and the data are considered to be highly accurate (Yu and Xiao, 1985). Although the survey did not contain any direct questions on sex preference for children, the strength of the preference for boys can be inferred by examining the relationship of fertility and family planning to the sex composition of children in the family.

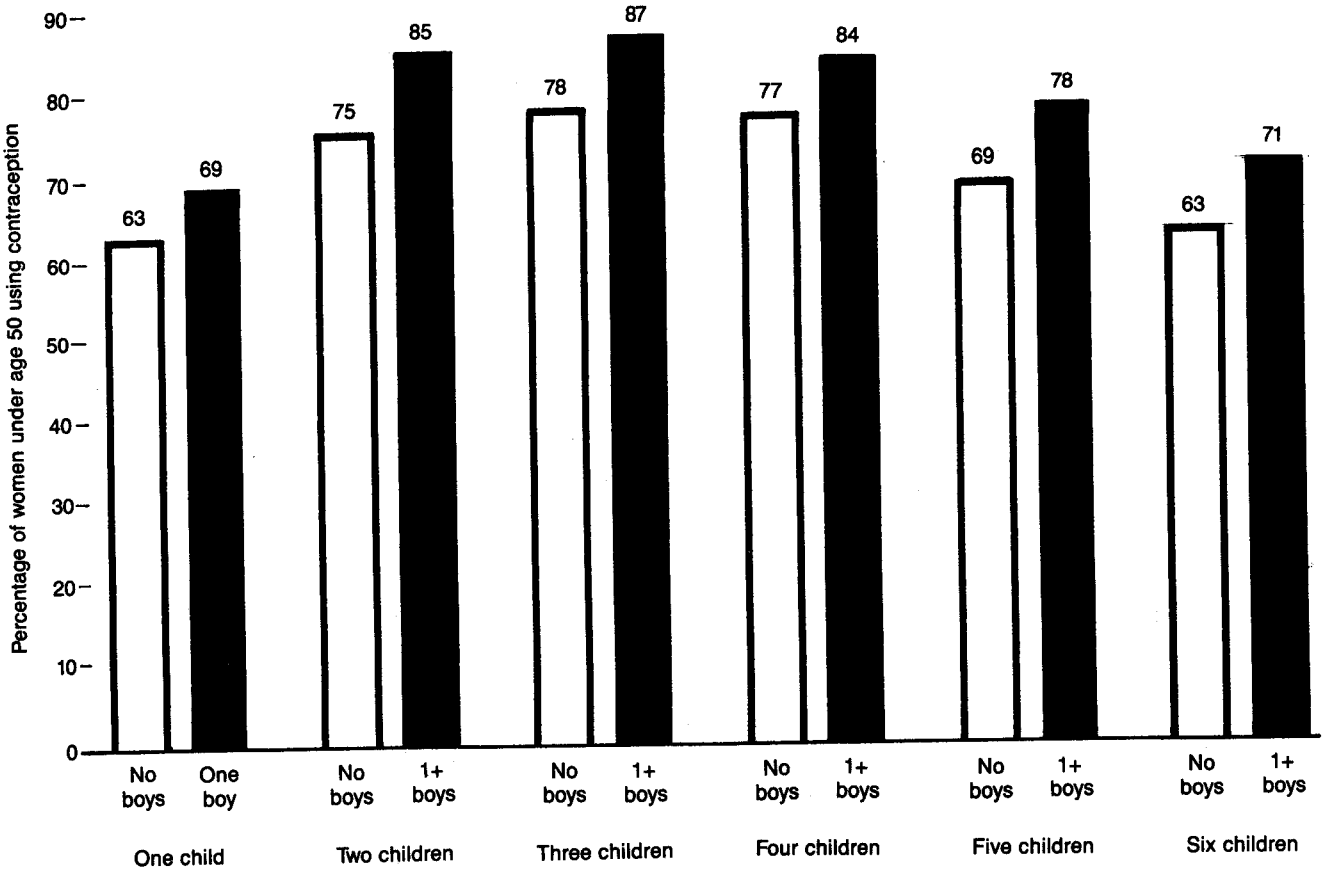
The survey yielded evidence of the persistence of the preference for sons in nearly every part of China (with the exception of Beijing and Shanghai), although the preference is not as strong as in some other countries with Confucian traditions, such as the Republic of Korea (Arnold and Liu, 1986). Couples with one girl are less likely to sign up for the one-child certificate than couples with one boy, and they are twice as likely to renounce the certificate once they have received it. Moreover, couples without a boy are less likely to be using contraception than are couples with at least one boy (see table 7 and the figure). Despite those differences, the overall effect of sex preference on fertility is small. We estimate that contraceptive use among married women under age 50 would increase from 70.9 per cent to only 72.7 per cent in the complete absence of sex preference, and the percentage of married couples using sterilization would increase from 25.1 per cent to 27.5 per cent. This relatively weak effect of sex preference is consistent with other findings from the same survey based on parity progression ratios (Feeney, Yu, and Tuan, 1985).

Those measures reflect the current influence of sex preference in China and do not indicate what impact sex preference may have had in the past. In fact, there is some evidence that the preference for sons was more influential during China's fertility transition. For example, the last column of table 7 shows that there is an imbalance in favour of boys at the first three parities. That implies, that in the past, couples with boys were less likely to continue childbearing than couples with girls. That "stopping rule" is also evident when one compares the sex ratio of the last child in families of any size (123.2) with the sex ratio of all other children (103.7). These cumulative measures of fertility indicate that the sex of a couple's children has often been an important consideration in child-bearing decisions in the past.

While a preference for sons is still evident in China, it is not currently an overriding concern of most Chinese couples. That finding is buttressed by the fact that nearly two thirds of couples with one daughter and no sons were using contraception at the time of the survey. Those couples may have preferred to have a son, but their preferences were not so strong that they were ignoring the one-child policy. Although the survey does not contain any direct evidence on the prevalence of female infanticide, the results suggest that sex preference in modern-day China may not be sufficiently strong to support allegations of very widespread female infanticide.

It is interesting to note, however, that the existence of a preference for sons has probably decreased the incidence of abortion in China. According to the survey, the ratio of abortions per 1,000 live births was 187.7 from 1 January 1979 to 30 September 1981 (Arnold and Liu, 1986). Using the same methodology as before, we estimate that the ratio would rise to 230.5 in the absence of sex preference. Since approximately 54.5 million babies were born in China during that period,[2] it appears that parental preferences for sons may actually have averted as many as 1.9 million abortions in that period of less than three years (or about 690,000 abortions per year). That is a slight over-estimate, however, because contraceptive use would also increase slightly in the absence of sex preference and, hence, the total number of pregnancies would probably be somewhat lower. Neverthe-

Figure 1. Use of contraceptives among currently married women with children, by family composition



less, sex preference for children has probably averted considerably more than half a million abortions a year.

Extensions of the method

The quantitative method used above can be extended or modified in a number of ways. It can be used to tackle other kinds of issues by changing the dependent variable; it can be modified to take the order of births into account; statistical controls can be introduced; and projections can be made of the effect of sex preference on fertility in the future. Those modifications are discussed briefly below.

First, the method can be extended by substituting different dependent variables in the equation. So far, we have explored the effect of sex preference on such variables as contraceptive use, the incidence of sterilization, desired fertility, contraceptive continuation rates, birth intervals and abortions. The method could equally well be employed to examine the effect of sex preference on parity progression ratios, infant mortality, or the incidence and length of time spent breast-feeding. In addition, the estimates can be refined by taking the order of births into account. That refinement of the method requires a large number of cases, but it is important to use it, where feasible, because the order in which couples have sons and daughters can be a factor in determining their subsequent fertility (Mason and Bennet, 1977; Park, 1978).

China's One-Per-Thousand National Fertility Sample Survey is an ideal data set in that regard because of the unusually large sample size. Table 8 shows the prevalence in 1982 of contraceptive use among currently married women. There is a slight, and not entirely consistent, tendency for contraceptive use to be higher among couples whose last child is a boy (controlling for the number and sex composition of the couple's living children). On the average, within number/sex categories, women whose last child is a boy have a contraceptive use rate that is 0.6 percentage points higher than women whose last child is a girl. The effect of that modification on the calculations done previously is also small. Contraceptive use was earlier estimated to rise from a level of 70.9 per cent to 72.7 per cent in the absence of sex preference. When the order of births is also taken into account, it is estimated that contraceptive use would rise further to 73.4 per cent.

Another refinement of the quantitative method introduces statistical controls for additional independent variables using multivariate methods. Multiple classification analysis (MCA) is an ideal multivariate technique for accomplishing that task, since it produces a set of adjustment means of the dependent variable for each category of the predictors. Those adjusted means can be used in place of the raw unadjusted means in calculating the effect of sex preference on fertility. We have applied that technique to unpublished tables from the Korean National Fertility Survey, controlling for the effects of the respondent's age, education, type of place of residence, religion, and pattern of work, and her husband's education. In that case, the statistical controls made little difference in the results. The effect of sex preference on the desire for additional children was virtually unchanged, while sex preference had a slightly stronger effect

TABLE 8. PERCENTAGE OF CURRENTLY MARRIED COUPLES USING CONTRACEPTION, BY NUMBER, SEX AND ORDER OF CHILDREN: CHINA, 1982

(G = girl; B = boy)

Number, sex and order of children	*Percentage using contraception*	*Number of cases*
No living children	2.4	17 271
One child		
Girl	63.1	14 855
Boy	69.3	18 150
Two children		
2G	75.0	6 456
1G, 1B	84.8	10 496
1B, 1G	84.5	9 606
2B	85.8	10 304
Three children		
3G	78.4	2 693
2G, 1B	87.3	5 044
1G, 1B, 1G	85.6	3 381
1B, 2G	85.7	3 559
1G, 2B	88.2	4 658
1B, 1G, 1B	87.7	4 571
2B, 1G	87.7	4 300
3B	87.8	4 403
Four children		
4G	77.2	1 132
3G, 1B	84.6	2 004
2G, 1B, 1G	84.3	1 392
1G, 1B, 2G	83.4	1 228
1B, 3G	83.8	1 195
2G, 2B	84.2	2 042
1G, 1B, 1G, 1B	85.8	1 834
1G, 2B, 1G	82.4	1 393
1B, 2G, 1B	84.6	1 679
1B, 1G, 1B, 1G	82.9	1 341
2B, 2G	84.8	1 326
1G, 3B	81.3	1 515
1B, 1G, 2B	83.0	1 402
2B, 1G, 1B	84.3	1 481
3B, 1G	85.5	1 588
4B	83.6	1 441
Five children		
5G	69.5	429
4G, 1B, B last	82.1	738
4G, 1B, G last	77.5	1 643
3G, 2B, B last	81.0	2 335
3G, 2B, G last	77.3	2 217
2G, 3B, B last	77.1	2 653
2G, 3B, G last	76.4	1 626
1G, 4B, B last	77.4	1 682
1G, 4B, G last	81.2	453
5B	77.3	490
Six children		
6G	63.4	161
5G, 1B, B last	82.8	221
5G, 1B, G last	74.4	657
4G, 2B, B last	75.2	835
4G, 2B, G last	68.2	985
3G, 3B, B last	71.0	1 169
3G, 3B, G last	69.0	947
2G, 4B, B last	70.6	1 062
2G, 4B, G last	68.0	462
1G, 5B, B last	72.2	528
1G, 5B, G last	71.3	108
6B	72.7	132
Seven or more children		
More girls than boys, B last	63.5	949
More girls than boys, G last	61.8	1 336
Same number of girls and boys, B last	58.6	174
Same number of girls and boys, G last	63.0	119
More boys than girls, B last	61.4	1 320
More boys than girls, G last	58.7	641
TOTAL	70.9	169 812

Source: Unpublished table from China's One-Per-Thousand National Fertility Sample Survey.

NOTE: This table is based on currently married women under 50 years old.

on contraceptive use after the introduction of statistical controls.

Finally, the method could be extended to explore the possible effect of sex preference on fertility in the future, if sex preference attitudes were to remain unchanged but fertility were to decline. That should be considered an experimental use of the method, but it can give some indication of whether the impact of sex preference is likely to become more pronounced as the fertility transition proceeds.

It has been suggested that although sex preference may not have impeded fertility declines substantially in many countries so far, the effect of sex preference may grow as the average family size continues to fall. Williamson (1978), for example, has found that a preference for boys is generally more important in smaller families. In the case of China, in particular, the concern has been expressed that the one-child family policy may be difficult to implement because of the continuing preference of couples to have at least one son. We demonstrated previously that sex preference does not have a strong impact on contraceptive use in China at the present time. Because the differentials in contraceptive use by the sex composition of children in the family are rather modest at any parity, it is unlikely that the influence of sex preference on family planning will become much stronger in the future. In order to explore that issue empirically, we have calculated the effect of sex preference on fertility under the assumption that sex preference attitudes will remain unchanged but that average family size will decrease.

The effect is not immediately evident, because two opposing forces come into play as fertility declines. On the one hand, the effect of a preference for sons on fertility should increase as average family size decreases, because more couples will not have any sons among their children. On the other hand, the effect of that preference on fertility should decrease, because there is less latitude for further improvements in contraceptive prevalence as contraceptive use becomes more nearly universal. The net change in the impact of sex preference depends on the particular future course that fertility follows in China. Obviously, if the one-child policy were to become completely successful, then sex preference would have no effect on fertility since no couples would have a second child even if their first child was a daughter. If we assume a more likely scenario—i.e., that the one-child policy will be more effective in the future, but not completely successful—then the effect of sex preference on fertility is still rather weak.

We have calculated the effect of sex preference on family planning in China under three assumptions about the future course of fertility. All three calculations assume that the percentage of currently married couples with no children would remain the same as it was in the 1982 One-Per-Thousand National Fertility Sample Survey (10.2 per cent). Note that that figure refers to the number of children at a single point in time, rather than completed family size. The remainder of the couples are divided according to the following three alternative sets of assumptions:

(*a*) One half of the couples will have one child, one quarter will have two children, and one quarter will have three children. No couples will have more than three children;

(*b*) One half of the couples will have one child and one half will have two children. No couples will have more than two children;

(*c*) Three quarters of the couples will have one child and one quarter will have two children. No couples will have more than two children.

In each case, the relative distribution of couples by the sex of their children within each parity is assumed to be the same as in the One-Per-Thousand National Fertility Sample Survey, except at the highest parity, in which adjustments have to be made to keep the overall sex ratio of children at the correct level.[3] The overall level of contraceptive use at each parity would undoubtedly increase if average family size were to fall further, but as long as the differentials by sex composition remain constant, the results are unaffected by the absolute level of contraceptive use.

The calculations indicate that the effect of sex preference on family planning would be no stronger under any of those three scenarios than it was in 1982. We previously estimated that the contraceptive use rate in 1982 would increase by 1.8 percentage points in the absence of sex preference for children. Under the above assumptions, the contraceptive use rate would increase by 1.8 percentage points in the first case, only 1.2 percentage points in the second case, and 1.9 percentage points in the third case. In fact, no plausible scenario would raise the effect of sex preference much higher than 2 percentage points. Therefore, even if sex preference attitudes remain unchanged in China, their effect on fertility and family planning is likely to be quite small in the future.

DISCUSSION

Concern among policy makers that parental sex preferences for children are a substantial barrier to the success of family planning programmes has resulted in spirited educational campaigns in many countries to encourage couples to be satisfied with children of either sex. For example, one-child family posters in China nearly always portray a couple's only child as a girl. Family planning slogans in a number of countries also explicitly take account of sex preference attitudes. In India, the family welfare programme has adopted the new slogan, "Son or daughter, one or two will do". At an early stage in its family planning programme, the Planned Parenthood Federation of the Republic of Korea adopted the slogan, "Daughter or son, without distinction, stop at two and raise them well". In China, the family planning programme exhorts couples to "have only one child; whether it is a boy or a girl is the same".

In all of those countries, the persistent preference of parents for sons over daughters led authorities to adopt measures to counteract the effect of sex preference on fertility and family planning. It is significant that those initiatives were based primarily on untested assumptions about the strength of the effect of sex preference, rather than on reliable empirical evidence. This paper has attempted to test those assumptions by providing some basic quantitative estimates of the effect of sex preference on a number of fertility and family planning measures. A recently developed method for estimating the effects of sex preference has been applied to survey data from 27 countries in different regions of the world. The results demonstrate that sex preference does not have as strong an influence on fertility and family planning behaviour as would be suggested by examining the strength of sex preference attitudes alone. In most cases, sex preference has only a weak effect on fertility and family planning. Even in countries in which son preference is pervasive, such as the Republic of Korea, the total elimination of sex preferences would have no more than a moderate impact on fertility rates.

Fertility has fallen rapidly in the past two decades in a number of countries that have not concomitantly undergone a major transition in attitudes about sex preference for children. That fact is consistent with our findings that, in general, sex preference does not post a substantial barrier to the success of family planning programmes. It does not mean, of course, that Governments should not do all they can to improve the status of women and to reduce the strength of sex preference attitudes, on both humanitarian and egalitarian grounds. It does suggest, however, that efforts to reduce sex preference for children are not likely to have a major salutary impact on fertility rates or on family planning acceptance rates.

List of sources for tables 2–6

Except where otherwise noted, tables 2–6 are based on currently married women in their child-bearing years. The sources of data for each country are listed below. Except where otherwise noted, the data are taken from national-level surveys.

Africa

Egypt: survey in 38 villages in rural areas of Menoufia Governorate, conducted by the Social Research Center, American University, Cairo, and Menoufia Integrated Social Services Delivery System Project. Currently married women 15–44 years old (Gadalla, McCarthy, and Campbell, 1985).

Ghana: Ghana Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women 15–49 years old (Accra, Central Bureau of Statistics, 1983).

Kenya: Kenya Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women 15–50 years old—except for table 5, which is based on currently married, non-pregnant women 15–50 years old (Kenya, Central Bureau of Statistics, 1980).

Lesotho: Lesotho Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women less than 50 years old—except for table 5, which is based on currently married, fecund women less than 50 years old (Lesotho, Central Bureau of Statistics, 1981).

Sudan: Sudan Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women 50 years old or less—except table 5, which is based on currently married, non-pregnant women 50 years old or less (Sudan, Department of Statistics and World Fertility Survey, 1982).

Asia

Bangladesh: Bangladesh Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women less than 50 years old—except for table 5, which is based on currently married women less than 50 years old (Bangladesh, Population Control and Family Planning Division, 1978). 1979 Contraceptive Prevalence Survey. Currently married women 10–50 years old (Amin, 1986).

China: One-Per-Thousand National Fertility Sample Survey. Currently married women age 15–49 (Arnold and Liu, 1986).

India: India Family Planning Survey. Currently married women 20–39 years old (Sarma and Jain, 1974).

Indonesia: Indonesia Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women under 50 years old—except table 5, which is based on currently married, non-pregnant women under 50 years old (Indonesia, Central Bureau of Statistics and World Fertility Survey, 1978).

Jordan: Jordan Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women 15–49 years old—except for table 5, which is based on currently married, non-pregnant women 15–49 years old (Jordan, Department of Statistics, 1979).

Nepal: Nepal Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women 15–49 years old—except for table 5, which is based on currently married, non-pregnant women 15–49 years old (Nepal Family Planning and Maternal Child Health Project, Ministry of Health, 1977).

Philippines: Republic of the Philippines Fertility Survey. Currently married, fecund, non-pregnant women 15–49 years old—except table 5, which is based on currently married, non-pregnant women 15–49 years old (Philippines, National Census and Statistics Office; University of the Philippines, Population Institute; Commission on Population; and National Economic and Development Authority, 1979).

Republic of Korea: Korean National Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women less than 50 years old (Republic of Korea, National Bureau of Statistics of the Economic Planning Board and Korean Institute for Family Planning, 1977). Various surveys of fecund women (1966–1970) (Kong and Cha, 1974).

Syrian Arab Republic: Syria Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women under age 50—except for table 5, which is based on currently married, non-pregnant women under age 50 (Syrian Arab Republic, Central Bureau of Statistics, Office of the Prime Minister, and the World Fertility Survey, 1982).

Taiwan, Province of China: KAP-I (1965), KAP-II (1967), KAP-III (1970), KAP-IV (1973), Value of Children Study (1976), KAP-V (1980). Married women 22–39 years old (Chang, Freedman, and Sun, 1981).

Thailand: 1984 Contraceptive Prevalence Survey. Currently married women 15–49 years old. Unpublished tables; Survey of Fertility in Thailand (World Fertility Survey). Currently married, non-pregnant women less than 50 years old (Institute of Population Studies, Chulalongkorn University, and Population Survey Division, National Statistical Office, 1977). National Longitudinal Study (Round 2, 1972–73). Currently married women 15–44 years old and male household heads with wives age 15–44 years old (Knodel and Prachuabmoh, 1976). National Longitudinal Study of Social, Economic and Demographic Change in Thailand (Round 1, 1969–70). Currently married women 15–44 years old (Prachuabmoh, Knodel, and Alers, 1974).

Turkey: Turkish Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women under 50 years old—except table 5, which is based on currently married, non-pregnant women under 50 years old (Turkey, Hacettepe Institute of Population Studies, 1980).

Europe

Italy: Fertility Survey in Italy (World Fertility Survey). Currently married, fecund, non-pregnant women 18–44 years old—except for table 5, which is based on currently married, non-pregnant women 18–44 years old (Italy, Instituto di Statistica, Dipartimento Statistico, and Instituto di Demografia, 1982).

Portugal: Portugal Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women 15–49 years old—except table 5, which is based on currently married, non-pregnant women 15–49 years old (Portugal, Instituto Nacional de Estatistica, 1980).

Latin America

Costa Rica: Costa Rica Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women 20–49 years old (Costa Rica, Dirección General de Estadística y Censos, 1978).

Guyana: Guyana Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women 15–49 years old (Guyana, Statistical Bureau, 1979).

Haiti: Haiti Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women 15–49 years old—except for table 5, which is based on currently married, non-pregnant women (Haiti, Institut Haitien de statistique, 1981).

Jamaica: Jamaica Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women 15–45 years old (Jamaica, Department of Statistics, 1979).

Mexico: Mexico Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women 20–49 years old (and those aged 15–19 who were married or who had at least one live birth)—except for table 5, which is based on currently married, non-pregnant women of the same ages (Mexico, Dirección General de Estadística, 1979).

Paraguay: Paraguay Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women 15–49 years old—except table 5, which is based on currently married, non-pregnant women 15–49 years old (Paraguay, Dirección General de Estadística y Censos, 1981).

Peru: Peru Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women 15–49 years old—except for table 5, which is based on currently married, non-pregnant women 15–49 years old (Peru, Dirección General de Censos Encuestas y Demografía, 1979).

Trinidad and Tobago: Trinidad and Tobago Fertility Survey (World Fertility Survey). Currently married, fecund, non-pregnant women less than 50 years old (Trinidad and Tobago, 1981).

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NOTES

[1] Fred Arnold, "Measuring the effect of sex preference on fertility: the case of Korea", *Demography*, vol. 22, No. 2 (1985), pp. 282–283.

[2] Ansley Coale, *Rapid Population Change in China: 1952–1982* (Washington, D.C., National Academy Press), p. 28.

[3] We have assumed that the overall sex ratio for children is 106 males per hundred females and have adjusted the sex ratio at the highest parity accordingly. In fact, the calculation of the effect of sex preference does not depend at all on the sex composition of children at the highest parity, since it is assumed that 100 per cent of couples at that parity are using contraception.

References

Amin, Ruhul (1986), "Son preference in Bangladesh: an emerging barrier to fertility regulation", unpublished paper prepared for the Institute for Urban Research, Morgan State University, Baltimore.

Arnold, Fred (1985), "Measuring the effect of sex preference on fertility: the case of Korea", *Demography*, vol. 22, no. 2, pp. 280–288.

_____ and Eddie C. Y. Kuo (1984), "The value of daughters and sons: a comparative study of the gender preferences of parents", *Journal of Comparative Family Studies*, vol. 15, no. 2, pp. 299–318.

_____ and Liu Zhaoxiang (1986), "Sex preference for children in China", *Population and Development Review*, vol. 12, no. 2, pp. 221–246.

Bangladesh, Population Control and Family Planning Division (1978), *Bangladesh Fertility Survey, 1975/76: First Country Report* (Dacca, Ministry of Health and Population Control).

Bulatao, Rodolfo A., and James T. Fawcett (1981), "Dynamic perspectives in the study of fertility decision-making: successive decisions within a fertility career", in International Union for the Scientific Study of Population, *International Population Conference, Manila, 1981* (Liège), vol. 1, pp. 433–449.

Chang, Ming-Chen, Ronald Freedman and Te-Hsiung Sun (1981), "Trends in fertility, family size preferences, and family planning practices: Taiwan, 1961–80", *Studies in Family Planning*, vol. 12, no. 5, pp. 211–228.

Cho, Lee-Jay, Fred Arnold and Tai-Hwan Kwon (1982), *The Determinants of Fertility in the Republic of Korea* (Washington, D.C., National Academy Press).

Cleland, John, Jane Verrall and Martin Vaessen (1983), "Preferences for the sex of children and their influence on reproductive behavior", *World Fertility Survey Comparative Studies No. 27* (Voorburg, Netherlands, International Statistical Institute).

Coale, Ansley J. (1984), *Rapid Population Change in China, 1952–1982* (Washington, D.C., National Academy Press).

Costa Rica, Dirección General de Estadística y Censos (1978), *Encuesta Nacional de Fecundidad, 1976, Costa Rica* (San José).

De Tray, Dennis N. (1980), "Son preference in Pakistan: an analysis of intentions vs. behavior", Paper No. P-6504 (Santa Monica, Rand Corporation).

Feeney, Griffith, Yu Jingyuan and Tuan Chi-hsien (1985), "Parity progression measures of fertility in China", paper presented at the International Symposium on China's One-Per-Thousand National Fertility Sample Survey, Beijing, 14–18 October.

Freedman, Ronald, and Lolagene C. Coombs (1974), *Cross-Cultural Comparisons: Data on Two Factors in Fertility Behavior* (New York, Population Council).

Gadalla, Saad, James McCarthy and Oona Campbell (1985), "How the number of living sons influences contraceptive use in Menoufia Governorate, Egypt", *Studies in Family Planning*, vol. 16, No. 3, pp. 164–169.

Ghana, Central Bureau of Statistics (1983), *Ghana Fertility Survey, 1979–1980: First Report* (Accra).

Greenhalgh, Susan (1985), "Sexual stratification: the other side of growth with equity in East Asia", *Population and Development Review*, vol. 11, no. 2, pp. 265–314.

Guyana, Statistical Bureau (1979), *Guyana Fertility Survey, 1975: Country Report* (Georgetown, Ministry of Economic Development).

Haiti, Institut Haitien de statistique (1981), *Enquête Haitienne sur la fécondité (1977), rapport national*, vol. II (Port-au-Prince).

Hooper, Beverly (1984), "China's modernization: are women going to lose out?" *Modern China*, vol. 10, no. 3, pp. 317–343.

Indonesia, Central Bureau of Statistics (1978), *Indonesian Fertility Survey, 1976: Principal Report*, vol. II (Jakarta).

Italy, Instituto di Statistica, Dipartimento Statistico, and Instituto di Demografia (1982), *Fertility Survey in Italy, 1979, General Report*, vol. II (Bologna).

Jamaica, Department of Statistics (1979), *Jamaica Fertility Survey, 1975/76: Country Report*, vol. II (Kingston).

Jordan, Department of Statistics (1979), *Jordan Fertility Survey, 1976, Principal Report* (Amman).

Kamnuansilpa, Peerasit, and Apichat Chamratrithirong (1985), *Contraceptive Use and Fertility in Thailand: Results from the 1984 Contraceptive Prevalence Survey* (Bangkok, Research Center, National Institute of Development Administration; Institute for Population and Social Research, Mahidol University; and National Family Planning Program, Ministry of Public Health).

Kenya, Central Bureau of Statistics (1980), *Kenya Fertility Survey: 1977–1978, First Report*, vol. II (Nairobi, Ministry of Economic Planning and Development).

Knodel, John E., and Visid Prachuabmoh (1976), "Preferences for sex of children in Thailand: a comparison of husbands' and wives' attitudes", *Studies in Family Planning*, vol. 7, no. 5, pp. 137–143.

Kong, Chung-Ja, and Jae-Ho Cha (1974), "Boy preference in Korea: a review of empirical studies related to boy preference", *Psychological Studies in Population/Family Planning* (Seoul), vol. 1, no. 8, pp. 1–28.

Lesotho, Central Bureau of Statistics (1981), *Lesotho Fertility Survey, 1977: First Report* (Maseru, Ministry of Planning and Statistics).

McClelland, Gary H. (1979), "Determining the impact of sex preferences on fertility: a consideration of parity progression ratio, dominance, and stopping rule measures", *Demography*, vol. 16, no. 3, pp. 377–388.

Mason, Andrew, and Neil G. Bennett (1977), "Sex selection with biased technologies and its effect on the population sex ratio", *Demography*, vol. 14, no. 3, pp. 377–388.

Mexico, Dirección General de Estadística (1979), *Encuesta Mexicana de Fecundidad, Primer Informe Nacional* (Mexico City).

Nepal Family Planning and Maternal Child Health Project (1977), *Nepal Fertility Survey, 1976: First Report* (Kathmandu, Ministry of Health).

Park, Chai bin (1978), "The fourth Korean child: the effect of son preference on subsequent fertility", *Journal of Biosocial Science*, vol. 10, pp. 95–106.

Peru, Direccíon General de Censos Encuestas y Demografía (1979), *Encuesta Nacional de Fecundidad del Peru, 1977–1978, Informe General* (Lima, Instituto Nacional de Planificación).

Philippines, National Census and Statistics Office; University of the Philippines, Population Institute; Commission on Population; and National Economic and Development Authority (1979), *World Fertility Survey, Republic of the Philippines Fertility Survey, 1978: First Report* (Manila).

Portugal, Instituto Nacional de Estatística (1980), *Inquérito Português a Fecundidade: Relatório Principal* (Lisboa, Centro de Estudos Demograficos).

Prachuabmoh, Visid, John Knodel and J. Oscar Alers (1974), "Preference for sons, desire for additional children, and family planning in Thailand", *Journal of Marriage and the Family*, vol. 36, no. 3, pp. 601–614.

Republic of Korea, National Bureau of Statistics of the Economic Planning Board and Korean Institute for Family Planning (1977), *The Korean National Fertility Survey, 1974, First Country Report* (Seoul).

Repetto, Robert (1972), "Son preference and fertility behavior in developing countries", *Studies in Family Planning*, vol. 3, no. 4, pp. 70–76.

Paraguay, Dirección General de Estadística y Censos (1981), *Encuesta Nacional de Fecundidad* (Asunción).

Sarma, D. V. M., and Anrudh K. Jain, (1974), "Preference about sex of children and use of contraception among women wanting no more children in India", *Demography India*, vol. 3, no. 1, pp. 81–104.

Sudan, Department of Statistics and World Fertility Survey (1982), *Sudan Fertility Survey, 1979, Principal Report* (Khartoum, Ministry of National Planning).

Syrian Arab Republic, Central Bureau of Statistics, and World Fertility Survey (1982), vol. II. *Syria Fertility Survey, 1978: Principal Report* (Damascus).

Taylor, Jeffrey R. (1985), "Employment and unemployment in China: results from 10-percent sample tabulation of 1982 population census", Foreign Economic Report No. 23 (Washington, D.C., United States Bureau of the Census).

Thailand, Institute of Population Studies, Chulalongkorn University, and Population Survey Division, National Statistical Office (1977), *The Survey of Fertility in Thailand: Country Report*, vol. II (Bangkok).

Trinidad and Tobago (1981), *Trinidad and Tobago Fertility Survey, 1977: Country Report* (Port of Spain, Central Statistical Office).

Turkey, Hacettepe Institute of Population Studies (1980), *Turkish Fertility Survey, 1978*, vol. II (Ankara).

Williamson, Nancy E. (1976), *Sons or Daughters: A Cross-Cultural Survey of Parental Preferences* (Beverly Hills, Sage Publications).

_____ (1978), "Boys or girls? parents' preferences and sex control", *Population Bulletin*, no. 33, pp. 1–35.

Wolf, Margery (1985), *Revolution Postponed: Women in Contemporary China* (Stanford, Stanford University Press).

Yu Wang and Xiao Zhenyu (1985), "A brief account of the national One-Per-Thousand Fertility Sampling Survey", paper presented at the International Symposium on China's One-Per-Thousand National Fertility Sample Survey, Beijing, 14–18 October.

MEASURING THE HEALTH STATUS OF A POPULATION: CURRENT STATE OF THE ART

*Harald E. Hansluwka**

SUMMARY

The Global Strategy for Health for All by the Year 2000 by the World Health Organization has revived interest in looking for objective measures of the health status of a given population. According to the WHO definition, health is a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity. This paper attempts to survey existing and proposed health indicators, including mortality and survival, growth and development, and morbidity and disability; and discusses problems associated with them. It concludes that mortality statistics are likely to retain their central place in the evaluation of health progress. With respect to health indicators, problems arise, among other things, from the awareness that health is the continuum between death and complete health and also that health tends to become more and more a matter of social perception and behavioural patterns. Caution and patience are advised in the search for internationally comparable health indicators that are feasible, objective and useful.

INTRODUCTION

"The object of statistical science is to discover methods of condensing information concerning large groups of facts into brief and compendious expressions suitable for discussion. The possibility of doing this is based on the constancy and continuity with which objects of the same species are found to vary." (Sir Francis Galton)

The search for "objective" measures of the health status of a population (community, nation) has a long tradition in public health and may be traced back to the foundation of demography in the second half of the seventeenth century. For many decades the infant mortality rate and the average expectation of life at birth have been widely accepted—and more or less unchallenged—as valid and comparatively readily available reflections of the level of health of a population. Only relatively recently has what one might term the "indicator" movement swept across the health field. This development can be attributed to the following causes, among others:

(*a*) The growing awareness that, as a consequence of the striking advances in the battle against many traditional killers, mortality-based indicators have lost a good deal of their information value and can no longer be regarded as sensitive measures of the health status of the population;

(*b*) The steadily expanding scope of governmental responsibility for the health of the population, as reflected in, among other things, the institution of comprehensive schemes of medical care and the adoption of systematic health planning;

(*c*) The widespread fascination with quantitative measurement which, after its truly revolutionary effect on economic theory, has swept the social sciences and social policy debates.

All those factors, to a greater or lesser degree, play a role in both the more developed and the less developed countries. In the latter, it is argued that importing modern medical technology and know-how has been effective in combating the major killers; however, non-fatal disabling diseases remain unaffected. "The vicious circle between poverty and poor health has not yet been broken but only concealed by the striking reductions in death rates."[1]

In the more developed countries, the criticism of the classic, mortality-based indicators as measures of a population's health status has most succinctly been expressed by Gruenberg and Koizumi. Both give a pessimistic appraisal of the ultimate impact of advances in medical science and technology. Gruenberg has coined the expression "failure of success", to imply that decreasing mortality leads to more sick people in the population.[2] Koizumi has gone even further: on the basis of available mortality and morbidity statistics, he has stated that "this study demonstrates that a remarkable growth in the average expectation of life at birth in Japan is due mainly to the survival of sick persons. It can be concluded, therefore, that average life expectancy does not represent levels of health and that a new health indicator should be sought to evaluate the quality of survival."[3] However, Koizumi may have drawn his conclusions without due attention to the difficulties inherent in the analysis of morbidity data, particularly as regards time trends. His and Gruenberg's line of reasoning has not been uncontested. Fries speaks of "compression of morbidity"—i.e., the period of increased ill health will shorten and a genuine improvement in the health status of the population will occur.[4] On the basis of currently available information, such mental constructs cannot be verified beyond reasonable doubt. They may, rather, be viewed as provocative statements, as points of departure for opening up new horizons.

The dramatic appeal of indicators as tools for the formulation, implementation and evaluation of social policies and programmes has benefited from the promotional activities of the United Nations, particularly their efforts to develop a

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level of living index,[5] and to conceptualize a system of social accounts,[6] movements which at least partly originated in the early 1950s. Likewise, the social indicators programme of the Organisation for Economic Co-operation and Development (OECD) has had an impact.[7] At the national level (particularly in the United States) concern for the consequences of rapid technological change led to the demand for a "social report", based on "objective" measurement.[8]

As to health indicators (a constituent part of social indicators)—much of the pioneering work originated in the Anglo-Saxon countries. In the 1930s the League of Nations published a comprehensive review of "indices of health".[9] The increase in proposals for "health indicators" prompted a 1972 conference of national health officials in the United States to recommend that the National Center for Health Statistics set up a clearing-house for health indexes in order "to promote the development of composite measures of health status".[10] That clearing-house distributes, among other things, a bibliography on health indexes four times a year. Recently, Goldbert, Rosser, and Carr-Hill[11] have reviewed developments in North America and Europe.

Another boost was given to the indicator movement by the World Health Organization (WHO). In its Health for All by the Year 2000 (HFA/2000) movement, a significant role has been assigned to the monitoring and evaluation of national, regional and global health strategies. A limited number of global indicators was approved by the World Health Assembly at its thirty-fourth session (1981) for the purpose of global monitoring and evaluation of the HFA/2000 Strategy. It was stated that that approval "implies the commitment of countries, individually as well as collectively in regional groupings, to use at least these indicators and provide the necessary information on them". It was also stressed that those constitute "a minimal list so that all countries may be in a position to use them". Since then four WHO regions (American, Eastern/Mediterranean, European, and Western Pacific) have added to that list regional indicators tailored to their specific needs and priorities (see annex I). Countries have been invited to use additional national indicators "in keeping with their needs and capacities".[12] A special publication provided essential information on the development and use of indicators relevant to the monitoring and evaluation of health strategies.[13]

This paper focuses on measures of the health status of a population as a constitutent part of societal monitoring—i.e., on measures for broad social policy orientation at the national level. Indicators of individuals or measures of community characteristics (relevant to the study of the interaction between population, health and the environment) are excluded, as are measures of the quality of medical care and programme-specific evaluative measures, important and informative as they are, and no attempt is made to review indicators useful for immediate action at the local (subnational) level. Emphasis is placed on indicators which lend themselves to—and indeed are used in—international comparisons. Country-specific approaches are mentioned only by way of a few examples without claim to extensive coverage of such a vast field and a widely dispersed literature. Although there have been some commendable efforts for relevant state-of-the-art reviews, they have been more or less limited to anglo- or francophone literature.

Over the course of the past 10–20 years, various WHO publications[14] have dealt with measures of family health and the health aspects of the family life cycle, one of the areas which sporadically attracts worldwide attention and then slips back into oblivion, except for relatively narrow specialist attention. Despite some significant advances, determined and uninterrupted efforts are still needed before statistical measures of "family health" constitute an accepted part of health status measurement. The profound social changes—including racial transformations in family building and living patterns—which are being witnessed throughout the world today make that task more urgent and—at the same time—more difficult.[15]

DEFINITIONAL ASPECTS

Definitions of health

In 1946 the Constitution of WHO defined health as a "state of complete physical, mental and social well-being and not merely absence of disease or infirmity".[16] Ever since, it has been debated whether that definition should be seen as a lofty statement of intent; as a programmatic, visionary appeal to Governments and the world community to awaken them to their responsibilities and potentials; or as a genuine definition, which can be put into operation (even if, at present, the lack of available pertinent data may be insurmountable). Some examples of different opinions are listed in annex II.

One may summarize the various views by highlighting the consensus of researchers concerning the difficulties of conceptualizing health. Efforts to put forward a generally acceptable and operationally feasible definition of health have been hampered by four factors common to all cases: the vagueness of the concept; the value judgement of the definer; the multidimensionality of the phenomenon; and the impossibility of meaningful operationalization. One of the consequences of the growing acceptance of a definition based on functional ability and/or performance and behaviour (the social health model) is that only certain clearly defined components of "health" lend themselves readily, if at all, to international comparisons. Likewise, it follows that what is measured is determined, by and large, by the value system of the society (or social group) concerned. As Schaefer has put it, "definitions of health and illness are therefore part and parcel of societies, cultures and epochs".[17]

There is a less clear-cut conviction that the lack of progress towards a universally accepted and practical concept of health should not discourage work in that area or lead to a moratorium until the definitional problems are solved. The WHO definition[15] has the merit of recalling that health is a multidimensional phenomenon. Taking up the *mens sana in corpore sano* idea of the Romans, WHO has furthered progress beyond the traditional, pathology-oriented medical model towards a prevention-oriented sociological concept, leaving the notion of "positive health" as a bone of contention for researchers, policy makers and demagogues.

Another important aspect relates to a fundamental shift in perspective: there is now a definite trend to break the monopoly of the medical profession and to no longer view the definition of health and action against ill-health as an exclusive domain of the specialist. That ideology-inspired movement is characterized, among other factors, by calls for community participation and the social control of the health care system, and was highlighted by WHO in the Declaration of Alma-Ata.[18] Accordingly, the individual's perception of his own health status comes into its own.

As to the feasibility of constructing one index of health, summarizing the various aspects of health, views differ, but the majority seems inclined to agree with Lawton and others, who concluded: "we hope that this study and others

will put to rest the idea that there is a single concept of health which may eventually be reduced to an operational definition".[19]

Definition of health indicators

It is generally agreed that the occasional interchange between health indicators and health indices should be discontinued. The latter term should be applied only to composite measures. The definition proposed by WHO in its HFA/2000 Series[20] as "variables which help to measure changes" is to be understood in the context of its Strategy—i.e., it refers to the monitoring and evaluation of progress in the implementation of the Strategy. It cannot claim to be generally applicable. Criteria for meaningful health indicators have been specified by a WHO Expert Committee[21] and are appended as annex III. However, as so aptly pointed out by Goldbert and others[11] in their comments on those criteria, "espérer pouvoir un jour obtenir une batterie d'indicateurs et indices d'état de santé possédant simultanément toutes ces qualités est certes une utopie. Mais chaque pas dans cette direction est un progrès nécessaire" (to hope one day to obtain a battery of indicators and health indexes which possess all those qualities is certainly utopia—yet each step in that direction is necessary to progress).

Definition of equity in health

Recent deliberations on the measurement of the health status of a given population have been characterized by a concentration on two fundamental aspects with far-reaching policy (and measurement) implications: the definition of health referred to above, including the identification of its dimensions; and the definition of equity (social justice) in health.[22] The second aspect, which now seems to dominate international and national health policy debates, is accorded a crucial role in the collectively agreed WHO Strategy of Health for All by the Year 2000. Frequently, equity in health is defined as "equal access to health care".[23] However, there have been very vocal statements that health policy aims not only at improving the level of health on the average but also at reducing inequalities in health between countries and within a given country, among the various strata of the population.[24] In short, not only indicators of the level of health of the general population are needed but also supplementary measures of the distribution of health, the differentials among population subgroups (in terms of socio-economic characteristics, ethnic groups, administrative subdivisions etc.) Terms such as "equity" and "equality" have a definite politico/ideological flavour, in contrast to the more neutral "differentials". Equity and/or equality require a clear specification of the policy thrust, objectives and targets if they are to lend themselves to measurement. The message such measures convey has to be understood accordingly. One of the great merits of the Report on Inequalities in Health[25] is that it has revived interest in the measurement of the distribution of health within a population or community. Beyond the methodological aspects of interest to the specialist, the crucial question, often ignored or downplayed, of whether and how far an objective and value-free measurement of social phenomena is possible, is being debated. The current state of the art in the measurement of inequality has been aptly summarized by Culyer: "There is another, extremely under-researched area where health indicators research and political philosophy interrelate. That concerns, for instance, questions of social equity".[26]

APPROACHES TO THE MEASUREMENT OF POPULATION HEALTH STATUS

The emphasis below will be on measures of the level of health and differentials in health, primarily from the point of view of international comparability. Traditionally, health measures have been developed for the following areas: mortality and survival; growth and development; and morbidity and disability.

Annex IV provides information on the developmental activities of the United Nations, and annex V, a synopsis of health status indicators used or proposed by various organizations. There clearly emerges a tendency to concentrate—for obvious reasons—on measures of mortality ("long life"), with little if any attention being paid to measures of the other components of the health spectrum. The problematic elements are the lack of generally agreed definitions, of measurement techniques and of pertinent data from which to derive meaningful indicators in dimensions other than mortality (survival). No generally accepted classification of health indicators exists. There is no consensus that an attempt in that direction is either necessary or even desirable.[26] However, a classification may serve as an aid in sorting out the issues involved, and therefore its potential usefulness should not be dismissed out of hand. Examples of proposed or actually used classificatory schemes are given in annex VI.

Traditional approaches

Indicators of mortality and survival

The two most widely used measures, life expectancy at birth and the infant mortality rate, are not perfect (no such thing as a perfect health status indicator exists). For low-mortality countries particularly, they are of decreasing policy relevance and information value; nevertheless, they still enjoy unparalleled acceptance. Much of the criticism against the use of mortality (survival) measures is exaggerated and/or misguided.[27] For instance, mortality data are frequently criticized because of their alleged insensitivity to the efforts of the health care system.[28] However, such claims are usually one-sided, disregarding the question of the sensitivity of indicators of health care resources (an underdeveloped area). Hadley has shown that the use of refined indicators of health care can yield plausible results even if mortality statistics are used as output measures.[29] In commenting on the alleged insensitivity of mortality statistics, Shapiro, among others, cogently defended their judicious use. "No evidence on problems of quality of the data or on inadequacy of the information to identify significant health deficits and their correlates can override the unique characteristics of mortality statistics."[30] To him, the case against mortality measures is a "non-issue". That life expectancy at birth and infant mortality are even nowadays in low-mortality countries of almost dramatic policy significance has been evidenced by the deterioration of the situation in several more developed countries during the 1970s and early 1980s. Decreasing values of life expectancy at birth and disappointing trends in infant mortality rates have sent warning signals, the significance of which has transcended national boundaries and the health sciences. Emotional, ideology-inspired controversy has questioned deeply ingrained and occasionally even sacrosanct views on social organization and value systems.[31] In contrast to measures of other aspects of health, mortality- (survival-) based indicators cannot easily be dismissed as statistical artefacts or simply ignored. Although they do not tell us much about the

underlying factors or measure up to modern notions such as quality of life, they are the ultimate test of health policy. They show the net effect of the various, often conflicting forces at work. Poor performance of one country as compared to others at similar levels of socio-economic development, stagnation or deterioration in its national values, and large differentials among various segments of the population all provide a wealth of facts about the state of the society, unmatched by any other health status data and likely to hold true for the foreseeable future.

Similarly—and this is important for international and interdisciplinary purposes—life expectancy at birth has been found to be the one health status measure most closely correlated with other aspects of social and economic development.[32] National publications of social indicators provide convincing evidence that—regardless of the level of a country's development—life expectancy at birth is the most widely used measure for monitoring the health status of the population. As stated in *The Global 2000 Report to the President,* "the life expectancy of a population is perhaps the most all-inclusive and widely used measure of a nation's environmental health".[33]

Infant mortality is gradually being replaced in the more developed countries by the perinatal mortality ratio. One of the problems associated with the use of the infant mortality rate is that values for individual years may be affected by short-term fluctuations in the birth rate (in the usual calendar year approach, the number of live births in a given year is the denominator, whereas the numerator is distributed over two calendar years). Likewise, advances in medical technology have reopened the debate about the definitions of live birth, stillbirth, foetal death etc. and their impact on the level and comparability of data on infant mortality (factors which also affect the interpretation of the perinatal mortality ratio). Although questions may be raised as to whether infant mortality is still a sensitive measure of the level of health of a population, particularly at low levels of infant loss, it must be stressed that infant mortality has been found to be an informative health status indicator in international research on socio-economic development.[34]

A concise presentation of some essential points to be considered in the use and interpretation of data on life expectancy at birth and infant mortality is contained in annex VII. Those two measures are the ones proposed by WHO in its HFA/2000 Strategy for assessing the health status of the population (see annex I). In the interpretation of life expectancy values, it is well to remember that life expectancy at birth:

(*a*) Is usually computed (estimated) from a cross-sectional (and not longitudinal or generation (cohort)) perspective; and

(*b*) Is often complemented by life expectancies at selected other ages in various, primarily developed countries (for instance, in the HFA/2000 Strategy of the European region of WHO).

The tendency towards concentration of death at old age in low-mortality countries can be expected to diminish the effect of the disproportionate weight of mortality at young ages, particularly in infancy and early childhood.[35]

As to measurement of differentials in life expectancy or infant mortality, measures such as the ratio of the best to the worst group have been widely discredited as far as objective measurement of differentials is concerned; however, it may still be regarded as a legitimate procedure when used in the context of a clearly specified strictly egalitarian philosophy.[36] There are many pitfalls in the interpretation of differentials in mortality and survivorship, particularly with regard to analysis of trends in differentials but also to comparison among countries. The large number of indicators of inequality used in the literature points to a generally unsatisfactory state of the art, with no single measure clearly superior to others. Even the one measure which is close to being widely accepted, the Gini co-efficient, may produce misleading results or be inadequate for policy purposes. It may suffice to quote Jenkin in his foreword to the report of the working group on inequalities in health: ". . . and while it is disappointing that the Group were unable to make greater progress in disentangling the various causes of inequalities in health, the difficulties they experienced are perhaps no surprise given current measurement techniques".[37] In addition, available data "may be found to be inadequate because it is based on implicit social theories which no longer correspond to social reality",[26] a consideration usually at variance with the desire to maintain continuity and comparability over time.

In its HFA/2000 Strategy, WHO has refrained—wisely—from proposing a definite approach to the measurement of health status differentials. As can be noted from the formulation of the global indicator "life expectancy at birth", no distinction by sex had been foreseen. However, in the case of infant mortality, WHO departed from that course, requesting information for "all identifiable subgroups of the population".[12] Neither in its 1983 monitoring nor in the 1985 evaluation of the Strategy has that topic been further pursued, the analysis having been limited to nation-wide information.

One of the most serious challenges facing the international community is how to tackle the problem of measuring inequality of death. Scientifically sound proposals are urgently required if the risk of manipulation or distortion is to be reduced. Questions such as "are there differences between countries with regard to within-country differentials?" can, at present, be addressed only with great circumspection and in a qualitative context, without claim to precise measurement. A telling example of wise restriction has been provided by the WHO co-ordinated study of the social and biological effects on perinatal mortality,[38] financially supported by UNFPA. Much pioneering work was provided by the European Science Foundation Workshops on Inequalities in Health, the first of which was organized in London in 1984. Relevant research is sponsored on an international level by the Committee for International Co-operation in National Research in Demography (CICRED), in collaboration with the United Nations and the World Health Organization,[39] with the financial support of the United Nations Fund for Population Activities (UNFPA). Likewise, the promotional activity of the WHO Regional Office for Europe on Social Equity and Health[40] must be mentioned as an interesting approach to that problem area. Listing some of the main elements to be considered in the study of social inequality of death, Hansluwka cautioned that "great care should be exercised to avoid pitfalls and erroneous interpretation. The computation of more than one index, checks of consistency of results and a look at the problem from both sides, survival and death, may significantly reduce the risk of misinterpretation".[36] Similarly, Le Grand, Ilsley and Pollard pointed to some of the potential fallacies one may encounter in such investigations.[41]

There are occasionally other mortality- (survival-) based indicators in use, particularly at the national level but also in international organizations (see annex V). Frequently, such measures serve specific purposes not directly related to the measurement of population health status as a part of

societal monitoring. Indicators such as the potential years of life lost between age 1 and 70,[42] or the index of preventable mortality,[43] the unnecessary and untimely death approach (a part of the sentinel health event scheme for public health surveillance),[44] and the "index of vitality"[45] offer many, as yet not fully exploited, uses in health planning and in the monitoring and evaluation of health programmes. However, none of those measures has yet found general acclaim.

The distinction between measures of mortality (the negative aspect) and measures of survivorship (the positive side) cannot be stressed enough because that point is frequently overlooked. In brief, mortality-based measures are relatively sensitive, with an inherent risk of exaggerating differences, whereas survival-based measures are robust, with an ensuing risk of belittling differences.

Indicators of growth and development

Weight at birth and weight for age (unfortunately without specific age reference) have been selected by WHO to monitor the nutritional health status of children and mothers within the context of its HFA/2000 Strategy (see annex VIII, which lists a few comments on their availability and interpretation). The assumption is that those two indicators adequately reflect the situation in the community. However, as pointed out, "the specificity of an indicator, and therefore its value for nutritional surveillance, may be different in different countries".[46] Likewise, "it is rather unrealistic to consider nutritional health surveillance in isolation from general health and morbidity".[47] The two indicators are not uncontested. Weight at birth has repeatedly been shown to be associated with ethnic (genetic) traits and its indiscriminate use cannot be recommended.[13] However, there is a widespread consensus that despite its limitations, weight at birth is "the most significant indicator of the risk to the survival of a baby and its healthy growth and development"; low birth weight "also reflects inadequate nutrition and ill-health of the mother".[13] A serious drawback, however, is unavailability or poor quality of pertinent data for many countries. Another problem in the use of that indicator for the identification of low birth weight babies stems from contradictory international recommendation. In 1948, the first World Health Assembly (WHA) adopted as international definition of "immaturity" (a term later changed at the recommendation of the Expert Committee on Maternal and Child Health in 1960 to "low birth weight") that "an immature infant is a liveborn infant with a birth weight of 2,500 grams or less".[48] That definition was changed in 1976 by the twenty-ninth WHA to a "birth weight of less than 2,500 grams (i.e., up to and including 2,499 grams)".[49] However, the United Nations—with good reason—still uses 2,501 as a dividing line. In a review of available evidence on the incidence of low birth weight in 1980, WHO likewise used the 1948 definition, because "it was found easier to present the findings of that enquiry according to the pre-1976 definition".[49] This is not merely a question of semantics, because the adoption of the 1976 definition may have serious consequences for international comparison and the study of national trends because of a "rounding" tendency in replies to the question on birth weight in relevant certificates. The best course would probably be to revert to the old definition.[50] Finally, in order to evaluate the reliability and the significance of data on birth weight, a detailed breakdown by birth weight groups, as recommended, for instance, by the United Nations and the WHO Expert Committee on Maternal and Child Health, would be highly desirable.[51]

As to weight for age (likewise unavailable throughout most of the developing, but also developed, world), the usefulness of the information depends on the precise purposes of measurement; many observers favour weight for height as the indicator if there is restriction to a single indicator. The best procedure, of course, would be to use weight for age, weight for height and height for age for children up to a specified age, preferably by single years of age.

An FAO/UNICEF/WHO Expert Committee[46] has recommended a short list for monitoring nutritional health status (annex IX). The same report also contains an expanded list, together with detailed comments on the relevance and specificity of the various (sub-)indicators.

No progress has so far been made with regard to the measurement of the psycho-social and behavioural aspects of growth and development, a challenge yet to be tackled.

Indicators of morbidity and disability

The frustration of many researchers, health planners and health administrators concerning their dependence on mortality data has been eloquently expressed by Elinson: "Mortality data, no matter how imaginatively analysed, tell us at most about the complete absence of health for one person in a hundred". The importance of a good information base on morbidity and disability has repeatedly been stressed. WHO has from its very inception initiated a series of vigorous promotional activities. An informative example is the synopsis of the sources and uses of morbidity statistics produced more than 30 years ago, and still of topical relevance (annex X). A determined effort was also made to standardize definitions and measures in the field of morbidity statistics (annex XI). However, Stock's diagnosis, made in the mid-1950s, that "with the current state of the art, it is infeasible to use morbidity data for the development of health indices for populations, and that there is no alternative to the use of mortality data"[45] is still, by and large, valid three decades later.

Characteristic of the present situation is the fact that WHO in its HFA/2000 Strategy has ignored morbidity indicators for global monitoring. However, some regional offices of WHO have attempted to use morbidity indicators for monitoring and evaluating regional health strategies. The experience so far is best illustrated by the European region, where four indicators were experimentally introduced: number of disability days per person and year; proportion of population with different levels of long-term disability; incidence of selected infectious diseases; and number of working days lost due to disease and injury. With the exception of data on infectious diseases (where reporting has a well-established tradition), the overwhelming majority of countries did not provide any information, and what was received was too heterogeneous to be analysed.

It is beyond the scope of this paper to investigate the reasons for this unsatisfactory situation. Nevertheless, a few remarks may be useful:

(*a*) Historically, the approach to morbidity statistics has largely, but not exclusively, been dominated by the programme-specific, immediate action-oriented needs of health professionals (administration);

(*b*) Whereas measures such as life expectancy at specified ages and mortality from all causes, preferably by age (groups), carry a relatively clear and straightforward message (though their correct interpretation may not always be as easy as it might appear at first sight), a measure such as "total morbidity load" of a community or population is next

to meaningless. Without information on the type of disease, its duration and severity, diagnostic criteria and precision, stock or flow character, or—to view it from a different angle—without information concerning its location on the health continuum, it is difficult to see how valid inferences can be drawn. To cope with such diverse elements, weighting and scaling procedures have been tried on an experimental basis. Due to the subjectivity of such approaches and the constraints imposed by the type and amount of information available, such efforts have remained interesting pieces of academic research, of a sporadic nature, with—hitherto—little national or international policy relevance, although on the subnational level exceptions may be detected;

(*c*) The focus on the bio-medical aspects of disease-specific, event- (case-) oriented information served its purpose when the epidemiological climate was dominated by infectious diseases, and it is still useful nowadays, particularly in many developing countries. With the change towards a morbidity pattern characterized by its chronicity and progressive nature, the socio-medical aspects of morbidity now assume a key role. However, they are still—despite some remarkable advances—largely in a state of development which more or less excludes not only intercountry comparison but also in-depth national assessment and trend analysis;

(*d*) Efforts to build up person-oriented morbidity statistics encounter enormous difficulties, partly because of prohibitive costs but even more so because of confidentiality problems, especially in the more developed countries.

Of the three dimensions of health—the physical, the mental and the social—specified in the WHO Constitution, physical health is the one that lends itself most easily to measurement. It is the area in which most of the efforts and experimentation have been concentrated. There have been some promising developments in a number of countries concerning the creation of relevant, disease-specific data bases; however, the overall assessment can only be disappointing, partly because of cost/effectiveness considerations and partly because of the very specificity of the data collection schemes, which makes integration into a comprehensive data base on a population's ill-health difficult.

As to mental health, "the problem of measuring mental health state in a population has defied solutions over the years".[52] This should be no surprise in view of the lack of consensus about the scope, content and delineation of mental health. Kramer and Anthony recently noted that "systematic annual morbidity statistics on the incidence and/or prevalence of mental disorders as a group or of specific disorders are not being produced by any country. The basic obstacle to their production is the absence of the necessary case-finding techniques for collecting the required numerator data. Although many studies on the incidence and prevalence of mental illness have been carried out, the population (sub)groups covered differed as much as the diagnostic criteria applied, the classification system used as well as the very definition of incidence and prevalence."[53] Their in-depth review of the situation in 22 member States resulted in the recognition that available statistics on mental disorders "lack comparability and uniformity and, for the most part, are quite limited". To a great extent that has been explained by the relative neglect and underdevelopment of mental health services in many countries and the wide diversity in programme structure and organization where some kinds of mental health services exist. Moreover, available statistics are frequently not tapped, either because their existence is unknown to the potential user or because adapting them to the specific needs of the user poses problems.

Rarely have efforts been made to obtain information on the total psychiatric morbidity in a country. The Epidemiologic Catchment Area programme in the United States is an exception. However, such endeavours "do not seem feasible in most countries, and certainly not so in the developing world".[54] The foundation for such a statement (with which one can only agree) is that mental health statistics and, consequently, mental health indicators are based on use of service and cover just the "tip of the iceberg" (i.e., only persons coming to the attention of the medical service). Deliège[55] has proposed a number of indicators of mental health (see annex XII). A few years ago, Brooke put forward suggestions for a short- and medium-term programme, to be promoted and co-ordinated by WHO, which would include meeting on standardization of measures in the field of mental health statistics.[56] Following up on those suggestions, an ambitious programme has been initiated, to develop indicators for:

"(*a*) Mental health and psychosocial development of the individual, including the normal psychosocial development in childhood, normal mental functioning in old age, as well as assessment of mental well-being;

"(*b*) Psychosocial implications of social development, including the assessment of social pathology like substance abuse, uprooting or family disruption, as well as social stimulation, community participation and support; and

"(*c*) Mental and neurological morbidity (here, emphasis is placed on reaching agreement on the definition and presentation of indicators, including the development of indicators of the quality of care by the neuropsychiatric service)."[57]

However, it will probably take years before those efforts can be evaluated. On the basis of past experience, optimism hardly seems justified.

Social well-being, the third dimension, is the most controversial one, the most difficult to measure—and the most attractive one from an interdisciplinary point of view. Social health is occasionally explained as "social and economic productivity" or the capacity to lead a "socially and economically productive life". Here, various currents of thinking converge. Social health reflects a tendency towards assessment of the economic and social consequences of ill-health, for the individual and the family as well as society. Examples of that approach can be traced back to the work of Pettenkofer[58] and Dublin and Lotka.[59] Among the more recent contributions one might refer to Winslow,[60] Rice and Hodgson[61] and Abt.[62] Schemes illustrating the various components of the economic and social implications of illness for the patient and his family have been used by a WHO/IARC Expert Committee (see annexes XIII and XIV).[63]

The other main focus of attention is the measurement of disability, not only with regard to its physiology but increasingly with a socio-medical thrust towards the identification of the impact of disability on activities of daily living (an index of activities of daily living has been proposed by Akpom and others[64] and is being used in evaluation studies of the effectiveness of treatment). Sociomedical, disability-based indicators would seem to be intuitively appealing, providing a potential as yet untapped for complementing mortality- (survival-) based measures as indicators of the health status of the population. That conviction can be detected in the regional indicators adopted in the WHO European region, as mentioned above. Indicators of disability can encompass a wider view of health, including social and behavioural consequences, than disease-oriented, biomedical indicators.

One of the problems associated with a disability-based indicator of the health status of the population is that it is doubtful whether disability is a single, one-dimensional phenomenon which can be measured in an objective way throughout the world. The main consideration in defining disability is its use. "Disabilities are not solely properties of individuals but also of their interaction with the culture in which they live."[65] In the search for a disability-based health indicator, the conflict between particularity and comprehensiveness, between variety and generalization, can be solved only by reference to the audience—i.e., to the particular uses the indicator should serve. Two fundamental aspects pose formidable short-term obstacles:

(*a*) The experimental stage of development, even in very advanced social settings, because of both the unavailability of relevant or reasonably representative data and the lack of tested and convincing theoretical constructs;

(*b*) The lack of agreed diagnostic criteria and the range of activities to be taken into account, a point defying solution not only among countries but also within a given culture and country.

For policy guidance not only national averages are required; at an equal level of priority, information on differentials between social groups is also needed. However, even a cursory review of the relevant literature shows that that point has not yet received the attention it deserves.

The problems associated with the use of disability data in trend analyses have been discussed by Wilson and Drury.[66] They single out the following major areas of concern:

(*a*) Data sources, including sampling frame and non-sampling errors;

(*b*) Changes in the organization and delivery of health care;

(*c*) Changes in the definitions of, and values related to, health.

They refer to the possibility that "important changes may go unnoticed because of long-term stability in aggregate levels of health statistics".[66] Likewise, they stress that "illness and disability time series, however, provide a more ambiguous data base for evaluating improvements in health status, because changes in health indicators do not always clearly reflect changes in the health phenomena they are purported to measure".

The United Nations Decade of Disabled Persons (1983–1992) and the World Programme of Action concerning Disabled Persons can be expected to stimulate and expedite work on indicators for monitoring and evaluation. As pointed out in the recent report of the Expert Group on the Development of Statistics on Disabled Persons,[67] the challenge is a formidable one. The Expert Group emphasized the importance of a conceptual framework concerning the linkages between policy goals and programme objectives. Such a framework would be extremely useful, and indeed, be a prerequisite for the development of appropriate data bases and the selection of suitable indicators. The Group stressed that "the social dimensions of disability should be given an adequate place in statistical measurement. Operationalization of the concepts, definitions and instruments of observation should not be dominated by health aspects alone" (a statement which might seem to be at odds with the WHO constitutional social health dimension). It is to be hoped that the developmental work now set in motion will not be limited to programme-specific, operational indicators but will encompass indicators of disability as a major social concern.

To conclude, one may legitimately express anxiety concerning "the risk of extending the frontiers of social health into the never-never".[68] Although views about ever being able to operationalize social health differ, one cannot ignore the implications for cross-cultural, intercountry comparability. If social health has meaning only in a defined set of values and societal norms, international comparisons are, at best, a very risky affair. Likewise, the potential pitfalls in the study of the distribution of social health within a population, especially one characterized by culturally or socio-economically heterogeneous subgroups, cannot be ignored. The "sickness impact profile" and the "functional limitation profile" and other imaginative ways to capture functional disability have shown "that there is no way of avoiding the essential subjectivity of responses to these survey instruments. . . . the perception of health varies between people".[8] "Increasingly sophisticated proposals call for disability measures. Unfortunately, it has been easier to propose the adoption of new and sophisticated indexes than to use them."[69]

The main source of information on morbidity and disability is service records. Accordingly, indicators based on service data cover only those events which have been brought to the attention of the service(s) concerned and may cover only the "tip of the iceberg". Improvement in service coverage of the population may therefore lead to a grossly distorted picture. Indicators based on self-reporting (in surveys) may, at least in theory, provide more complete information about ill-health than service data; however, they are subject to the usual survey problems such as sampling design, response bias and subjectivity of replies. Goldbert and others[11] have commented with regard to the consistency of information provided by physicians, on the one hand, and patients from various ethnic groups, on the other, that the results are very different in each case, and with regard to morbidity- and disability-oriented indicators, they conclude that the results depend, to a surprising degree, on whether the diseases are perceived by the patients, the physicians or the specialists in health statistics.

Mathematical approaches to the measurement of health

Another important approach to tackling the challenge of measuring the health status of a population has been the advancement of the mathematical theory of health-status measurement. A first step forward was taken by Chiang[70] and by Fanshel and Bush.[71] Without claiming to provide an extensive review of that area, the contributions of Chen,[72] Miller,[73] and Sullivan[74] may be listed as other relevant examples. Yet, attempts to develop a simple and comprehensive index of the current state of health, similar in its philosophy to the gross domestic product, have been unsuccessful. Most of the efforts to develop such an index have so far been made in the United States. All have one thing in common: they address themselves to a sophisticated audience; they have not been easy to understand and to interpret by non-experts. The most practical follow-up, and the one with the most appeal, was done by Sullivan, who proposed three indices:

(*a*) The conventional expectation of life;

(*b*) The expectation of a disability-free life;

(*c*) The expectation of life free of bed-disability.

However, they cannot be applied in an international setting owing to the basic lack of relevant data throughout most of the developed and developing world. Chen[72] and Miller[73] concentrate more on comparing the health of specific (un-

derprivileged) target groups with the norm (average population) in order to facilitate decisions on priorities and to generate programmatic action for reducing or eliminating prevailing differentials in health and survivorship.

That school of thought is closely associated with some fundamental theoretical advances, the perception of health as a continuum, and the use of Markov models for the estimation of the expected period of life spent in defined stages. Nonetheless, the practical policy relevance of that approach has yet to be demonstrated, even if one does not agree with Rosser, who described much of that work as a "rather sterile manipulation of broad theoretical values".[11]

CONCLUSION

It is interesting to note that the search for health indicators has acquired such prominence at a time of disillusionment with social and economic indicators. It is as though the international community and WHO are intent on compensating for the relative neglect of quantitative information in the past and running the risk of passing to the other extreme, of quantophrenia, even if only temporarily.

In the foreseeable future, it can be assumed that mortality statistics will retain their central place in the evaluation of health progress. For comparisons among countries and the study of changes over time, they simply cannot be replaced. The main directions for future work are as follows:

(*a*) Improvement and consolidation of data bases in the developing countries;

(*b*) Wider application of quality control in the elaboration of statistics, particularly with regard to traditionally "soft" areas such as occupation and cause of death. The latter will be a serious challenge; as deaths increasingly shift towards old (and very old) age, the classical concept of classifying only one underlying cause is likely to require careful scrutiny (similarly, cause of death statistics for the perinatal period pose formidable problems which have not yet been solved);

(*c*) More refined analysis, making the best possible use of advances in statistical methodology and technology—for instance, record linkage, disaggregation by groups or areas and rearranging cause of death tabulations so as to meet specific needs such as health planning;

(*d*) More attention to the sensitivity of mortality- (survival-) based indicators at different levels of mortality;

(*e*) Complementary use of other life table measures in addition to the average expectation of life at birth—for example, the probable and the normal life expectancies, the average life expectancy at selected crucial ages of the life cycle (where an agreement between the users would be an advantage of international comparisons) and survivorship curves. The approach of Koizumi is worth mentioning. He has drawn four survivorship curves, one based on the usual cross-sectional life table and one each for survivors without medical care, survivors without any discernible disease and survivors by subjective feeling of health. Even if the reliability of the data derived from the Japanese Patient Survey needs to be confirmed, it opens up potentially promising perspectives;

(*f*) Development of imaginative analytical uses of statistics. The above-mentioned experiments by Romeder, Wolsey, and Rutstein demonstrate the usefulness and topicality of mortality data even under low-mortality conditions;

(*g*) Complementation of mortality- (survival-) based indicators by information relating to other aspects of the health continuum, when and where available. Wilkins and Adams[75] have pleaded for the application of "health expectancy indices" (including quality-adjusted life expectancy) in health planning and policy analysis. They argue that "health expectancy" is a comprehensive, understandable and operational index of health. Collishaw has put forward the notion that "the health expectancy index probably represents the most objective measurement of general health that could be hoped for in a national household survey".[76]

The above changes will go a long way towards meeting national and international requirements. According to Carr-Hill, "there is considerable mileage to be made out of the attempt to refine the mortality data for the purposes of the analysis".[8]

As to indicators of health, zeroing in on the other stages of the health continuum, their usefulness for international comparison (and to some extent also intra-country variation) does not look promising, at least in the short term.

The current trends in thinking may be summarized as follows:

(*a*) A growing awareness that health is a continuum of which only the one extreme of ill-health (death) lends itself to objective and comparable measurement among countries and according to different social strata within a country;

(*b*) In step with the rapidly changing disease spectrum and success in the fight against premature death, societal concerns have moved beyond the traditional emphasis on long life to broad issues such as the "five Ds" (death, disease, disability, discomfort and dissatisfaction);[77]

(*c*) Assessment of ill-health (or its opposite—positive health) tends to become more and more a matter of social perceptions and culturally rooted behavioural patterns. "Morbidity and impairment are more than ever recognized today as encompassing a number of socio-medical conditions—i.e., deviant conditions that may be as much social as medical in origin". Consequently, as "post-industrial society moves towards a social definition of health",[78] research on relevant indicators should be socio-medicine oriented, a conviction strongly held and reflected in the political philosophy of WHO's HFA/2000 Strategy;

(*d*) Health statistics have been mainly concerned with ill-health. In recent years, experimentation with the development of indicators of positive health, instead of traditional, relatively easy-to-document measures of ill-health, has given rise to sharp controversy and anxiety that a concentration on positive health, whose practical relevance to health policy has yet to be demonstrated, may deflect attention from the issues that countries and the international community are able to cope with. "Rather than concern ourselves with the utopian end of the health spectrum, we should concentrate our attention on refining measurements of negative health".[79] And Culyer commented:

> "Moreover, whether such a state [the WHO definition of complete physical, mental and social well-being] can actually be described in a non-relativist fashion (let alone measured) seems to be in doubt: if health is conceived as a continuum of states of which one extreme is ['perfect health'], it seems both analytically more manageable and practically more relevant to focus on the in-between states and on improvements [movements towards the state of 'perfect health'] than upon the extreme state itself which may be unattainable and even unimaginable."[80]

Bice categorically stated that "from our admittedly pragmatic perspective, effort directed towards positive indicators is not likely to bear fruit relevant to short-run policy-making for some time to come";[79]

(*e*) A shift towards a more pronounced consumer focus—i.e., a tendency to base health status indicators on subjective perceptions of one's own health. The WHO Regional Office for Europe has specifically addressed countries in that region on that issue,[61] a move which should be seen as part of its commitment to be a catalyst for the restructuring of health care systems in the more developed countries. (A book based on measurement in health promotion and protection is due to come out shortly.) That approach has a certain potential for capturing aspects of positive as well as social health;

(*f*) The multidimensional character of health is accordingly reflected in the search for appropriate health status indicators. As Culyer states, "the unity of health indicators research is characterized by diversity".[26] Users have a decisive say; the ways they want to use the indicators vary, and may not necessarily be consistent—one principal cause for the widespread dissatisfaction with the current state of the art;

(*g*) A move away from the obsession with indicators towards the "characteristics" approach—i.e., organizing the information into a "health profile". One may include here also the "health accounts scheme". Such approaches enjoy a certain degree of support from international bodies. That concession to the complexity of health status measurement may lead to more carefully planned and organized sets of data, which can be selected, re-arranged and transformed into indicators. The decisive element of that transformation is the ultimate use of the measure(s) derived from the data. That approach may facilitate correct interpretation, as a result of the specification requirements inherent therein;

(*h*) Concern about and realization of the conceptual and logistics problems encountered in the creation of reliable cost-effective data systems. The disease-specific orientation of classical morbidity statistics, important and indeed indispensable as it may be for a broad range of health actions and research, should be supplemented by information on disability and on the consequences of ill-health for the individual, the family and society. Studies such as those by Rice and Hodgson[61] and Abt[62] are examples of innovative and potentially promising ways of highlighting the socio-medical side of ill-health. Their use in intercountry comparison needs to be examined;

(*i*) Person-oriented morbidity statistics are still exceptions, despite their undeniable value for social policy and epidemiological research, to mention two main fields of interest. Progress in that area is facing an uphill struggle in many of the more developed countries, owing to concerns about confidentiality and privacy;

(*j*) Another grave challenge concerns the interpretation of the information. Health status indicators should be used in conjunction with an in-depth analysis of the phenomena they are to reflect. The legitimate move beyond the comparatively objective mortality- (survival-) based measures is facilitating the use (or abuse) of the information for political manipulation. The utilization of statistics may be influenced not so much by an urge to "seek truth from facts" (to quote an old Chinese saying) but rather by a fascination with the "beauty of information"—i.e., their use for proving preconceived notions. As Pollard put it, "For the politician, the ability to choose whichever statistics give him the answer he desires is possibly very convenient".[82]

In conclusion, one may recapitulate the main points of controversy in the search for indicators of the health of a population (leaving aside mortality and long life), as follows:

(*a*) Subject of measurement: ill-health vs. positive health;

(*b*) Perspective of measurement: socio-medical vs. biomedical;

(*c*) Source of information: health care provider vs. population at large (consumer);

(*d*) Type of measurement: objective vs. subjective (i.e., based on self-perception);

(*e*) Dimension and specificity of measurement: disaggregation, sensitivity and particularity vs. comprehensiveness, robustness and summarization;

(*f*) Distribution of health: impartial (neutral) vs. policy (ideology) inspired measurement;

(*g*) National (local) relevance vs. international comparability.

Of course, those aspects are not mutually exclusive. A strong case can be made for pursuing both lines of reasoning.

International comparison of politically sensitive health status measures is fraught with dangers. Especially at a time when statistics are in vogue for monitoring and evaluating national and international health strategies, it is well to remember that a little knowledge is a dangerous thing, and may lead to frustration and ultimately rejection of statistics as an aid to rational decision-making. Caution and patience are advisable. Priority should be given by the relevant international bodies to activities of direct relevance to the development of national data systems (such as clearing-houses for the exchange of experience) and to the promotion of collaborative studies, based on carefully designed study protocols to explore the potential for intercountry comparability. The road ahead is an arduous and exacting one.

NOTES

[1] "Health trends and prospects: 1950–2000", *World Health Statistics Report*, vol. 27, No. 10 (1974), pp. 670–706.

[2] E. Gruenberg, "The failure of success; health and society", *Millbank Memorial Fund Quarterly*, vol. 55, No. 1 (1977), pp. 3–24.

[3] A. Koizumi, "Human survival: quality vs. quality" in *Health Policy Towards the 21st Century: Health Problems Beyond the National Boundary. Report of the First Takemi Symposium on International Health, Tokyo, 19–20 May 1984*, pp. 88–89.

[4] J. Fries, "Aging, natural death and the compression of morbidity, *New England Journal of Medicine*, vol. 303, No. 3 (1980), pp. 130–135.

[5] J. Drewnowski, The level of living index, parts 1 and 2. United Nations Research Institute for Social Development Report, No. 4, Geneva, September, 1966.

[6] "Special issues: future direction of work on social indicators: report of the Secretary-General" (E/CN.3/1985/3).

[7] Organisation for Economic Co-operation and Development, *The OECD List of Social Indicators* (Paris, OECD, 1982).

[8] R. Carr-Hill, *Indicators of Health and Inequalities (in health)*. Consultant Report for the Social Affairs Committee of Inequalities in Health (Aberdeen, Institute of Medical Sociology, 1983).

[9] K. Stoutman and I. Falk, "Health indices: a study of objective indices of health in relation to environment and sanitation", *Quarterly Bulletin of the Health Organization* (League of Nations), vol. V (1936), pp. 901–1081.

[10] P. Erickson, "Objectives and organization of the clearing-house for health indexes in the National Center for Health Statistics, United States of America", *World Health Statistics Report*, vol. 29, No. 3 (1976), pp. 140–143.

[11] M. Goldbert and others, "Indicateurs de santé et 'sanometrie': les aspects conceptuels des recherches récentes sur la mesure de l'état de santé d'une population", *Revue épidémiologie et santé*, vol. 27 (1979), pp. 51–68 and 133–152; R. Rosser, "Issues of measurement in the design of health indicators: a review", in *Health Indicators: An International Study for the*

European Science Foundation, A. J. Culyer, ed. (Oxford, Martin Robertson, 1983), pp. 34–81; and R. Carr-Hill, *op. cit.*

[12] See World Health Organization, *Global Strategy of Health for All by the Year 2000.* Health for All Series, No. 3 (Geneva, WHO, 1981).

[13] _____*Development of Indicators for Monitoring Progress Towards Health for All by the Year 2000.* Health for All Series, No. 4 (Geneva, WHO, 1981), p. 38.

[14] *Statistical Indices of Family Health.* Technical Report Series, No. 587 (Geneva, WHO, 1976); "Mortality and the life cycle of the family. Some implications of recent research", *World Health Statistics Report*, vol. 29, No. 4 (1976), pp. 220–227.

[15] *Health and the Family Life Cycle: Selected Studies on the Interaction between Mortality, the Family and its Life Cycle* (Federal Institute for Population Research, in collaboration with WHO, 1982).

[16] See World Health Organization, *Basic Documents* (Geneva, WHO, 1986).

[17] Quoted by E. Schroeder, "Concepts of health and illness", in *Health Indicators: An International Study for the European Science Foundation*, A. J. Culyer, ed. (Oxford, Martin Robertson, 1983), p. 33.

[18] *Report of the International Conference on Primary Health Care, Alma Ata*, 6–12 September 1978 (Geneva, WHO, 1978).

[19] M. Powell Lawton and others, "Indices of health in an aging population", *Journal of Gerontology*, vol. 22 (1967), pp. 334–342.

[20] World Health Organization, *Health Programme Evaluation: Guiding Principles.* Health for All Series, No. 6 (Geneva, WHO, 1981).

[21] *Statistical Indicators for the Planning and Evaluation of Public Health Programmes.* Technical Report Series, No. 472 (Geneva, WHO, 1971).

[22] H. Mahler, "Social perspectives in health: a fairer sharing of resources is needed", *International Journal of Health Education*, vol. XIX, No. 2 (1976), pp. 74–76.

[23] H. Hansluwka, "Santé et justice sociale", *Cahiers de sociologie et de démographie médicales*, No. 1 (janvier-mars 1985), pp. 23–32.

[24] J. Le Grand, "Inequalities in health and health care: a research agenda", paper delivered at the first meeting of the European Science Foundation Workshops on Inequalities in Health, London, 1984.

[25] H. Hansluwka, "A note on social inequality of death in more developed countries", in *Socio-economic Differential Mortality in Industrialized Societies*, vol. 3 (Paris, CICRED, 1984), pp. 345–361.

[26] A. J. Culyer, "Introduction", in *Health Indicators: An International Study for the European Science Foundation*, A. J. Culyer, ed. (Oxford, Martin Robertson, 1983), pp. 1–22.

[27] "Insensitive health statistics and the dilemma of the HSAs", *American Journal of Public Health*, vol. 67, No. 5 (1977), pp. 417–418.

[28] M. Goldberg, *op. cit.*; J. Elinson, "Towards sociomedical health indicators", *Social Indicators Research*, vol. 1 (1974), pp. 59–71.

[29] J. Hadley, *More Medical Care, Better Health* (Washington, D.C., Urban Institute, 1982).

[30] S. Shapiro, "A tool for health planners", *American Journal of Public Health*, vol. 67, No. 9 (September 1977), pp. 816–817.

[31] See, for instance, H. Hansluwka, "Zur politik der säuglingssterblichkeit", *Zeitschrift für Bevölkerungswissenschaft*, vol. 10, No. 2 (1984), pp. 133–152.

[32] D. McGranahan and others, *Contents and Measurement of Socio-economic Development* (Geneva, United Nations Research Institute for Social Development, 1972); H. Hansluwka, "Cancer mortality in Europe, 1970–74", *World Health Statistics Quarterly*, vol. 31, No. 2 (1978), pp. 159–194.

[33] United States of America, *The Global Report to the President* (Washington, D.C., Government Printing Office, 1982).

[34] D. McGranahan, *op. cit.*

[35] For instance, in Japan the difference between the average and the probable life expectancies was about 8–9 years for males and females alike around the turn of this century, whereas it is now only about 3 years.

[36] H. Hansluwka, "Reflections on the measurement of social inequality of death", in *New Developments in the Analysis of Mortality and Causes of Death*, H. Hansluwka and others, eds. (Bangkok, 1986), pp. 121–152.

[37] *Inequalities in Health.* Report of a Research Working Group (London, Department of Health and Social Services, 1980).

[38] World Health Organization, *WHO Report on Social and Biological Effects on Perinatal Mortality*, vol. 1 (Budapest, Statistical Publishing House, 1978). Reissued by *Saudi Medical Journal*, vol. 4, Supplement No. 1 (1983).

[39] *Socio-economic Differential Mortality in Industrialized Societies*, vol. 1 (Paris, CICRED, 1981); vol. 2 (Paris, CICRED, 1982); vol. 3 (Paris, CICRED, 1984).

[40] "The health burden of social inequalities: report of the WHO Meeting on the Health Burden of Social Inequalities", Copenhagen, 5–7 December 1984 (ICP/HSR/804, 7018D).

[41] J. Le Grand, contribution to the June 1985 Joint Meeting of the Society for Social Medicine and the Medical Section of the Royal Statistical Society on "public controversies and scientific evidence" (see *RSS News and Notes*, vol. 12, No. 6 (February 1986), pp. 2–3); R. Ilsley, "Inequalities in health—Britain: summary of knowledge, issues and services", paper submitted to the WHO Meeting on the Health Burden of Social Inequalities, Copenhagen, 5–7 December 1984 (ICP/HSR/804, MO1/17); J. Pollard, "Methodological issues in the measurement of inequality of death", in *Mortality in South and East Asia: A Review of Changing Trends and Patterns, 1950–75* (Manila, WHO/ESCAP, 1982), pp. 531–561.

[42] J. Romeder and J. McWinnie, "Potential years of life lost between ages 1 and 70: an indicator of premature mortality for health planning", *International Journal of Epidemiology*, vol. 6 (1977), pp. 143–151.

[43] T. Wolsey, *Toward an Index of Preventable Mortality.* United States Department of Health and Human Services, National Center for Health Statistics, Series 2, No. 85 (Hyattsville, May 1981).

[44] D. Rutstein, "Measuring the quality of medical care—a clinical method", *New England Journal of Medicine*, vol. 294 (1976), pp. 582–588; D. Rutstein and others, "Sentinel health events (occupational): a basis for physician recognition and public health surveillance", *American Journal of Public Health*, vol. 73, No. 9 (September 1983), pp. 1054–1062.

[45] P. Stocks, "An index of vitality for assessment of national health levels", unpublished report (Geneva, WHO, 1955).

[46] *Methodology of Nutritional Surveillance.* Technical Report Series, No. 893 (Geneva, WHO, 1976), p. 17.

[47] H. J. L. Burgess, "Surveillance of the population at risk: the community", in *Nutrition and Preventive Medicine.* WHO Monograph Series, No. 62 (Geneva, WHO, 1976), pp. 256–267.

[48] *Prematurity.* Technical Report Series, No. 27 (Geneva, WHO, 1950); *Public Health Aspects of Low Birth Weight.* Technical Report Series, No. 217 (Geneva, WHO, 1961).

[49] "The incidence of low birth weight: a critical review of available information", *World Health Statistics Quarterly*, vol. 33, No. 3 (1980), pp. 197–224.

[50] *Handbook of Vital Statistics Methods.* Statistical Papers, Series F, No. 7 (United Nations publication, Sales No. E.55.XVII.1).

[51] *Public Health Aspects of Low Birth Weight.* Technical Report Series, No. 217 (Geneva, WHO, 1961).

[52] *Statistical Indices of Family Health.* Technical Report Series, No. 587 (Geneva, WHO, 1976).

[53] M. Kramer and J. Anthony, "Review of differences in mental health indicators used in national publications: recommendations for their standardization", *World Health Statistics Quarterly*, vol. 36, Nos. 3/4 (1983), pp. 256–338.

[54] R. Giel, "Mental health problems in the community: a discussion of their assessment", *World Health Statistics Quarterly*, vol. 36, Nos. 3/4 (1983), pp. 234–255.

[55] A. Deliège, "Psychosocial components of national health strategies", *World Health Statistics Quarterly*, vol. 36, Nos. 3/4 (1983), pp. 498–552.

[56] E. Brooke, "Planning for mental health statistics", *World Health Statistics Report*, vol. 28, No. 2 (1975), pp. 77–87.

[57] W. Gulbinat, "Mental health problems assessment and information support: directions of WHO's work", *World Health Statistics Quarterly*, vol. 36 (1983), pp. 224–232.

[58] Quoted by A. Ciocco, "On indices for the appraisal of health department activities", *Journal of Chronic Diseases*, vol. 11 (1960), pp. 509–522.

[59] L. Dublin and A. Lotka, *The Money Value of a Man* (New York, Ronald Press, 1946).

[60] *The Cost of Sickness and the Price of Health*, WHO Monograph Series, No. 72 (Geneva, WHO, 1951).

[61] D. Rice and T. Hodgson, "Social and economic implications of cancer in the USA", *World Health Statistics Quarterly*, vol. 33, No. 1 (1980), pp. 56–100.

[62] C. Abt, "The social cost of cancer", *Social Indicators Research*, vol. 2 (1975), pp. 175–190.

[63] *Cancer Statistics.* Technical Report Series, No. 632 (Geneva, WHO, 1979).

[64] C. A. Akpom, S. Katz, and P. M. Denson, "Methods of classifying disability and severity of illness in ambulatory care patients", *Medical Care*, vol. 11, No. 2 (1973), supplement, pp. 125–131.

[65] R. Williams, "Disability as a health indicator", in *Health Indicators: An International Study for the European Science Foundation*, A. J. Culyer, ed. (Oxford, Martin Robertson, 1983), pp. 150–164.

[66] R. Wilson and Th. Drury, "Interpreting trends in illness and disability: health statistics and health status", *American Journal of Public Health*, vol. 5 (1984), pp. 83–106.

[67] "Report of the Expert Group on Development of Statistics on Disabled Persons" (ESA/STAT/AC.18/7), 20 August 1984.

[68] H. Hansluwka, "Measuring the health of populations: indicators and interpretations", *Social Science and Medicine*, vol. 20, No. 12 (1985), pp. 1207–1224.

[69] J. Gentry and J. Matthews, "Health service indicators as components of a health status index", *Health Services Research*, vol. 8, No. 1 (Spring 1983), pp. 14–16.

[70] C. L. Chiang, "Making annual indexes of health", *Health Services Research*, vol. 11 (1976), pp. 442–451.

———, *An Index of Health: Mathematical Models*. PHS Publication No. 1,000, Series 2, No. 5 (Washington, D.C., United States Government Printing Office, 1965).

[71] S. Fanshel and J. W. Bush, "A health-status index and its application to health-services outcomes", *Operations Research*, vol. 18, No. 6 (1970), pp. 1021–1066.

[72] M. Chen, "A comprehensive population health index based on mortality and disability data", *Social Indicators Research*, vol. 3 (1976), pp. 257–271; M. Chen, J. W. Bush, and D. L. Patrick, "Social indicators for health planning and policy analysis", *Policy Sciences*, vol. 6 (1975), pp. 71–81.

[73] J. E. Miller, "Guidelines for selecting a health status index: suggested criteria", in *Health Status Indexes*, R. L. Berg, ed. (Chicago, Hospital Research and Education Trust, 1973).

[74] D. F. Sullivan, *Conceptual Problems in Developing an Index of Health*. Publication No. (HRA) 74-1,017, Series 2, No. 5 (Washington, D.C., United States Department of Health, Education and Welfare, 1966); D. F. Sullivan: *Disability Components for an Index of Health*. Vital and Health Statistics, Data Evaluation and Research, Series 2, No. 42 (Rockville, Maryland, United States Department of Health, Education and Welfare, Health Services and Mental Health Administration), 1971.

[75] R. Wilkins and O. Adams, *Healthfulness of Life* (Montreal, Institute for Research on Public Policy, 1983).

[76] Quoted in Wilkins and Adams, *op. cit.*, p. 4.

[77] A. Siegmann, "A classification of socio-medical health indicators: perspectives for health administrators and health planners", in *Socio-medical Health Indicators*, J. Elinson and A. Siegmann, eds. (Farmingdale, New York, Baywood Publishing Company, 1979), pp. 197–213.

[78] M. Lerner, "Conceptualization of health and social well-being", in *Health Status Indexes*, R. L. Berg, ed. (Chicago, Hospital Research and Education Trust, 1973), pp. 1–6.

[79] T. W. Bice, "Comments on health indicators: methodological perspectives", in *Socio-medical Health Indicators*, J. Elinson and A. Siegmann, eds. (Farmingdale, New York, Baywood Publishing Company, 1979), pp. 185–195.

[80] Quoted in Carr-Hill, *op. cit.*, p. 49.

[81] "Regional targets in support of the regional strategy of health for all", document prepared for the thirty-fourth meeting of the World Health Organization Regional Office for Europe, Copenhagen, 24–29 September 1984 (EUR/RC34/7, Rev. 1).

[82] J. Pollard, *op. cit.*

ANNEX I

The WHO indicators for monitoring health for all by the year 2000

GLOBAL INDICATORS

The number of countries in which:

1. *Health for all has received endorsement as policy at the highest official level*—e.g., in the form of a declaration of commitment by the head of State; allocation of adequate resources equitably distributed; a high degree of community involvement; and the establishment of a suitable organizational framework and managerial process for national health development;

2. *Mechanisms for involving people in the implementation of strategies have been formed or strengthened, and are actually functioning*—i.e., active and effective mechanisms exist for people to express demands and needs; representatives of political parties and organized groups such as trade unions, women's organizations, farmers' or other occupational groups are participating actively; and decision-making on health matters is adequately decentralized to the various administrative levels;

3. *At least 5 per cent of the gross national product is spent on health;*

4. *A reasonable percentage of the national health expenditure is devoted to local health care*—i.e., first-level contact, including community health care, health care centres, dispensary care and the like, excluding hospitals. The percentage considered "reasonable" will be arrived at through country studies;

5. *Resources are equitably distributed*, in that the per capita expenditure as well as the staff and facilities devoted to primary health care are similar for various population groups or geographical areas, such as urban and rural areas;

6. *The number of developing countries with well-defined strategies for health for all, accompanied by explicit resource allocations, whose needs for external resources are receiving sustained support from more affluent countries;*

7. *Primary health care is available to the whole population, with at least the following:*

(*a*) Safe water in the home or within 15 minutes' walking distance, and adequate sanitary facilities in the home or immediate vicinity;

(*b*) Immunization against diphtheria, tetanus, whooping-cough, measles, poliomyelitis, and tuberculosis;

(*c*) Local health care, including availability of at least 20 essential drugs within one hour's walk or travel;

(*d*) Trained personnel for attending pregnancy and childbirth, and caring for children up to at least one year of age;

8. *The nutritional status of children is adequate, in that:* (*a*) At least 90 per cent of newborn infants have a birth weight of at least 2,500 g; (*b*) At least 90 per cent of children have a weight for their age that corresponds to the reference values given in annex I to [*Development of Indicators for Monitoring Progress Towards Health for All by the Year 2000*];

9. *The infant mortality rate for all identifiable subgroups is below 50 per 1,000 live-births;*

10. *Life expectancy at birth is over 60 years;*

11. *The adult literacy rate for both men and women exceeds 70 per cent;*

12. *The gross national product per head exceeds $US 500.*

REGIONAL INDICATORS RELATING TO HEALTH STATUS

1. Life expectancy at birth, separately for males and females (Eastern Mediterranean, European);
2. Life expectancy at ages 1, 15, 35 and 65, by sex (European);
3. Maternal mortality (Eastern Mediterranean, Western Pacific, European, American);
4. Latest available data on the annual number of cases of diphtheria, tetanus, whooping-cough, measles, poliomyelitis or tuberculosis (Western Pacific);
5. Mortality rates, by sex and 5-year age groups, for 10 selected causes of death (European);
6. Incidence of infectious diseases (13) (European);
7. Number of disability days per person per year, by level of restriction (European);
8. Percentage of population experiencing different levels of long-term disability, by age and sex (European);
9. Incidence of certified occupational diseases (European);
10. Incidence of injury purposely inflicted by other persons, disaggregated if possible by type of injury, including rape and child battery (European);
11. Number of working days lost per person, per year, due to disease or injury (European);
12. Proportion of children having a weight-for-age in relation to reference values at entrance to primary school (Eastern Mediterranean);
13. General mortality, by cause and age (American);
14. Mortality for EPI diseases (American);
15. Mortality from chronic diseases, by cause (American);
16. Incidence of EPI diseases (American);
17. Persons incapacitated by accidents (American);
18. Morbidity (prevalence and/or incidence of chronic diseases) (American);

19. Annual incidence rate of each of the six EPI target diseases for the most recent five years (Eastern Mediterranean).

Sources

Global indicators

Global Strategy for Health for All by the Year 2000. Health for All Series, No. 3 (WHO, Geneva, 1981).

Development of Indicators for Monitoring Progress Towards Health for All by the Year 2000. Health for All Series, No. 4 (WHO, Geneva, 1981).

Regional indicators

American region

Complementary document to CD27/34A, p. 30, table 2, published in *Health for All by the Year 2000* (Washington, D.C., Pan American Health Organization and Regional Office of WHO, 1980).

Eastern Mediterranean region

"Review of the reports on monitoring progress in implementation of the strategies and plans of action for health for all by the year 2000" (EM/RC 30(83)/5 and Add. 1).

European region

"Regional targets in support of the regional strategy of health for all" (EUR/RC23/7, 460D/4445D), and "List of proposed indicators for monitoring progress towards health for all in the European region" (EUR/RC/34/13), documents prepared for the thirty-fourth regional committee meeting of WHO, held at Copenhagen, 1984.

Western Pacific region

"Regional strategy for HFA", (Manila, WHO Regional Office for the Western Pacific, 1982), section IX, p. 60.

ANNEX II

Some views on the definition of health and the capacity to measure it

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

WHO Constitution. See World Health Organization, *Basic Documents* (Geneva, WHO, 1986).

The concept of health is vague; it can be regarded as being of two main orders, one very broad and abstract and the other narrower for working purposes. "In order that the concept of health may be used operationally with more clarity, it may be advisable to study further the definition given by WHO, with the object of making it more precise" and "Health may be expressed as a degree of conformity to accepted standards of given criteria in terms of basic conditions of age, sex, community and region, within normal limits of variation. It is a relative concept in this sense only."

Measurement of Levels of Health. Technical Report Series, No. 137 (Geneva, WHO, 1957).

The WHO definition is a challenge to the international research community. Though at present we lack the methodology and information necessary for measurement, it would be wrong to adopt a defeatist attitude towards the possibility of measurability of "health" as defined by the WHO.

K. Uemura, personal communication, 1984.

Health is a state of moral, mental and physical well-being which enables a man to face any crisis with the utmost facility and grace.

Pericles. Quoted in D. Gordon, *Health, Sickness and Society: Theoretical Concepts in Social and Preventive Medicine* (St. Lucia, University of Queensland Press, 1976), p. 42.

Health is not simply the absence of disease; it is something positive, a joyful attitude towards life and a cheerful acceptance of the responsibilities that life puts on the individual.

H. Sigerist, *Medicine and Human Welfare* (New Haven, Yale University Press, 1941), p. 100.

No criterion is given by WHO by which to decide where the disease state begins and ends.

J. May, *The Ecology of Human Disease* (New York, MD Publications, 1958), p. 1.

The WHO definition of health may serve the Organization as an ideal or a slogan, but not as a goal to be achieved.

I. Moriyama, "Problems in the measurement of health status", in *Indicators of Social Change: Concepts and Measurements*, E. B. Sheldon and W. E. Moore, eds. (New York, Russell Sage Foundation, 1968), pp. 573–586.

There has been a tendency to depreciate the bold, forward-looking concept of WHO as woolly and not subject to scientific application. In the Human Population Laboratory of Alameda County, California, however, we have been endeavouring to apply the WHO idea in the measurement of health and in ascertaining how to improve health.

L. Breslow, "A quantitative approach to the World Health Organization definition of health: physical, mental and social well-being", *International Journal of Epidemiology*, vol. 1, No. 4 (1972), pp. 347–355.

The health of an individual is a dynamic phenomenon, varying on a continuum from optimum well-being to extreme illness. An individual's health at a given instant may be represented by a point on the continuum. Change in health can be visualized as the movement of the point along the continuum. For an entire population, the distribution of individual points over the continuum at each instant gives a visual description of a population's state of health at that instant. As time advances, individual points move in one direction or another as the health of the people improves or declines; the distribution pattern for the entire population changes as a result.

C. L. Chiang and R. Cohen, "How to measure health: a stochastic model for an index of health", *International Journal of Epidemiology*, vol. 2, No. 1 (1973), pp. 7–13.

The medical conception of health as absence of disease is a value-free theoretical notion, its main elements being biological function and statistical normality: Health is the ability to perform all typical physiological functions with at least typical efficiency.

C. Boorse, "Health as a theoretical concept", *Philosophy of Science* (1977), pp. 542–573.

Health is a relative concept and standards of health vary from person to person and from country to country.

J. E. Park and K. Park, *Textbook on Preventive and Social Medicine: A Treatise on Community Health* (Jabalbur, Banarsidas Bhanal Publishers, 1977), p. 75.

. . . an operational definition of health, for health status assessment, requires a construct that incorporates a variety of health definitions and the variety of determinant factors that contribute to health status.

A. Siegmann, "A classification of sociomedical health indicators: perspectives for health administrators and health planners", in *Sociomedical Health Indicators*, J. Elinson and A. Siegmann, eds. (Farmingdale, Baywood, 1979), pp. 197–213.

Measuring "health" in terms of deviations from health seems to be the most realistic course and likely to prevail.

S. Hunt and J. McEwan, "The development of a subjective health indicator", *Sociology of Health and Illness*, vol. 2, No. 3 (1980), pp. 234–246.

(1) The concept of perfect and positive health is a utopian creation of the human mind.

(2) The nearest approach to health is a physical and mental state fairly free of discomfort and pain, which permits the person concerned to function as effectively and as long as possible in the environment where chance or choice has placed him.

R. Dubos, *Man Adapting* (New Haven, Yale University Press, 1980), p. 346 and p. 351.

The WHO's physical, mental and social well-being is more utopian than real.

A. Calvez and M. Blanchet, "Disability trends in the United States, 1966–76: analysis of reported causes", *American Journal of Public Health*, vol. 71, No. 5 (May 1981), p. 464.

Health is used to connote the absence of any disease, physical or mental. The impairment may be only imaginary or may lack objective confirmation (for example, by a physician). Even such a general definition, however, has its cultural undertones as patients vary not only in their standards of normality and dysfunctioning according to differing social standards and values, but also in the choice of symptoms presented. Similarly, the medical response to reported symptoms may be modified by cultural factors. Health has been seen traditionally as a characteristic or property of an individual.

The above statement is a reflection of the current state of the art and

underlines the distance yet to be covered before the definition of the WHO Constitution can be made operational.

Meeting on Family Cycle Methodology, "Glossary of selected terms for health studies of the family", in *Health and the Family Life Cycle* (Wiesbaden, Federal Institute for Population Research, in collaboration with the World Health Organization, 1982), pp. 27-34.

Health is a societal concept applied to its component individual human beings and describes their fitness for the survival of society.

M. Kottow, "Defining health", *Medical Hypotheses*, vol. 6, No. 10 (1980), pp. 1097-1104.

Definitions of health at any time are likely to reflect the ideology and culture of the most powerful groups in society.

D. Patrick and S. Guthmacher, "Socio-political issues in the use of health indicators", in *Health Indicators: An International Study for the European Science Foundation*, A. J. Culyer, ed. (Oxford, Martin Robertson, 1983), pp. 165-173.

According to this [WHO] definition, none of us is, has ever been, or is ever likely to be healthy.

R. Gillon, "On sickness and on health", *British Medical Journal*, vol. 292 (1 February 1986), p. 318.

ANNEX III

Criteria for a health index

Availability. It should be possible to obtain the data required without special complex investigations.

Completeness of coverage. The index should be derived from data covering the population of an entire country or that part of it to which the index is supposed to refer.

Quality. The national data should not vary with time and place in such a way as to have a substantial effect on the index.

Universality. The index should, as far as possible, be the expression of a group of factors that determine and affect the level of health.

Calculation. The index should be calculated in as simple a manner as possible, and the calculation should not be costly in terms of the resources required.

Acceptance. The index should be widely accepted and used, and no doubts should exist in respect of the methods employed for developing the index or for interpreting it.

Reproducibility. When the index is used by different specialists under different conditions at different times, the results should be identical.

Specificity. The index should reflect changes only in those phenomena of which it is the expression.

Sensitivity. The index should be sensitive to changes in the phenomena concerned. Allowance should be made for the effect of inflation on the index.

Validity. The index should be a true expression of the factors of which it is supposed to be a measure. Some form of independent or external evidence for this should be provided.

Source

Statistical Indicators for the Planning and Evaluation of Public Health Programmes. Technical Report Series, no. 472 (Geneva, WHO, 1971), p. 20.

ANNEX IV

Illustrative series and classifications for selecting indicators of health, health services and nutrition

		To be classified by
State of health		
1.	Mortality and length of life	
	Number and rates of death (annually; some classifications less frequently)	Sex, age, urban, rural, national or ethnic origin, causes of death, socio-economic group
	Expectation of life, selected ages (annually or less frequently)	Sex, age, urban, rural, national or ethnic origin, socio-economic group
2.	Morbidity, impairments and handicaps	
	Spells of bed disability and restricted activity, specified periods (annually or less frequently)	Sex, age, urban, rural, national or ethnic origin, diseases and injuries (broad and/or selected groups), socio-economic group
	Duration of spells of bed disability and restricted activity, specified period (annually or less frequently)	Sex, age, urban, rural, diseases and injuries (broad and/or selected groups), socio-economic group
	Number and proportion of persons with selected chronic functional disabilities, specified period (annually or less frequently)	Sex, age, urban, rural, national or ethnic origin, impairments and handicaps, socio-economic group
	Number and/or incidence of selected communicable diseases of public health importance (annually)	Sex, age, urban, rural, geographical area, selected diseases
Availability, use and performance of health services attended by physicians (annually)		
1.	Number and ratio in the total population of health services personnel (annually)	Geographical area, level of education completed, services
2.	Number and ratio to the total population of hospital beds (annually)	Geographical area, services, institutional sector
3.	Number and rate in the total population of hospital discharges (annually)	Geographical area, diseases (broad groups), services, socio-economic group
4.	Total and per capita total and household consumption expenditures on health services (annually)	Geographical area, governmental purposes, goods and services, household goods and services, institutional sector, percentile groups of households according to total household income
5.	Proportion of children immunized against specific diseases (less than annually)	Age, urban, rural, geographical area, diseases (selected)
6.	Number and proportion of persons visiting physicians and dentists, specified period (annually or less frequently)	Sex, age, urban, rural, geographical area, national or ethnic origin, institutional sector
7.	Ratio or average number of patient bed-days to available hospital bed-days, specified periods (annually)	Urban, rural, geographical area, institutional sector
8.	Index numbers of the annual output and unit-costs of health goods and services	Urban, rural, geographical area, goods and services, institutional sector
Nutrition		
1.	Per capita energy (calories) intake, specified periods (infrequently)	Sex, age, urban, rural, geographical area, classification of foods according to energy values, classification of population according to energy requirements, percentile groups of households according to total household income
2.	Per capita intake of protein, specified periods (infrequently)	Sex, age, urban, rural, geographical area, classification of foods according to protein content, classification of population according to safe levels of protein intake
3.	Total and per capita supply of energy (calories), specified periods (annually)	Geographical area, classification of foods according to energy values

		To be classified by
4.	Rate of subclinical protein-calorie malnutrition among children (infrequently)	Age, urban, rural, geographical area, nutrition standards, socio-economic group, percentile groups of households according to total household income
5.	Total and per capita total and household consumption expenditures on health services (annually)	Geographical area, governmental purposes, goods and services, household goods and services, institutional sector, percentile groups of households according to total household income
6.	Proportion of children immunized against specific diseases (less than annually)	Age, urban, rural, geographical area, diseases (selected)
7.	Number and proportion of persons visiting physicians and dentists, specified period (annually or less frequently)	Sex, age, urban, rural, geographical area, national or ethnic origin, institutional sector
8.	Ratio of average number of patient bed-days to available hospital bed-days, specified periods (annually)	Urban, rural, geographical area, institutional sector
9.	Index number of the annual output and unit-costs of health, goods and services	Urban, rural, geographical area, goods and services, institutional sector

Source

Social Indicators: Preliminary Guidelines and Illustrative Series. Statistical Papers, Series M, No. 63 (United Nations publication, Sales No. E.78.XVII.8).

ANNEX V

Indicators of health status in international programmes[a]

Indicator	*United Nations*	*CMEA*	*EEC*	*OECD*	*UNRISD*	*World Bank*	*FAO*	*WHO*
			Mortality and length of life					
Life expectancy, by sex								
At birth	X	X	X	X	X	X	X	-
At selected ages								
Age 1	-	-	X	X	-	-	-	-
Age 20	-	-	X	X	-	-	-	-
Age 40	-	X	X	X	-	-	-	-
Age 60	-	X	X	X	-	-	-	-
At 5-year intervals	X	-	-	-	-	-	-	-
By selected ages and socio-economic status	-	-	-	X	-	-	-	-
At birth without distinction by sex	-	-	-	-	-	-	-	X
Infant mortality								
Total	X	-	X	-	X	X	X	X
Neonatal	-	X	-	-	-	-	-	-
By cause	X	-	-	-	-	-	-	-
Perinatal mortality	-	-	X	X	-	-	-	-
Stillbirth ratio, by sex	-	X	-	-	-	-	-	-
Maternal mortality	X	-	X	-	-	-	-	-
Childhood mortality (age 0–4), by cause	X	-	-	-	-	-	-	-
Childhood mortality (age 1–4)	-	-	-	-	-	-	X	-
Chances of eventually dying from selected causes	X	-	-	-	-	-	-	-
Death rates for selected causes, by sex	X	-	-	-	X[b]	-	-	-
By sex and age	-	X	-	-	-	-	-	
Persons killed in road traffic accidents; death rates by age; percentage distribution by age and by mode of transport	-	-	X	-	-	-	-	-
Deaths age 15+ as percentage of all deaths by sex	X	-	-	-	-	-	-	-
Violent deaths								
Suicides	-	-	-	X	-	-	-	-
Death rates by cause and sex; percentage distribution of deaths by age	-	-	X	-	-	-	-	-
Accidental deaths of children and young people per 100,000 by age	-	-	X	-	-	-	-	-
			Morbidity disability-based indicators[b]					
Selected notifiable diseases (rates per 100,000)	X	-	-	-	-	-	-	-
Rates of diseases by type and sex	-	X	-	-	-	-	-	-
Disability days per peson per year by level of restriction and whether accident-related or other	-	-	-	X	-	-	-	-
Number of invalids and their distribution by various types of disability and by sex	-	X	-	-	-	-	-	-
Percentage of population experiencing different levels of long-term disability and whether accident-related or other	-	-	-	X	-	-	-	-

Sources: Status as of January 1985. Based on "Progress report on national and international work on social indicators" (ST/ESA/STAT/102), 15 July 1981; "FAO socio-economic indicators for monitoring and evaluation of agrarian reform and rural development" (ESS/MISC/80-7), December 1980; *The OECD List of Social Indicators* (Paris, OECD, 1985), pp. 24 and 25.

[a] CMEA—Council for Mutual Economic Assistance
EEC—European Economic Community
OECD—Organisation for Economic Co-operation and Development
UNRISD—United Nations Research Institute for Social Development
FAO—Food and Agriculture Organization of the United Nations
WHO—World Health Organization

[b] Only infectious and parasitic diseases.

ANNEX VI

Selected classifications of health indicators

CLASSIFICATION OF THE WHO STRATEGY FOR HEALTH FOR ALL BY THE YEAR 2000[a]

I. HEALTH POLICY INDICATORS

1. Political commitment
2. Resource allocation
3. Degree of equity of distribution
4. Community involvement in monitoring Health for All
5. Organizational framework and managerial process
6. International political commitment

II. INDICATORS OF THE PROVISION OF HEALTH CARE

1. Availability
2. Physical accessibility
3. Economic and cultural accessibility
4. Utilization of services
5. Quality of care

III. COVERAGE BY PRIMARY HEALTH CARE

1. Information and education concerning health
2. Promotion of food availability and proper nutrition
3. Water and sanitation
4. Maternal and child health
5. Immunization
6. Prevention and control of endemic diseases
7. Treatment of common diseases and injuries
8. Provision of essential drugs
9. Coverage by referral system
10. Workers

IV. HEALTH STATUS INDICATORS

1. Basic health status indicators
1.1 Nutritional status and psycho-social development
1.2 Infant mortality rate
1.3 Child mortality rate
1.4 Under-5 mortality rate
1.5 Life expectancy at a given age
1.6 Maternal mortality rate

IV.2 FURTHER HEALTH STATUS INDICATORS

2.1 Disease-specific mortality
2.2 Morbidity
2.3 Disability
2.4 Social and mental well-being

CLASSIFICATION BY WHO FOR MANAGERIAL PROCESS FOR NATIONAL HEALTH DEVELOPMENT[b]

I. Output indicators
II. Process indicators
III. Product indicators

CLASSIFICATION FOR MONITORING THE EUROPEAN REGIONAL STRATEGY OF WHO[c]

I. INDICATORS RELATING TO HEALTH STATUS

1. Indicators based on mortality rates
2. Indicators based on incidence of infectious diseases
3. Other indicators relating to morbidity and disability
4. Indicators based on health-related behaviours
5. Other indicators of health status

II. INDICATORS RELATING TO PROVISION, DISTRIBUTION AND UTILIZATION OF RESOURCES

1. Percentage of GNP spent on health
2. Percentage of national health expenditure devoted to local health care
3. Distribution of resources: ratio between population and health facilities and personnel (primary care units, hospital beds, physicians, qualified nurses, auxiliary nursing personnel, midwives, dentists, pharmacists)
4. Proportion of the population for whom primary health care is available
5. Proportion of children under 5 fully immunized, disaggregated by age for all diseases covered by national populations
6. Proportion of persons using contraceptive methods by age, sex and type of method
7. Proportion of population served by safe water in house or within 15 minutes' walking distance and adequate sanitary facilities in the house or immediate vicinity
8. Proportion of public health expenditure spent on research

CLASSIFICATION OF THE WHO STUDY GROUP ON THE MEASUREMENT OF LEVELS OF HEALTH[d]

1. Indicators associated with the health status of persons and populations in a given area
2. Indicators related to physical environmental conditions having a more or less direct bearing on the health status of the area under review
3. Indicators concerned with health services and activities directed to the improvement of health conditions (availability and use of hospitals, physicians and other health personnel)

(Alternative classification)

I. Micro level indicators (directed to a single individual)
II. Macro level indicators (related to a family or household, or a community, or different occupational, social and economic categories belonging to given access regions; or to the population of a country as a whole)

In addition, "the Group realized that it would be possible, within each of the three types of health indicators mentioned above, to construct indicators for different aspects or groups of aspects of the problem". It distinguished between "comprehensive indicators" (such as the expectation of life) and "specific indicators" (i.e., specific for the purpose in view, such as infant mortality).

CLASSIFICATION OF THE STATISTICAL OFFICE, UNITED NATIONS SECRETARIAT[e]

A. State of health
   1. Mortality and length of life
   2. Morbidity, impairments and handicaps
B. Availability, use and performance of health services
C. Nutrition

CLASSIFICATION OF THE STATISTICAL COMMISSION AND OF THE ECONOMIC COMMISSION FOR EUROPE[f]

I. Indicators of the state of health of a population
II. The supply and use of health services (physical indicators)
   1. Availability indicators
   2. Use indicators
   3. Financial flows and the national account

OECD LIST OF HEALTH INDICATORS[g]

A. Health status
   I. Length of life
   II. Healthfulness of life

In addition, health-relevant items are included among the following classification groups:

(*a*) Employment and quality of working life (fatal occupational injuries);

(*b*) Physical environment (housing conditions; accessibility to medical services offering emergency treatment day and night and environmental nuisances);

(*c*) Social environment (suicide rate);

(*d*) Personal safety (exposure to risk of fatal or serious injuries and fear for personal safety).

CLASSIFICATION OF THE UNITED STATES OFFICE OF MANAGEMENT AND BUDGET[h]

I. Indicators of system performance
   1. Indicators of gross national health deficit
   2. Indicators of environmental health hazards
   3. Indicators of distribution of personnel and facilities
II. Indicators of well-being
   1. Differential mortality by cause for selected groups
   2. Differential health status for selected groups
   3. Differential disability status for selected groups
   4. Differentials in dietary intake for selected categories
   5. Differential access to medical services and facilities among selected groups
   6. Type and extent of coverage by medical or accident insurance programmes among selected population categories
III. Public perceptions
   1. Self-ratings of personal health status
   2. Differential utilization of medical services and facilities among selected population categories

CLASSIFICATION OF CULYER, LAVERS AND WILLIAMS[i]

I. Measures of the state of health
   1. Mortality measures
   2. Morbidity measures
   3. Composite measures
II. Measures of the need for health
III. Measures of the effectiveness of health-affecting activities

CLASSIFICATION OF DELIÈGE[j]

I. Indicators of well-being (social factors at a collective level)
   1. Nutrition
   2. Housing conditions
   3. Economic level
   4. Basic social units
   5. Work
   6. Education
   7. Living conditions
   8. Political and social structure
   9. Cultural values
II. Classification of risk factors (social factors at an individual level)
   1. Food
   2. Housing problems
   3. Economic circumstances
   4. Basic social unit
   5. Home management problems
   6. Employment
   7. Education
   8. Conditions of life
   9. Social and political structures
III. Indicators of health and welfare infrastructures
   1. Hospital beds
   2. Personnel
   3. Collective preventive medical services
   4. Services ministering to mental and social well-being
IV. Indicators of the quality of care (from the psychosocial standpoint)
   1. Initial stage, 1985–1990: qualitative reports
   2. Second stage, 1990–2000: quantitative reports
V. Health promotion indicators
   1. Nutrition
   2. Housing conditions
   3. Economic level
   4. Basic social unit
   5. Work/employment
   6. Education
   7. Living conditions
   8. Social and political provisions

NOTES

[a] WHO, *Development of Indicators for Monitoring Progress Towards Health for All by the Year 2000.* Health for All Series, No. 4 (Geneva, WHO, 1981).

The volume proposes four categories of indicators: health indicators; indicators of the provision of health care; socio-economic indicators; and indicators of health status, including quality of life. In the past, there has been a tendency to concentrate almost entirely on health status indicators. The scope of "health for all" as explained in the Global Strategy—namely, the level of health that permits every person to live a socially and economically productive life—shows why other categories of indicators are also necessary.

[b] WHO, *Managerial Process for National Health Development: Guiding Principles.* Health for All Series, No. 5 (Geneva, WHO, 1981).

[c] Addendum to DGO/84.1, 22.10.1984. In the classification on p. 7 of the addendum, group II has not been further subdivided. The specific "subdivisions" listed under that heading appear on p. 13 of the addendum.

[d] *Measurement of Levels of Health.* Technical Report Series, No. 137 (Geneva, WHO, 1957), pp. 10–14.

[e] "Progress report on national and international work on social indicators" (ST/ESA/STAT/102), 15 July 1981.

[f] "Report of the Conference of European Statisticians Working Party on the Framework for the Integration of Social and Demographic Statistics, on its eighth session" (GES/WP.34/52/Add.1), 16 November 1983.

[g] OECD, *The OECD List of Social Indicators* (Paris, OECD, 1982), p. 13.

[h] Dr. R. Johnston, quoted in *Health Services Research*, vol. 3 (1976), pp. 86–89.

[i] See "Health indicators", in *Social Indicators for Social Policy*, A. Shonfield and S. Shaw, eds. (London, Heinemann, 1972), pp. 94–118.

[j] See *World Health Statistics Quarterly*, vol. 36, No. 3/4 (1983), pp. 349–393.

ANNEX VII

Proposed types of health indicators

1. *Health-related*
   Demographic
   Social structure
   Way of life
   Hygiene and environmental conditions
2. *Health status*
   Physiological and biometric measures
   Disability
   Morbidity
   Mortality (including expectation of life at different ages)
3. *Health and medical/social facilities*
   Institutions
   Programme and services
4. *Activity of health and medical/social institutions/services*
   For specific population groups
   Against specific groups of diseases and conditions
5. *Health and personnel training*
6. *Cost and finance*
   Economic consequences of sickness
   Cost of services
   Health benefit from programmes or activities
7. *Other*
   Health legislation
   Satisfaction

Source

Dr. A. Weber, "Social indicators in the field of health", paper presented to the second joint ECE/WHO Meeting on Health Statistics, held at Geneva, 25–29 October 1976.

ANNEX VIII

The four global indicators of health status proposed by WHO for the HFA/2000 Strategy

Indicator[a]	Sources of data		Availability		International comparability	Comments		
	Numerator	Denominator	MDCs	LDCs		General aspects	Differential mortality	Time trends
Infant mortality	1. Vital registration 2. Sample survey 3. Population census	1. Vital registration 2. Sample survey 3. Population census or population register	Excellent	Good in terms of population coverage but weak in terms of number of countries	Reasonably good but fraught with some pitfalls resulting primarily from differences in legislation reporting practices and degree of coverage	Coverage, definitions, reporting and data handling practices essential; method of computation may in times of substantial fluctuations in the annual number of births produce misleading results	Presupposes equal coverage for all subgroups studied; magnitude of differences depends on number of groups differentiated and summary measure used	Continuity in legislation enumeration practices and coverage important; results on direction and pace of change of differential mortality not independent of methodological approach
Life expectancy at birth	1. Vital registration 2. Sample survey	1. Population census or population survey 2. Sample survey	Excellent	Good in terms of population coverage but less so in terms of number of countries	Good but depends on quality of the source information	Measures survivorship and not mortality; advantages as well as limitations of statistical average with unequal weighing of individual ages. Results may differ depending on whether cohort (generation) or cross-sectional (current) life tables are used	Often unavailable for subgroups and, if available, of uneven quality; magnitude of differences in low mortality countries often small with ensuing problems for alerting policy makers and public for remedial action; differences in experience at specific ages may be masked; degree of inequality not independent of number of subgroups studied and summary index used; number of subgroups for which its computation yields valid results usually limited due to constraints in availability of data	Age-specific differences in experience may be concealed; difficult to assess properly the rate of change (even the direction may occasionally be influenced); often wrongly interpreted as measure of mortality change; trends in differential survivorship depend on number of subgroups distinguished and summary measures used
Weight at birth		1. Vital registration 2. Health service records	Unavailable throughout much of the world if assessed in terms of complete—or at least "reasonably representative"—national coverage; in developing countries with a shortage of trained birth attendant personnel, almost impossible to obtain valid data		Good but birth weight groupings may differ	As indicator of "community nutrition", not uncontested. Birth weight may be influenced by genetic traits and certain diseases of the mother (such as malaria); nevertheless, "most significant indicator of the risk to the survival of a baby and its healthy growth and development" and a "reasonable indirect indicator of general health conditions in the community, care being taken to consider the operation of any specific conditions that influence pregnancy itself"		
Weight for age		1. Health service records	Widely unavailable throughout the world		Reasonably good but may be adversely affected by differences in the quality of the data and in the birth weight grouping used; contradictory recommendations of WHO for identification of "low birth weight"	Through the pre-school ages (best for ages up to 2 years), for a detailed exposé of the advantages and related measures, see M. Griffith, "Growth monitoring", *Social Statistics Bulletin of UNICEF*, vol. 6, No. 1 (1983), and G. H. Beaton and J. M. Bengoa, "Practical population indicators of health and nutrition", in *Nutrition and Preventive Medicine* (Geneva, WHO, 1976), annex III, pp. 500-519		

[a] The terminology used here is the one adopted by the World Health Organization in *Global Strategy for Health for All by the Year 2000*, Health for All Series, No. 3 (Geneva, WHO, 1981), and in *Development of Indicators for Monitoring Progress Towards Health for All by the Year 2000*, Health for All Series, No. 4 (Geneva, WHO, 1981), annex I.

[b] MDCs = more developed countries; LDCs = less developed countries.

ANNEX IX

Short list for monitoring nutritional health status

Phenomenon	*Indicator*
Maternal nutrition	Birth weight
Infant and pre-school child nutrition	Proportion being breast-fed and proportion on weaning foods, by age in months
	Mortality rates in children aged 1, 2, 3, and 4 years, with emphasis on 2-year-olds
	If age known: weight for height height for age weight for age
	If age unknown: weight for height arm circumference clinical signs and syndromes
School-child nutrition	Height for age, weight for height at 7 years or school admission clinical signs

Source: Methodology of Nutritional Surveillance. Technical Report Series, No. 593 (Geneva, WHO, 1976).

ANNEX X

Sources and uses of morbidity statistics

	Coverage			
	Population	*Morbidity*	*Uses*	*Applicability*
Sickness surveys by home visitation of:				
All persons in selected area	X	1–4	b, c, d, e	ABC
Representative sample of selected area	X	1–4	b, c, d, e	(A)BC
Representative sample of whole population	W	1–4	b, c, d, e, h	C
Mass diagnostic and screening surveys (tuberculosis etc.)	XY	3	a, d	ABC
Census enumeration of sick persons	W	3	d, h	BC
Census enumeration of certain defects	W	3	h	BC
Records of notifiable communicable diseases	WX	4	a, b, d, e, f	BC
Registration of certain diseases (cancer, rheumatism etc.) with or without follow-up survey	WX	4	c, d, f, g, h	C
Certification of certain conditions for special benefits (including special food allowances)	W	4	b, d	C
Records of road accidents	WX	4	b	C
Records of industrial and occupational accidents and diseases	Y	4	b	C
General hospital in-patient records	Z	2–4	c, d, f, g	ABC
General hospital or clinic out-patient records	Z	4	c, d	ABC
General home-visiting and nursing services	Z	4	d	BC
Records of special clinics, hospitals and agencies (tuberculosis, mental diseases, venereal diseases, dentistry etc.)	Z	4	b, c, d, f, g	ABC
Continuous records of doctors' practices	Z	2, 4	d	BC
Social security schemes—compulsory and voluntary	Y	1–4	c, d, e	BC
Voluntary health plans and funds	Y	1–4	c, d, e	BC
Pensions and veterans' records	Y	3, 4	d, g	C
Life-insurance and sickness-insurance records	Y	3, 4	e, f	BC
Records of health welfare centres (maternity, infant and pre-school child)	(Y)Z	3, 4	b, c, d, f	BC
Medical records in educational institutions (routine inspections, sickness, absenteeism)	Y	1–4	a, b, d	BC
Records of physical examinations and sickness, absenteeism in industrial, civil service, and other occupational groups	Y	2–4	b, c, e	ABC
Sickness and recruitment records of the armed forces	Y	1–4	a, b, g, h	(A)BC

Source: Expert Committee on Health Statistics, Third Report. Technical Report Series, No. 53 (Geneva, WHO, 1951), p. 8.

NOTES:

- W Whole population of country (or representative sample of it)
- X Population of selected locality (or sample of it)
- Y Selected types of persons in whole population (or samples of them)
- Z Persons applying to selected health services
- 1 All sicknesses at a point in time
- 2 All sicknesses during a period of time
- 3 Selected diseases or impairments at a point in time
- 4 Selected diseases or impairments during a period of time
- a Control of communicable diseases
- b Planning for development of preventive diseases
- c Ascertaining relationship of the disease(s) to social factors
- d Planning for the provision of adequate treatment services
- e Estimation of economic importance of sickness
- f Research into aetiology and pathogenesis
- g Research on efficacy of preventive and therapeutic measures
- h National and international study of distribution of diseases and impairments
- A Countries with no complete enumeration of population and lacking (or with only slightly developed) public health and vital registration systems
- B Countries with an overall or partial census and with a well developed public health and vital registration system for parts of the population (e.g., for large towns) but not for all
- C Countries with an overall census and well developed facilities for obtaining morbidity statistics

ANNEX XI

Recommendations for measurements in the field of morbidity statistics

BASIC CONCEPTS

Morbidity can be measured in terms of three units: persons who are ill; the illnesses (periods or spells of illness) that those persons experience; and the duration (days, weeks, etc.) of those illnesses. It can best be measured in terms of (*a*) periods (spells) of illness or, alternatively, of persons with illness, commencing during a defined period; (*b*) illness current, or persons ill, during a defined period; (*c*) illness current, or persons ill, at a particular point of time within the period, or at an average point of time within the period; (*d*) the duration of those illnesses.

INCIDENCE

Incidence is a measurement of the frequency of illnesses commencing during a defined period. The denominator of the *incidence rate* should be the average number of persons exposed to risk during the defined period or the estimated number of persons at the midpoint of that period.

PERIOD PREVALENCE

"Period prevalence" describes the frequency of illnesses in existence at any time during a defined period (for instance, week or year). The denominator of the period prevalence rate should be the average number of persons exposed to risk during the defined period or the estimated number of persons at the midpoint of that period.

POINT PREVALENCE

"Point prevalence" describes the frequency of illnesses in existence at a particular point in time. The denominator of the point prevalence rate should be the number—actual and estimated—of persons at risk at the given time.

SUBJECT OF MEASUREMENT

Incidence, period prevalence and point prevalence may be expressed in terms of either persons or illnesses. Therefore, it is essential to make it clear whether the measurements are used in respect of persons who are ill or in terms of illnesses.

DURATION OF ILLNESS

Duration can be expressed in terms of either the average duration or a frequency distribution of duration. The two forms of statistical measurement can be computed for:

(*a*) The population at risk, yielding an average duration of illness and a frequency distribution of durations of illness in the population at risk during a defined period (e.g., days of illness per person of the population);

(*b*) Ill persons, yielding an average total duration of illness and a frequency distribution of durations of illness among persons who were ill during a defined period (e.g., total days of illness per person ill);

(*c*) Periods (spells) of illness, yielding an average duration of periods of illness and a frequency distribution of durations of periods of illness during a defined period (e.g., total days of illness per person ill);

Particular forms of measurement of duration will be required for particular purposes, but the majority of them will correspond with one or other of the three types listed above. In measuring duration, the date of onset and the date of recovery from illness should be defined on the basis of uniformly applied criteria, which will depend upon the type of morbidity statistics under consideration.

Source

Adapted from *Expert Committee on Health Statistics, Sixth Report.* Technical Report Series, No. 164 (Geneva, WHO, 1959).

ANNEX XII

Indicators of mental health listed by Deliège

MORTALITY WITH A PSYCHO-SOCIAL COMPONENT[a]

Some causes of death are an index for disorders of mental origin:
Mortality from cerebro-vascular diseases
Mortality from cirrhosis of the liver
Mortality from suicide
Mortality from violent causes (e.g., car accidents)
Mortality from poisoning (especially certain drugs)

MORBIDITY (MENTAL DISEASES AND MORBIDITY WITH A PSYCHO-SOCIAL COMPONENT)[b]

(*a*) Mental disorders and mental health status
Mental diseases
Mental health status (negative and positive)

(*b*) Health problems with a psycho-social component
Mental or psychological component (e.g., psycho-somatic diseases)

(*c*) Health problems with psycho-social repercussions
Health problems that may lead to mental disorders (e.g., cardiovascular diseases)
Health problems often associated with difficulties of a psycho-social nature for the patient or those around him (e.g., malformations, handicaps, etc.)

(*d*) Health problems of psycho-social origin
Origin in life-styles (e.g., lung cancer, gonorrhoea)
Origin in living conditions (e.g., silicosis)

Source

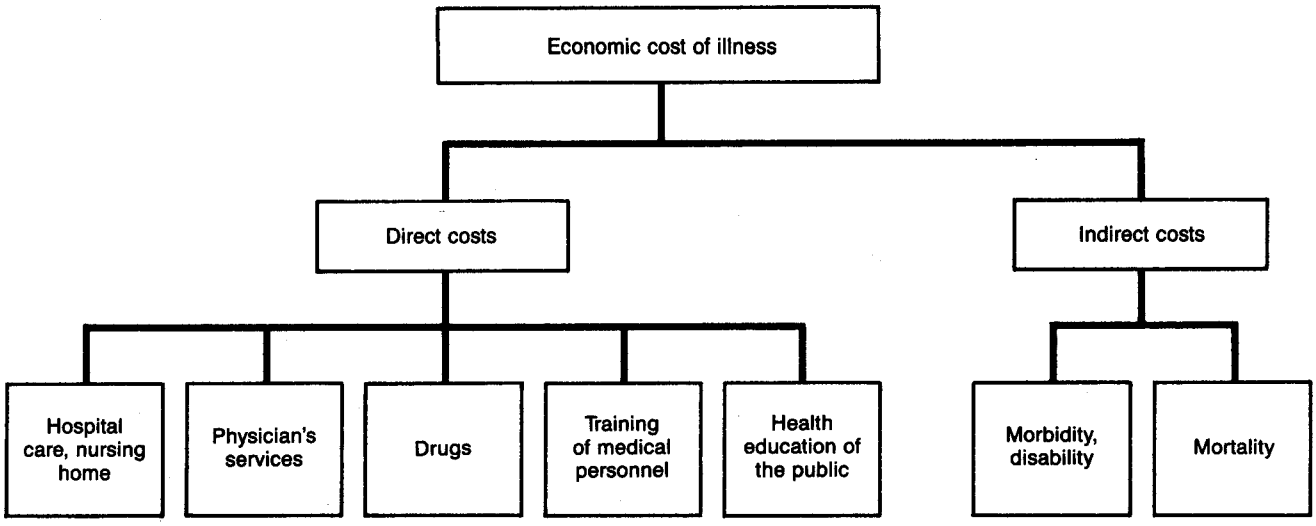
World Health Statistics Quarterly, vol. 36, Nos. 3/4 (1983), pp. 543–544.

NOTES

[a] As a percentage of mortality and/or of the population.
[b] Among indicators of general morbidity, permanent physical and mental disabilities (nature and severity) are also mentioned.

ANNEX XIII

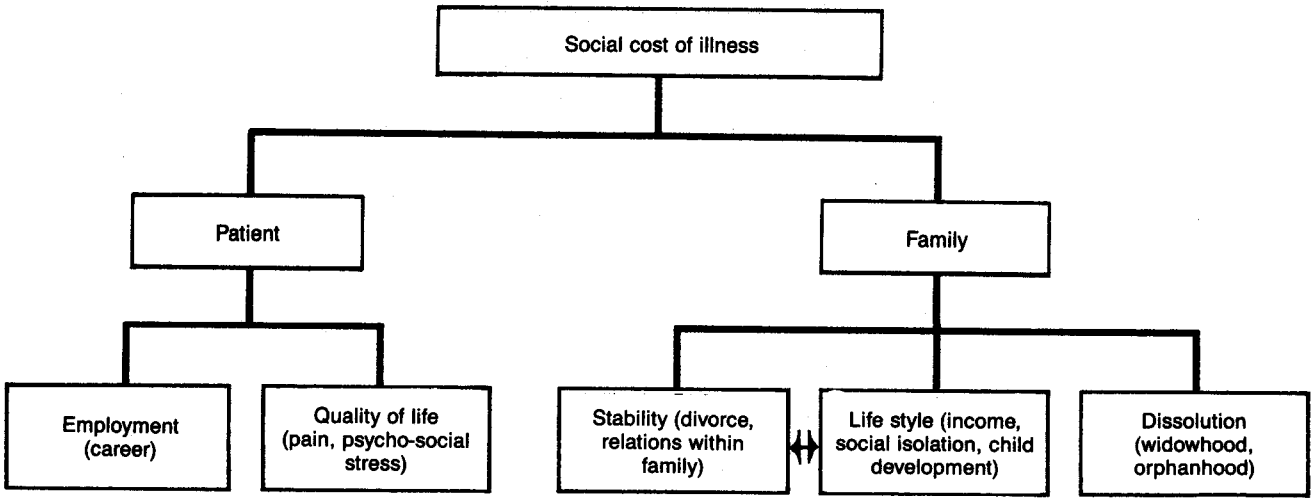
Measuring the economic cost of illness



Source: Cancer Statistics. Technical Report Series, No. 632 (Geneva, WHO, 1979).

ANNEX XIV

Measuring the social cost of illness



Source: Cancer Statistics. Technical Report Series, No. 632 (Geneva, WHO, 1979).

THE WORLD POPULATION PLAN OF ACTION AND THE REGIONAL COMMISSIONS

*United Nations Secretariat**

SUMMARY

Since their establishment, the regional commissions of the United Nations have been devoting particular attention to population and development concerns. Each commission, with its unique social, demographic, economic and political characteristics, has contributed to the international debate on population issues. The commissions have provided a suitable forum for the discussion of those issues, have established programmes and activities to respond to them, and, with growing experience and expertise, have contributed to a better understanding of them. National Governments, international organizations, private groups, and the public in general have benefited from their regional activities. This article deals with the substantive contributions of the regional commissions to the last two population conferences, the World Population Conference (Bucharest, 1974), where the World Population Plan of Action was adopted, and the International Conference on Population (Mexico City, 1984), where the experience in applying Plan of Action was assessed and a set of recommendations for the further implementation of the Plan was adopted.

INTRODUCTION

The United Nations World Population Conference, held at Bucharest in August 1974, was the first intergovernmental conference convened by the United Nations with the specific purpose of dealing with issues of population and development. The Conference was specifically requested to discuss basic demographic problems, their relationship to economic and social development, and population policies and action programmes needed to promote human welfare and development.[1] The principal outcome of the deliberations was the drafting of the World Population Plan of Action.[2]

In August 1984, 10 years after the Bucharest Conference, representatives of 146 States met at the International Conference on Population, held at Mexico City, to discuss selected issues related to population and development, to review and assess the experience gained in applying the World Population Plan of Action and to adopt a series of measures for its further implementation.[3] Working within the framework of the Plan of Action and reaffirming its principles and objectives, the Conference adopted the Mexico City Declaration on Population and Development and a set of 88 recommendations for the further implementation of the Plan of Action.[4]

Though the meetings were conducted at the intergovernmental level, their successes were derived, in no small part, from the contributions of individual social scientists, research institutions and non-governmental organizations, particularly at the preparatory stages. The success of the Conference was also due in part to the work of various units and bodies of the United Nations system. Among them, the regional commissions deserve a special mention. Each of them, in accordance with its own distinctive features, contributed to and enriched the quality of the debate on population and development. Some of them had previously played a pioneering role in the field of population, anticipating later decisions adopted by the General Assembly or the Economic and Social Council.[5] The purpose of this article is to appraise the substantive contributions of the regional commissions to the Bucharest and Mexico City conferences.

Established as subsidiary organs of the Economic and Social Council to promote development and to strengthen the economic relations between the countries in their respective regions, the five regional commissions have unique characteristics reflecting the varied historical, cultural, demographic and socio-economic backgrounds of their member countries. They are:

(*a*) Economic Commission for Europe (ECE), established in March 1974;

(*b*) Economic and Social Commission for Asia and the Pacific (ESCAP), established in March 1947 as the Economic Commission for Asia and the Far East (ECAFE);

(*c*) Economic Commission for Latin America and the Caribbean (ECLAC), established in February 1948 as the Economic Commission for Latin America (ECLA);

(*d*) Economic Commission for Africa (ECA), established in April 1958;

(*e*) Economic and Social Commission for Western Asia (ESCWA), established in 1973 as the Economic Commission for Western Asia (ECWA) and originally part of ECAFE.

At the sessions of the General Assembly and of the Economic and Social Council, and at numerous regional meetings, Member States have called for strengthening the role of the regional commissions. As a result, a gradual process of decentralization has been taking place within the United

* Population Division of the Department of International Economic and Social Affairs

Nations system. In 1961 the General Assembly strengthened the secretariats of the commissions, making them the executive arms of the United Nations at the regional level in the economic and social fields, including technical assistance operations. They also became focal points for the discussion of issues related to social and economic development.

In choosing between global or regional fora for dealing with critical issues, national Governments recognize that discussions and negotiations held at the regional level have a different character from those at the global level. Generally, when Governments decide to utilize a regional forum, they tend to emphasize the dissimilarities between the regions and the need for selecting measures consonant with the unique characteristics of their region. By contrast, when they select a global forum, they tend to emphasize universal commonalities and the need for adopting global measures. Reaching consensus is easier within a more homogeneous grouping. However, the regional approach may reduce the possibility of reaching consensus on the similar issues at the global level. Nevertheless, the two approaches need not necessarily be in conflict; at times they can be complementary and even reinforce each other.

In addressing population issues, the developing countries have utilized fora at both levels. At the global level, consensus was achieved when proponents of action accepted compromises on specifics in order to adopt a concerted global strategy, recognizing that the measures proposed were rather vague. By contrast, at the regional level, the measures adopted were more specific, focused and precise.

BACKGROUND

After reviewing the findings of numerous studies on the difficulties experienced by the developing countries in achieving social and economic development, the 1953 edition of *Determinants and Consequences of Population Trends* concluded by raising an important question: "Can industrialization, agricultural development, encouragement of investments, educational programmes, land reform, etc., alone solve the so-called problem of population in these countries, or are measures designed to check population growth also required to ensure satisfactory levels of living in the long run?"[6] At that time, only one country, India, had established a family planning programme as a population policy measure. Apparently China had adopted a birth control policy to affect population growth as far as 1953.[7] By 1966, however, 14 countries, representing 42 per cent of the population of the less developed countries (the figure would be 72 per cent if China were included), had adopted official family planning policies.[8]

In 1961, in its report to the Economic and Social Council, the Population Commission reiterated its view that each Government should decide its own policies and devise its own programmes of action for dealing with population problems.

However, the years 1965 and 1966 marked a major turning point in the history of international action in the field of population. The Population Commission, at its thirteenth session (1965), on the basis of a report of the *Ad Hoc* Committee of Experts on a Long-range Programme of Work in the Field of Population, endorsed the recommendation that the United Nations should provide assistance to Governments in all aspects of population problems, including the formulation and execution of family planning programmes. In endorsing the recommendations of the Population Commission, the Economic and Social Council invited the regional economic commissions and specialized agencies to consider how they might modify and expand their programmes in the field of population accordingly. The Economic and Social Council also requested the Secretary-General to provide advisory services and training on action programmes in the field of population at the request of Governments.

These developments led in 1966 to the unanimous adoption by the General Assembly of resolution 2211 (XXI) on population growth and economic development. In it, the Assembly requested the economic commissions to assist in developing and strengthening national and regional facilities for training, research, information and advisory services in the field of population. The resolution represents the major foundation upon which the United Nations expanded its population programme and initiated its support of action-oriented activities.

These developments at the global level were influenced by a series of important antecedents, among which the following seem to be most important:

(*a*) The request by three Governments—Barbados, India and Egypt—for United Nations assistance in establishing family planning programmes;[9]

(*b*) The recognition in the Strategy of the First United Nations Development Decade (1961–1970) that rapid population growth aggravates the social and economic problems of developing countries;[10]

(*c*) The population inquiry in 1963/64 which indicated increasing governmental concern for population problems and the willingness of States to accept United Nations assistance;[11]

(*d*) The population censuses taken around 1950 and 1960 which showed that population was increasing faster than previously projected, particularly in the developing countries;[12]

(*e*) The Declaration on Population Growth and Human Dignity and Welfare, signed by 12 Heads of State, proclaiming the right of parents to decide the number and spacing of their children.[13]

These global developments were accompanied by related events at the regional level. For example, in 1955, the then Economic Commission for Asia and the Far East (ECAFE) organized a seminar on population at Bandung, which focused attention on the implications of population trends in the region. In 1958, the secretariat of the Commission completed its first population study, "Population trends and related problems of economic development in the ECAFE region" (E/CN.11/L.67), which was later defined by the Commission to be a continuing project of high priority. Those activities paved the way for the First Asian Population Conference at New Delhi, in December 1963. The Conference concluded that population growth was an obstacle to economic growth and called for an expansion of the scope of the technical assistance programme of the United Nations to cover action programmes related to population.[14] Its recommendations were then unanimously endorsed by the Commission. The resolution of the Commission was the first mandate ever given by an intergovernmental legislative body authorizing United Nations assistance to action programmes carried out by countries in the field of population.

In December 1955, the United Nations organized at Rio de Janeiro a seminar on population problems in the Latin American region. The seminar was attended by governmental officials and social scientists from 20 countries of the region. Their principal concern was improving the quality of demographic data and improving the human resources of the region. To those ends the participants recommended the

creation of a regional centre, and in 1957 an agreement between the Government of Chile and the United Nations led to the establishment of the Latin American Demographic Centre (CELADE).

In October/November 1962 at Cairo, ECA organized a seminar on population problems in Africa, which was attended by representatives of 21 African Governments. The principal topic of discussion was similar to that at the Latin American seminar—the availability of demographic data and of human skills.

In its resolution 2211 (XXI) of 17 December 1966, on population growth and economic development, the General Assembly facilitated the initiation or the strengthening of diverse population activities in each of the regions. In the case of the Asian region, the Second Asian Population Conference, which took place at Tokyo in November 1972, made a series of specific recommendations and adopted the Declaration of Population Strategy for Development. The Declaration reaffirmed that problems associated with rapid population growth "are of vital concern to the entire world community" and called upon "the World Population Conference in 1974 to consider means which might be applied on a global level for the solution of these problems".[15]

In 1966 CELADE became a regional project financed by the United Nations Development Programme (UNDP) and by contributions from five countries of the region. The International Union for the Scientific Study of Population (IUSSP) organized, with the co-sponsorship of ECLAC and CELADE, the Latin American Regional Population Conference, which was held at Mexico City in 1970. The first large-scale meeting of its kind in the region, it reviewed the information and studies available on the characteristics and trends of the Latin American population, their relationships with economic and social development, population policies, and the promotion of research and training programmes.

In 1970 the Conference of Ministers of the Economic Commission for Africa established the Conference of African Demographers as a standing body of ECA, with a mandate to review the population programme of ECA and make recommendations to the Commission in that area. In December 1971, the African Population Conference took place at Accra, Ghana, based on the theme "Population in African Government".

United Nations World Population Conference

Preparations for the Conference

The regional commissions participated actively in the preparatory work for the Bucharest Conference, which included four meetings of the Population Commission (acting as the Preparatory Committee for the Conference), four major symposia on substantive subjects (population and development; population, resources and environment; population and the family; and population and human rights) and five regional pre-Conference consultations.[16]

The regional pre-Conference consultations, as agreed upon by the Preparatory Committee and by the Secretary-General of the Conference, were to provide an opportunity for Governments to continue their preparations for Bucharest and to express preliminary views on the documentation prepared for submission to the Conference (particularly the draft Plan of Action). It was expected that a consensus could be achieved prior to the Conference and that major conflicts over the draft Plan could be resolved at those regional consultations.[17]

The consultations took place from April to June 1974 and were attended by representatives of a total of 103 countries and territories. At each of the meetings, the Secretary-General of the Bucharest Conference, Mr. Antonio Carrillo-Flores, and the Deputy Secretary-General, Mr. Léon Tabah (who was also the Director of the Population Division of the Department of Economic and Social Affairs), described the background of the Conference, the status of the preparatory work and the purposes of the consultations.

In general, there were few objections to the draft Plan prepared by the Secretariat;[18] at four of the five meetings specific recommendations involving only minor revisions to the different parts of the draft Plan were made. Although Governments had not been given an opportunity to study the draft Plan before the regional consultations, at the consultations they concluded that the draft Plan was a good basis for discussion and that reaching a consensus would be possible at the Bucharest Conference. It was also agreed that post-Conference meetings would be held in order to elaborate regional variations of the Plan of Action.

An account of the regional consultations is given below.

Economic Commission for Latin America

The first regional consultation was convened by ECLA at San José, Costa Rica, from 15 to 19 April 1974. It was attended by high-level representatives of 24 (out of 30) member States of the Commission; furthermore, most of the participants were ministers. The consultation provided them their first opportunity to discuss regional population problems and governmental policies.[19]

The meeting recognized the diversity of demographic conditions in the region and the role of demographic factors in social and economic development. It was noted that few Latin American countries had adopted population policies, although many of them, recognizing the right of parents to decide the number and spacing of their children, had established or given support to private family planning programmes.

The meeting did not produce a specific set of recommendations for the modification of the draft Plan. Because of the high level of the participants, the consultation was of a political rather than a technical nature, and in that respect, it anticipated the discussions that took place later on in Bucharest in at least two respects. First, the conception of the Plan of Action as a population strategy at the world level was rejected. In particular, the adoption of quantitative demographic targets was opposed: "countries should be free to set their own population goals and . . . these should always respond to national considerations".[20] Secondly, there was insistence on the idea that "population policies are not to be considered as an alternative to economic and social development but as one of the means of achieving it".[21]

Economic Commission for Asia and the Pacific

The second consultation took place at Bangkok, Thailand, from 6 to 9 May 1974, under the auspices of ESCAP, and was attended by representatives of 21 (out of 39) member States.[22] Although the meeting endorsed the draft Plan in principle, it suggested some specific additions and changes. It suggested that the background to the Plan precede the Plan but not be part of it, and it called for the adoption of quantitative targets for population growth, maternal mortality and fertility. Those proposals were not accepted in Bucharest.[23] However, another of its recommendations was incorporated into the Plan of Action—namely,

that "all individuals [the word "couples" was added at Bucharest] have the basic human right to decide freely and responsibly the number and spacing of their children and to have the information, education and means to do so; the responsibility of couples in the exercise of this right should take into account the needs of their living children, and the community".[24] The consultation agreed that its conclusions should be submitted to the Bucharest Conference for inclusion in the World Population Plan of Action and that those proposals not incorporated in the Plan should remain as part of an Asian variant.[25]

Economic Commission for Africa

The third regional consultation was held at Addis Ababa, Ethiopia, from 13 to 16 May 1974, under the auspices of ECA, and was attended by representatives of 25 (out of 45) member States.[26] Unlike the consultations at San José and Bangkok, the Conference of African Demographers, the standing body of ECA on population, had an opportunity to review the draft Plan prior to its meeting. It concluded that the draft was in consonance with African aspirations and that it provided enough flexibility to serve the different population strategies of the countries of the region.

The consultation reaffirmed the view that population planning should be an integral part of the process of social and economic development planning. Concern over the lack of basic demographic data and inadequate assessments on the interrelations between population and development was accompanied by calls to the donor community to increase its assistance to population activities (though not at the expense of other development assistance).

The consultation made a series of specific recommendations concerning the draft Plan, including the following:

(*a*) The background to the Plan should remain as an integral part of the Plan;

(*b*) A reference should be made to the Declaration . . . on the Establishment of a New International Economic Order and its related Programme of Action;

(*c*) A new paragraph should be added indicating that the inequity in the international distribution of resources hindered the proper formulation and implementation of population policies.[27]

Economic Commission for Western Asia

The fourth regional pre-Conference consultation took place at Damascus, Syria, from 21 to 23 May 1974, under the auspices of ECWA, and was attended by representatives of 10 (out of 12) of its member States.[28] The consultation concluded that if the relevance of the Plan of Action at the global level was to be preserved, the priorities of the countries of the ECWA region and those of other regions could not be adequately reflected. It, therefore, welcomed the idea of elaborating regional variants of the Plan. The meeting recommended that the background of the Plan should be an introductory section, numbered separately from the rest of the Plan. It also made several other suggestions, which were accepted, dealing with the fertility increase as a means of increasing population growth rates[29] and forced migration.[30] The proposal calling for a medical examination for both spouses before marriage, in the recommendation on family formation, was not adopted at Bucharest but was approved by the Mexico City Conference a decade later.

Economic Commission for Europe

The fifth pre-Conference consultation took place at Geneva, Switzerland, from 29 May to 1 June 1974, and representatives of 30 (out of 34) countries participated.[31] Unlike the four other consultations, which were convened by the regional commissions, the fifth was convened by the Secretary-General of the Conference in consultation with the ECE secretariat. The pre-Conference consultation was the first meeting organized by the United Nations to deal with the broad population questions of concern to the ECE members. Although several member countries had played an important role in creating world-wide awareness of the role played by population variables and had supported many population-related activities, they had not discussed population policy issues during the ECE meetings.

The countries represented at the consultation not only differed in their views of the socio-economic and demographic situation but also in their views on their national population problems and the strategies needed to be adopted, and in terms of what and how things should be done at the international level. There was, therefore, a tacit agreement that the population questions to be discussed would be those of a global character and in relation to the Bucharest Conference.

Detailed proposals for additions or changes to the draft Plan, which were submitted by individual participants, were not discussed by the consultation. Instead, the suggestions were transmitted to the Bucharest Conference with the clarification that they did not necessarily reflect the views of the Commission as such. Some of the proposed additions were identical to those suggested at the ESCAP consultation (i.e., the reference to the right to decide on the number and spacing of children, and the call for quantitative targets for population growth, maternal mortality and fertility).

Discussion at Bucharest[32]

Despite the lack of controversy in the regional consultations, the debates that took place at Bucharest involved controversy not only on population issues but on economic and political matters as well. Several explanations were given as to why these political issues surfaced at the Conference and not at the meetings of the Preparatory Committee or at the pre-Conference consultations:

(*a*) The draft Plan, which was focused on population as a field of governmental intervention, was prepared by population experts, while those who participated in the Conference debate were political leaders who perceived the Plan as a political instrument;[33]

(*b*) Though the participants at the pre-Conference meetings were governmental representatives, they were, in general, of lower rank than those attending the Conference;[34]

(*c*) Some very influential countries at the Conference (such as Algeria and China) did not participate at the regional consultations or (like Argentina) did not present their concerns at those meetings;[35]

(*d*) Some delegations felt that it was too early to present their reactions to the draft Plan at the consultations.[36]

To those explanations must be added the fact that in May 1974 (between the pre-Conference consultations and the Conference itself), the General Assembly, at a sixth special session, adopted the Declaration and Programme of Action on the Establishment of a New International Economic Order. Third world countries that were supporters of governmental intervention in the field of population and that

also played a major role at the sixth special session remained silent at Bucharest or joined those opposing the draft Plan. This made it appear that the third world countries were unified in their support of the New International Economic Order and that negotiations on that topic were more important than producing a stronger population Plan of Action. Some third world countries took the position that, whatever the final contents of the Plan, the solution of their population problems would ultimately depend on the measures adopted by their Governments rather than on the availability of a precise Plan of Action, and that the Bucharest Conference represented for them the first major opportunity to reaffirm the decisions taken by the General Assembly at its sixth special session.[37]

Post-Conference consultations

The Plan of Action, as ultimately adopted, underlined the importance of the regional commissions and in paragraph 102 invited countries sharing similar population conditions and problems to consider the Plan jointly, to exchange experiences and to elaborate those aspects of the Plan that were of particular relevance to them. The General Assembly, in its resolution 3344 (XXIX) of 17 December 1974, on the Conference, took note with satisfaction of the report of the Conference, including the World Population Plan of Action and, among other things, called upon the regional commissions to determine how each could best assist countries in implementing the Plan.

Post-Conference consultations took place in each of the five regions between December 1974 and July 1975. They were attended by representatives from 104 countries and territories, and the level of the participants was similar to that at the pre-Conference meetings.[38] The consultations were organized by the regional commissions, in collaboration with the Population Division of the Department of International Economic and Social Affairs and the United Nations Fund for Population Activities, in order to assist Governments in each region in the elaboration of the regional variants of the Plan of Action, taking into account each region's characteristics and priorities. The meetings were also intended to help the United Nations system, and particularly those units involved in technical assistance, in identifying new areas for action and the types and levels of support required to respond to the national, regional and global needs.

The meetings produced a large number of recommendations which amplified or made more precise those contained in the Plan and which correspond, *pari passu*, to the items covered in the pre-Conference consultations. Those regions that had more experience and expertise in dealing with population issues adopted more detailed recommendations. Some regions insisted on a further conceptualization of the different topics of the Plan, while others were more concerned with the implementation of policies and programmes. In every case it was recognized that the ways of integrating population concerns into the development planning process and the nature and scope of population policies to be adopted would vary according to how different Governments approached their own social and economic development problems.

Economic Commission for Asia and the Pacific

The first regional post-Conference consultation was held at ESCAP headquarters, Bangkok, Thailand, from 14 to 20 January 1975, and was attended by representatives of 24 Member States.[39] The participants reaffirmed the need for adopting quantitative targets for population growth, mortality and fertility. Countries with high population growth were invited to achieve replacement levels of fertility in two or three decades. In terms of mortality, the expectation of life at birth was targeted at 62 years by 1985 (the target in the World Population Plan of Action is 50 years), and maternal mortality rates were to be reduced to no more than 210 per 100,000 live births. They adopted the same infant mortality rates target as specified in the Plan (120 per 1,000). In relation to fertility, countries were invited to reduce birth rates by 10 per 1,000 before 1985 and urged to make family planning services available by no later than then, and to consider incentive schemes to promote contraception.

While the right to move freely within national boundaries was recognized, specific measures were recommended to deal with problems of population distribution: relocation of industries; resettlement of urban squatters; decongestion of large cities by means of rural development and creation of regional urban centres; programmes on new lands for resettlement; land reform; employment schemes in the areas of out-migration; and permanent settlement of nomadic populations. In the case of international migration the consultation centred its concerns on the problem of "brain drain" and called upon the developed countries to discourage the inflow of highly qualified personnel from the developing countries and to encourage their return.

The consultation recommended the use of labour-intensive technologies, the promotion of small- and medium-scale industries, support to rural co-operatives, social welfare programmes for the poor and the aged, full protection to children, and provision of day-care centres. The topics of data collection, analysis and research also received special mention, and emphasis was put on their relevance for action-oriented activities. Training, education, information and management were also the subject of specific recommendations.

Economic Commission for Latin America and the Caribbean

The second post-Conference consultation took place at Mexico City from 3 to 7 March 1975; representatives of 27 ECLAC member States attended. The meeting produced an ordered sequence of principles (special emphasis was given to the rights and duties of States and individuals), followed by the identification of juridical and institutional instruments required for the formulation of population policies, a listing of the principal requirements for such policies, a statement of the role of international co-operation, the objectives and goals of population policies, and finally, a list of specific areas for further action.[40]

When dealing with instruments for population policy formulation and implementation, the consultation paid special attention to the organization and functioning of high-level population units. It stressed the importance of training and recommended a variety of programmes in that field, including advanced training for planners and senior professionals. There was explicit recognition of the prerogative of each country to determine the objectives of its own population policies, but some specific objectives were recommended for consideration. The meeting identified a number of situations in which population factors played an important role, and reference was made to specific policies and measures proposed or being implemented for dealing with those situations. In respect of population distribution and internal migration, the meeting proposed some specific measures to

improve conditions in places of origin, to reorient migration flows to alternative destinations, and to respond to social and economic problems associated with the process of rapid urbanization.

Economic Commission for Africa

The third post-Conference consultation was held at Lusaka, Zambia, from 16 to 22 April 1975. Representatives of 29 ECA member States participated.[41] Prior to the consultation, the Conference of African Ministers adopted a resolution on integrated population programmes, in which it requested Governments, *inter alia*, to give due attention to the socio-economic conditions of parents and children and to ensure that family planning becomes an integral part of development programmes. The ECA secretariat prepared a comprehensive working paper on proposals for an African population programme,[42] which was the basis of the discussions of the meeting. Special attention was given to the Declaration and Programme of Action on the Establishment of a New International Economic Order, the Charter of Economic Rights and Duties of States, and the Programme of Action for the Second United Nations Development Decade as the proper framework for consideration of population questions.

The background paper provoked a lively discussion on mortality targets, which some participants considered arbitrary and unrealistic because of a weak data base. Abortion upon request was another controversial subject, and family life education was recommended as a way of reducing unwanted pregnancies and illegal abortions. Data collection, analysis and training received special attention from the participants. The highest priority was given to conducting population censuses between 1975 and 1985. Countries were urged to establish or improve their vital registration systems, to utilize better available international assistance and to provide training at the national level as a complement to the services provided by the regional training centres.

Economic Commission for Western Asia

The fourth post-Conference consultation was convened at Doha, Qatar, on 24 and 25 March 1975, but due to the death of King Faysal, it adjourned and reconvened at Beirut, Lebanon, on 1 and 2 May 1975. Representatives of all 12 ECWA member States participated in the Doha meeting, but Yemen did not participate in the Beirut meeting.[43] The consultation reiterated its concern over the high levels of morbidity and mortality in the region. Problems of internal migration and population distribution were to be confronted by narrowing the gap between rural and urban areas. The meeting emphasized problems related to international migration; it distinguished intraregional migration as a special type of international migration, and recommended policies to facilitate labour movements between Arab countries in order to halt the brain drain, to protect the rights of migrating workers and their families, and to stop forced migration in the region. On each topic, the meeting emphasized the need to improve the collection and analysis of demographic and socio-economic data, to conduct research and to train specialists.

Economic Commission for Europe

The fifth post-Conference consultation took place at ECE headquarters at Geneva from 7 to 11 July 1975, and was attended by representatives of 24 member States.[44] The meeting included a candid discussion of regional demographic trends since the Second World War, perspectives to the year 2000, the implications of further declines in the already low levels of fertility, the direct and indirect actions taken by Governments to deal with those trends, and the relevance of the Plan of Action for population programmes in the region. The participants were aware that, in spite of the advanced level of development achieved by the countries of the region and the corresponding declines in their mortality and fertility rates, they had different population problems and that the provisions contained in the Plan were relevant to them. The meeting adopted a resolution calling for the implementation of the Plan of Action at the regional level.

International Conference on Population, 1984

Preparations for the Conference

The World Population Plan of Action called for a periodic review and appraisal of progress made towards implementing the provisions of the Plan. In its resolution 1979/32, the Economic and Social Council, after considering the first periodic review, requested the Population Commission to advise the Council on the feasibility of another international population conference. In its resolution 1981/87, on the basis of a recommendation from the Population Commission, the Council decided to convene the Conference, with the object of contributing to the process of review and appraisal of the Plan and to contribute to its further implementation.

It was decided that the Conference should be conducted with the utmost economy in size, duration and other cost factors. Only two major documents were to go to the Conference. The first, a review and appraisal of the Plan, was to include a summary of major changes in population trends and policies and their interrelations with social and economic development, and an assessment of the level of implementation of the Plan.[45] That document was also intended to serve as the rationale for the second document, a set of recommendations for the further implementation of the Plan.[46]

Drafts of the two documents were prepared by the Population Division of the Department of International Economic and Social Affairs and were submitted to the Population Commission, which acted as the Preparatory Committee for the Conference. Sources for the documents included the deliberations of the four expert group meetings organized by the Population Division; the 1983 monitoring report on population trends and policies;[47] and the results of the Fifth United Nations Population Inquiry among Governments.[48]

The co-ordination of the substantive preparations was carried out by the Population Division of the Department of International Economic and Social Affairs with significant contributions from the regional commissions and other units and agencies of the United Nations system. The *Ad Hoc* Task Force of the International Conference on Population was established in order to ensure the participation of the different units, bodies and organizations of the United Nations system in the preparations of the Conference. The regional commissions, which were represented in the Task Force, contributed substantively to the four expert group meetings, the preparation of the 1983 monitoring report, the two main documents on review and appraisal, and the set of recommendations.

The regional commissions took a productive part in other important events—for example, the International Consultation of Non-Governmental Organizations on Population Issues (Geneva, September 1983),[49] several meetings of parliamentarians on population and development issues, and, in particular, in the population meetings convened by the commissions themselves, as part of their regular programmes of work. Although the Economic and Social Council did not convene the regional meetings as part of the official preparations for the Conference (as it did for the Bucharest Conference), certain commissions saw them as an opportunity to discuss the population issues of their respective regions, to review the progress made since the adoption of the Plan of Action and to identify priority areas of action. The meetings provided an opportunity for the Governments in each region to better prepare themselves for the Mexico City Conference.

The Economic and Social Council, in resolution 1981/87, convening the Mexico City Conference, had requested the Secretary-General to invite substantive contributions from the regional commissions, other units and agencies of the United Nations system and other international organizations, as appropriate. Later, in resolution 1982/42, the Council invited the regional commissions to consider, at their annual sessions in 1984, the report of the Preparatory Committee for the Conference, to present their views on the application of the Plan at the regional level and to transmit them to the Conference for its consideration. The commissions complied with that request and transmitted to the Mexico City Conference recommendations prepared at regional meetings.[50]

At their annual sessions in 1984, the commissions took note of the report of the Preparatory Committee and endorsed the recommendations prepared by each regional meeting. The documents prepared by the regional meetings are thus considered as updated regional variants of the Plan of Action—that is, as further elaboration of those topics of the Plan that were of particular relevance to each region and that bring the views expressed in the post-Bucharest regional consultations up to date. In the same vein, the Mexico City Declaration is the global variant of the Plan of Action—that is, an elaboration of those topics in the Plan that would address the new problems that had emerged since the Bucharest Conference as well as those already identified but that required a sharper focus and a heightened emphasis. Just as the Declaration is not and was never intended to replace the Plan of Action, the regional variants are not substitutes for the Plan but rather regional elaborations of the principles and objectives contained in the Plan.

The analysis below will present the major contributions of the regional commissions to the Mexico City Conference, particularly to the recommendations adopted for the further implementation of the Plan.[51]

Economic and Social Commission for Asia and the Pacific

The ESCAP report and recommendations were an outgrowth of the Third Asian and Pacific Population Conference, which took place at Colombo, Sri Lanka, from 20 to 29 September 1982 and was attended by representatives of 32 members and associate members.[52] The major product of the Conference was the Asia-Pacific Call for Action on Population and Development.[53] ESCAP endorsed the Call for Action (Tokyo, April 1984) and decided to transmit it as its contribution to the Mexico City Conference.

The Call for Action consists of a short preamble, a background section, an outline of principles and objectives, and a set of 55 recommendations addressed to the Governments of the region, to international organizations and to donor Governments. Among its principles, it emphasized respect for the sovereignty of nations and the need for involvement of the community in development programmes—positions that were reaffirmed at the Mexico City Conference. The recommendations begin with a section on population and development policy, as the overall frame for the subsequent recommendations. The section on socio-economic policies of the Plan of Action was introduced at the Bucharest Conference and was placed between specific recommendations, with the unintended result of limited visibility. The Mexico City document followed the initiative taken by the ESCAP Conference and relocated those considerations at the beginning. The Asia-Pacific Call for Action reaffirmed the need to integrate population programmes into related social and economic development programmes, and called for giving high visibility and priority attention to the organizational setting for the implementation of population policies.

A major contribution of the Call for Action was the presentation of women's issues as a separate section. The Plan of Action had included the promotion of the status of women and the principle of equality with men in its recommendations on reproduction and the family, and the draft recommendations submitted to the Mexico City Conference strengthened those goals. The Conference itself decided, following the example of the Call for Action and the Kilimanjaro Programme of Action (which will be discussed below), to create an entire new section devoted to women's concerns. The review and appraisal of the Plan of Action had indicated that contraceptive practices primarily involved methods to be used by women,[54] but the Mexico City Conference did not make any specific provision in that respect. The Call for Action recommends, in the section on women, an investigation of the causes of the sex imbalance in contraceptive and sterilization practice and the promotion of greater balance in future.

There was a significant departure from the Mexico City recommendations in the area of population growth. The draft recommendations submitted by the Preparatory Committee to the Conference invited countries to consider setting quantitative population growth targets, but the Mexico City Conference rejected that suggestion and instead invited Governments to consider pursuing demographic policies if they perceived their population growth as an obstacle. This does not mean that the Mexico City Conference rejected the idea of inviting Governments to adopt quantitative targets on other demographic variables; in fact, the Conference fixed quantitative mortality targets (recommendation 14) and, in relation to fertility, urged Governments that had or intend to have fertility goals to set their quantitative targets (recommendation 33).

The Call for Action, however, urged the revision of existing targets and goals and proposed the attainment of a replacement level of fertility by the year 2000. The recommendation was formulated in line with the suggestions made by the region during the pre- and post-Conference consultations of the mid 1970s. The mortality targets of the Call for Action are formulated for the end of the 1980s (life expectancy at birth of a minimum of 55 years and an infant mortality rate of less than 100 per 1,000 births). The Call for Action also recommended that the mean age at marriage of females be fixed above age 20. The Mexico City document has, in its section on women, a recommendation to raise the age at marriage, but in Mexico City, as in Bucharest, several delegations suggested that it

was up to every Government to define the minimum legal age at marriage.

Economic Commission for Europe

The First Intergovernmental Meeting on Population in the ECE region was held at Sofia, Bulgaria, from 6 to 12 October 1983, under the auspices of the Commission, and was attended by 27 countries. The meeting had three objectives: to provide a forum for discussing population questions and policy among the members of the Commission; to discuss in depth specific population issues; and to formulate the suggestions requested by the Economic and Social Council. A report summarizing the discussions was submitted to and approved by the Commission (Geneva, April 1984) and the suggestions and recommendations were transmitted to the Mexico City Conference.[55]

The report of the ECE meeting has a preamble (which contains the reaffirmation of some of the principles of the Plan of Action), a review of the demographic situation of the region, and a set of 46 recommendations. The nature of the recommendations corresponds to the demographic situation of the region. Although few Governments expressed serious concern over their very low population growth rates, the report recommends that policies aimed at raising those rates should be based on long-term planning considerations. The field of mortality received special attention from the ECE countries, and their recommendations on adult mortality were all included in the Mexico City document. They called for a reduction of differentials between socio-economic groups and between males and females, improvement of environmental and working conditions, and modification of life-style characteristics that had a detrimental effect. In the area of fertility and the family, the ECE report emphasizes assistance to families and support to parents in the care of their children; a detailed recommendation on the topic was included in the Mexico City document (as recommendation 34). The ECE report also gave special attention to the problem of adolescent fertility.

In the field of internal migration and population distribution, the ECE report expressed concern that rural-to-urban migration flows concommitant with low levels of fertility might produce irreversible demographic trends in the rural areas. On international migration there are references to the respect for human rights and prevention of discrimination. Finally, the report called upon the members of the region to increase their assistance to international population programmes.

Economic Commission for Latin America and the Caribbean

ECLAC decided to hold a regional preparatory meeting for the Mexico City Conference within the framework of the seventh session of the Committee of High-Level Government Experts (CEGAN). Social scientists met in Mexico City at the Latin American Congress on Population and Development (8-10 November 1983[56]).

The governmental meeting took place at Havana, Cuba, from 16 to 19 November 1983 and was attended by 16 members of the Committee. On the basis of a draft prepared by the secretariat of ECLAC and the Latin American Demographic Centre (CELADE), the meeting produced a set of proposals (6 conclusions and 14 recommendations) which was later approved by the Commission and presented to the Mexico City Conference as the ECLAC contribution.[57]

The theme of sovereignty of nations on population questions is mentioned in several of the conclusions and recommendations. Population policies are conceived as a specific expression of global and sectorial socio-economic policies, and efforts to integrate them into the process of development planning are urged.

The ECLAC document insists that the right of couples to decide on the number and spacing of children should be protected from all forms of pressure and that if Governments would like to influence fertility patterns, social, economic and cultural measures should be adopted to create new structural conditions. There is special emphasis on reducing morbidity and mortality differentials. The document states that the general guidelines of the Plan of Action in the area of population distribution and internal migration should be reaffirmed. There are references to the need for training, for strengthening technical co-operation activities among developing countries and regional bodies, and for translating into operational terms the principles adopted in international strategies, particularly those related to the integration of population variables into the process of social and economic development. Finally, the document states that the creation or strengthening of governmental mechanisms to take charge of population policy formulation and implementation and related training and research might contribute to such integration.

Economic Commission for Africa

The Second African Population Conference, organized under the auspices of ECA, was held at Arusha, Tanzania, from 9 to 13 January 1984 and was attended by representatives of 44 member States. The Conference reviewed the conclusions and recommendations produced at the First Population Conference (1971) and the Lusaka Consultation (1975) and examined the demographic situation of the region. Special attention was given to population and development interrelationships, urbanization and population distribution, family health and family planning, and women and development. The Conference produced the Kilimanjaro Programme of Action for African Population and Self-reliant Development.[58] That document was submitted to the Conference of Ministers of ECA (Addis Ababa, May 1984) and transmitted to the Mexico City Conference.

In its chapter on principles and objectives, the Kilimanjaro Programme affirms that population "should be considered as a central issue in development strategies and plans". Like the ESCAP Call for Action, it begins the chapter on recommendations with a section on population and development, where the creation or strengthening of high-level population units is urged, and it is suggested that the integration of population in development planning should be extended to subregional and district levels in each country. The Programme affirms the usefulness of family planning and child-spacing for the stability and well-being of the family, and urges the incorporation of family planning services into maternal and child health services; those services are to be offered free of charge or at subsidized prices, and should include a variety of contraceptive methods.

The Programme calls for a reduction in morbidity and mortality levels, particularly among children and mothers in the rural areas, and for maximum community participation in health programmes and the search for autochthone solutions (i.e., traditional medicine) to reduce dependence on imported technology. In the field of migration, there are various provisions on urbanization, rural development programmes, and issues related to refugees. Women's concerns were dealt with

in a special section. Other recommendations addressed to the Governments in the region refer to data collection and analysis, research, training and information action. The Programme concludes by addressing regional and other international organizations and the donor community on their assistance to the region in implementing the Programme of Action.

Economic and Social Commission for Western Asia

In order to review population questions in the Arab region and to formulate joint approaches and positions, the secretariats of ESCWA and of the League of Arab States decided to convene the Regional Population Conference in the Arab World at Amman, Jordan, from 25 to 29 March 1984. The Conference was attended by representatives from 15 member States of the League belonging also to ESCWA or to ECA. It produced the Amman Declaration on Population in the Arab World,[59] which was endorsed by the Commission (Baghdad, April 1984) and then transmitted to the Mexico City Conference.

The principles discussed in the Declaration take into account the particular characteristics of the region (i.e., population problems may be solved if addressed from a Pan-Arab standpoint), or make reference to those contained in the Plan of Action. The objectives are grouped around a major topic: the formulation of an Arab population policy that could serve as a framework for country population policies.

Some of the recommendations call for comprehensive and integrated planning, popular participation, the advancement of women, rational use of natural resources, and intercountry co-operation. Others are devoted to components of population policy. The need for fertility change to be in line with the process of development is mentioned, along with several proposed measures addressing mortality. Internal migration and population distribution policies are advocated in order to encourage the establishment of small and medium-size centres, new centres of human settlement and rural development programmes. Issues on international migration are mentioned in relation to Arab migrant workers, and the establishment of an Arab labour compensatory fund for the promotion of Arab co-operation in the use of resources is proposed. Other recommendations refer to data collection, research, training, the exchange of information and international co-operation.

Discussion at Mexico City[60]

In spite of the tense international climate in 1984, characterized by a deterioration of international economic and political relations (economic recession, deterioration of terms of trade, reappearance of protectionism, growing international debt, weakening of multilateral economic co-operation etc.), there was a minimum of ideological controversy during the Mexico City Conference. Unlike the Bucharest Conference, the 1984 meeting had been proposed by third world countries. Their initiative was another indicator of the shift in political attitudes *vis à vis* population issues and of the increasing concern of developing countries in that regard. Special efforts had been made to persuade Governments to organize their national preparatory groups in advance and to ensure a high level of representation. Their adherence to the objectives of the Conference convinced even the most skeptical that a short, economical and well-organized population conference was feasible.

Whereas the draft Plan of Action had been a proposal of the Secretariat to the Bucharest Conference, the documents submitted to the Mexico City Conference were the proposals of the intergovernmental Preparatory Committee. By thus having possible political discussions brought before the Preparatory Committee, major points of controversy were resolved by it prior to the Conference.[61]

After careful deliberation, the Mexico City Conference adopted two major documents:

(*a*) The Mexico City Declaration on Population and Development, which in 23 paragraphs reaffirmed the role of population concerns in the process of social and economic development;

(*b*) Recommendations for the further implementation of the World Population Plan of Action.

The latter document consists of three parts: a preamble (or a background to the recommendations), a section on peace, security and population,[62] and a set of 88 recommendations for action. The recommendations start with a major section on socio-economic development, the environment and population, which is followed by sections on the role and status of women, the development of population policies, population goals and policies, and the promotion of knowledge and policy. The two documents, based on the experience gained since Bucharest, constitute the guidelines adopted by 146 Governments for their programmes and policies in the field of population.

CONCLUSION

Through the mosaic of diverse socio-demographic and political conditions, the contributions made by the regional commissions to the Bucharest and Mexico City Conferences have been significant. Each commission brought to the international debate its own experiences and concerns. Together the commissions have played an important role, by serving not only as an initial forum for discussing population and development issues but also by providing information and technical support.

The countries of the ESCAP region initially emphasized measures to modify their high fertility levels. Later they considered other action "beyond family planning". Most recently they have taken a broader approach, linking population and development planning.

The countries of the ECLAC region emphasized the sovereignty of nations and the need to respect individual and family rights. Their views and policies have varied according to their changing demographic, political and socio-economic conditions, and after the Bucharest Conference, they began to insist that the population dimension should be incorporated into the process of social and economic planning.

The members of ECA—initially concerned with the availability of reliable demographic data and of trained personnel—have been insisting on the need to adopt a holistic approach in which population would be one among many dimensions of the development process. As manifested in the Kilimanjaro Programme of Action, they have urgently called for building up national capabilities and self-reliance in the different population programmatic areas. Similar developments have taken place among the countries of the ESCWA region.

From these positions flow the following propositions:

First, there is a great variety of demographic, socio-economic and political conditions within and between the major regions. The Plan and the Mexico City recommendations recognize the diversity of national and regional conditions and call upon the appropriate bodies to adopt measures

attuned to their particular conditions, yet the Plan and the Mexico City documents embrace the commonalities of the diverse national and regional views.

Secondly, there has been increasing concern about population problems other than those associated with high fertility levels, such as those related to morbidity and mortality, the spatial distribution of the population, the nature of internal and international migratory movements, the age/sex composition of the population, the balance between population, resources, the environment and the process of development, and the requirements to assess and act upon the different issues (i.e., reliable data, analytical tools, trained personnel, financial resources, and co-operation among countries).

Thirdly, the controversy over population growth has given way to a new view of population as part of the development process and a recognition that population measures (such as family planning) and development strategies (such as popular participation) are mutually reinforcing and can have a synergistic impact.

Fourthly, a large and increasing number of developing countries have changed their attitudes towards population problems in the past two decades. The changes have generated new programmes and have led to more focused and technical discussions. One indicator of the shifts is the increasing number of population units in governmental planning offices. In a large number of cases their establishment has benefited from the assistance provided by the secretariats of the commissions.

Finally, through efforts at the national, regional and global levels, population has emerged in the past 15 years as an important, programmable area of social and economic development. Population is now not only an element in a large and increasing number of national development plans but also an identifiable and strategic component of international assistance.

NOTES

[1] Economic and Social Council resolution 1484 (XLVIII) of 3 April 1970.

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

[3] Economic and Social Council resolution 1981/87 of 25 November 1981.

[4] See *Report of the International Conference on Population, 1984, Mexico City, 6-14 August 1984* (United Nations publication, Sales No. E.84.XIII.8), chap. I.

[5] A good account of the history of population debates within the United Nations system is given in K. Symonds and M. Carder, *The United Nations and the Population Question: 1945-1970* (New York, McGraw-Hill, 1973).

[6] *The Determinants and Consequences of Population Trends* (United Nations publication, Sales No. 53.XIII.3), p. 283.

[7] See M. Freeberne, "Birth control in China", *Population Studies*, vol. 18, No. 1 (July 1964), pp. 5–16.

[8] In addition to India and Pakistan, the list includes the following 12 countries: Republic of Korea (1961), Fiji (1963), Jamaica (1963), Egypt (1965), Malaysia (1965), Singapore (1965), Sri Lanka (1965), Tunisia (1965), Turkey (1965), Kenya (1966), Mauritius (1966) and Morocco (1966).

[9] "Objectives and accomplishments of the United Nations in the field of population" (E/CN.9/158), pp. 15–18.

[10] *The United Nations Development Decade. Proposals for Action* (United Nations publication, Sales No. 62.II.B.2), pp. VII, 7.

[11] "Inquiry among Governments on problems resulting from the interaction of economic development and population changes": report of the Secretary-General (E/3895/Rev.1/Corr.1/and Add.1).

[12] See *World Population Prospects as Assessed in 1963* (United Nations publication, Sales No. 66.XIII.2), pp. 15–17.

[13] The 12 signatories were: Colombia, Finland, India, Republic of Korea, Malaysia, Morocco, Nepal, Singapore, Sweden, Tunisia, United Arab Republic and Yugoslavia. The heads of 18 other countries added their signatures to the Declaration, bringing the number to 30; for the full text, see "Declaration on population by world leaders". *Population Newsletter* (issued by the Population Division of the Department of International Economic and Social Affairs), No. 1 (April 1968), pp. 44–45.

[14] *Report of the Asian Population Conference, New Delhi, India, December 1963* (United Nations publication, Sales No. 65.11.F.11).

[15] *The Second Asian Population Conference, Tokyo, November 1972. Report, Declaration and Selected Papers* (E/CN.11/1,152), p. 67.

[16] For a collection of substantive documents, see *The Population Debate: Dimensions and Perspectives. Papers of the World Population Conference, Bucharest, 1974*, vols. 1 and 2 (United Nations publication, Sales No. 75.XIII.4 and 5). A summary of the principal documents prepared for the Conference appeared in *To Promote Human Welfare and Development. A Digest of the Basic Documents prepared for the World Population Conference* (United Nations, Centre for Economic and Social Information, 1974).

[17] See "Reports of the regional consultations preparatory to the Conference" (E/CONF.60/CBP/34).

[18] The Economic and Social Council decided that the draft Plan should be included in the agenda of the Conference and requested the Secretary-General to prepare it with the assistance of the Advisory Committee of Experts on Global Population Strategy, as recommended by the Population Commission (resolution 1672 (LII) of 2 June 1972, part B, para. 4).

[19] "Reports of the regional consultations preparatory to the conference" (E/CONF.60/CBP/34), pp. 25–29.

[20] "Reports of the regional consultations preparatory to the conference" (E/CONF.60/CBP/34), p. 25.

[21] "Reports of the regional consultations preparatory to the conference" (E/CONF.60/CBP/34).

[22] "Reports of the regional consultations preparatory to the conference" (E/CONF.60/CBP/34), pp. 10–17.

[23] ESCAP is the only commission that has proposed the adoption of quantitative targets in fertility and population growth. This item became part of the Asian and Pacific variant of the Plan of Action.

[24] "Reports of the regional consultations preparatory to the conference" (E/CONF.60/CBP/34), pp. 11–12. This was included in the WPPA as one of the principles (para. 14(*f*)).

[25] "Reports of the regional consultations preparatory to the conference" (E/CONF.60/CBP/34), p. 14.

[26] "Reports of the regional consultations preparatory to the conference" (E/CONF.60/CBP/34), pp. 5–9.

[27] This was included in the WPPA as para. 4.

[28] "Reports of the regional consultations preparatory to the conference" (E/CONF.60/CBP/34), pp. 30–33.

[29] Included in the WPPA as para. 18.

[30] Included in the WPPA as para. 53.

[31] "Reports of the regional consultations preparatory to the conference" (E/CONF.60/CBP/34), pp. 18–24.

[32] Among the numerous accounts about the Bucharest Conference, the following are recommended: B. Berelson, "The World Population Plan of Action: where now?", *Population and Development Review*, vol. 1, No. 1 (September 1975), pp. 115–146; J. L. Finkle and B. B. Crane, "The politics of Bucharest: population, development, and the New International Economic Order", *Population and Development Review*, vol. 1, No. 1 (September 1975), pp. 87–114; W. P. Mauldin, and others, "A report on Bucharest. The World Population Conference and the Population Tribune, August 1974", *Studies in Family Planning*, vol. 5, No. 12 (December 1974); C. Miro, "The World Population Plan of Action: a political instrument whose potential has not been realized", *Population and Development Review*, vol. 3, No. 4 (December 1977), pp. 421–442; L. Tabah, "The significance of the Bucharest Conference on population", *International Social Science Journal*, vol. XXVII, No. 2 (1975), pp. 375–384; L. Tabah, "Principales conclusions de la Conférence Mondiale de la Population", in M. Marois, ed., *Proceedings of the World Conference, Towards a Plan of Action for Mankind*, vol. 5. *Conclusion and Perspectives* (New York, Pergamon Press, 1977), pp. 165–172; R. Tabbarah, "Population policy issues in international instruments: with special reference to the World Population Plan of Action", *Journal of International Law and Economics*, vol. 9, No. 3 (December 1974), pp. 419–454.

[33] W. P. Mauldin and others, "A report on Bucharest. The World Population Conference and the Population Tribune, August 1974", *Studies in Family Planning*, vol. 5, No. 12 (December 1974), p. 373.

[34] J. L. Finkle and B. B. Crane, "The politics of Bucharest: population, development, and the New International Economic Order", *Population and Development Review*, vol. 1, No. 1 (September 1975), p. 96.

[35] *Ibid*, pp. 96–97.

[36] L. Tabah, "The significance of the Bucharest Conference on population", *International Social Science Journal*, vol. XXVII, No. 2 (1975), p. 377.

[37] The closest systematization of this kind of strategy could be found in Ch. E. Lindblom, "The science of muddling through", *Public Administration Review*, vol. XIX (Spring 1959), pp. 79–88.

[38] See "Results of the regional consultations subsequent to the World Population Conference", *Population Bulletin of the United Nations*, No. 8 (United Nations publication, Sales No. 76.XIII.3), pp. 107–124.

[39] See E/CN.11/1208.

[40] See ST/ECLA/CONF.54/L.9/Rev.1.

[41] See E/CN.14/POP/136.

[42] See E/CN.14/POP/135.

[43] See E/ECWA/POP/CONF.2/11.

[44] See ESA/P/AC.5/5 and Corr.1.

[45] *Review and Appraisal of the World Population Plan of Action* (United Nations publication, Sales No. 86.XIII.2). A first version of this publication was submitted to the Preparatory Committee (E/CONF.76/PC/10), and a second one to the Conference (E/CONF.76/4).

[46] The initial set of proposals for recommendations was submitted by the Secretary-General to the Preparatory Committee (E/CONF.76/PC/11). On the basis of the discussions at the Preparatory Committee, a second version was produced by an informal open-ended working group (E/CONF.76/PC/WG/L.1/Rev.1). The final version that went to the Conference at Mexico City was prepared by the Preparatory Committee at its resumed session (E/CONF.76/5).

[47] See *World Population Trends and Policies, 1983 Monitoring Report.* vol. I, *Population Trends* (United Nations publication, Sales No. 84.XIII.10) and vol. II, *Population Policies* (United Nations publication, Sales No. 84.XIII.11).

[48] See "Summary of findings of the Fifth Population Inquiry among Governments: report of the Secretary-General" (E/CN.9/1984/3). A more detailed treatment of Governments' positions is presented in the *World Population Trends, Population and Development Interrelations and Population Policies: 1983 Monitoring Report*, vol. II. *Population and Development Interrelations and Population Policies* (United Nations publication, Sales No. E.85.XIII.2), chaps. XIX–XXIII.

[49] *Report of the International Consultation of NGOs on Population Issues* (Geneva, 13–15 September 1983).

[50] See "Recommendations for the further implementation of the World Population Plan of Action. Recommendations of the regional commissions for the further implementation of the World Population Plan of Action at the regional level: report of the Secretary-General" (E/CONF.76/6).

[51] See "A comparison of the World Population Plan of Action and the recommendations for the further implementation of the World Population Plan of Action", *Population Bulletin of the United Nations*, No. 18 (United Nations publication, Sales No. 85.XIII.6), pp. 1–9.

[52] See Economic and Social Commission for Asia and the Pacific, *Report of the Third Asian and Pacific Population Conference*. Asian Population Studies Series No. 55 (1982).

[53] See "Recommendations for the further implementation of the World Population Plan of Action" (E/CONF.76/6), pp. 5–14.

[54] See *Review and Appraisal of the World Population Plan of Action*, para. 219.

[55] See "Recommendations for the further implementation of the World Population Plan of Action" (E/CONF.76/6), pp. 15–26. For a full text of the report, see ECE/AC.9/2.

[56] See El Colegio de Mexico, *Memorias del Congreso Latinoamericano de Población y Desarrollo* (Mexico City, 1984).

[57] See "Recommendations for the further implementation of the World Population Plan of Action" (E/CONF.76/6), pp. 27–31. For a full text of the report, see E/ECLA/SES.20/G.19.

[58] See "Recommendations for the further implementation of the World Population Plan of Action" (E/CONF.76/6), pp. 33–45. For a full text of the report, see E/ECA/CM.10/14.

[59] See "Recommendations for the further implementation of the World Population Plan of Action" (E/CONF.76/6), pp. 46–56. For a full text of the report, see E/ECWA/POP/CONF.5/15.

[60] Some accounts about the Mexico City Conference can be found in the following articles: R. Atappattu, "A feeling of hope", *POPULI*, vol. 12, No. 1 (1985), pp. 12–16; G. Brown, "United Nations International Conference on Population, 1984", in *Studies in Family Planning*, vol. 15, No. 6, part I (November/December 1984), pp. 296–302; J. Buckley, "All alone at the UN. The Mexico City Conference", *National Review* (14 December 1984), pp. 25–28; P. Demeny, "Bucharest, Mexico City and beyond", *Population and Development Review*, vol. 11, No. 1 (March 1985), pp. 99–106; J. L. Finkle and B. B. Crane, "Ideology and politics at Mexico City: the United States at the 1984 International Conference on Population", *Population and Development Review*, vol. 11, No. 1 (March 1985), pp. 1–28; D. F. Heisel, "The road to Mexico City: preparations for the 1984 International Conference on Population", *Managing International Development*, vol. 1, No. 5 (September-October 1984), pp. 23–44; R. P. Kapoor, "Consensus vindicates Conference", *POPULI*, vol. 11, No. 4, 1984, pp. 27–31; C. B. Keeley, "Population: the gathering crisis", *World View*, vol. 27, No. 11 (November 1984), pp. 4–8; M. Macura, "Guidance for population policies", *POPULI*, vol. 11, No. 4 (1984), pp. 4–12; G. Martínez-García, "Dialogue and understanding", *POPULI*, vol. 11, No. 4 (1984), pp. 32–35; A. V. Nevzorov, "A major international event", *POPULI*, vol. 12, No. 1 (1985), pp. 4–11; F. Sai, "A tremendous success", *POPULI*, vol. 11, No. 4 (1984), pp. 21–26; L. Tabah, "Preparations for the 1984 International Conference on Population", *Population and Development Review*, vol. 10, No. 1 (March 1984), pp. 81–86; L. Tabah, "A turning point", *POPULI*, vol. 11, No. 4 (1984), pp. 13–20; P. D. Willson, "The 1984 International Conference on Population: What will be the issues?", *International Family Planning Perspectives*, vol. 10, No. 2 (June 1984), pp. 43–48; P. D. Willson, "Global politics in Mexico City", *Family Planning Perspectives*, vol. 16 (September-October 1984), pp. 228–232.

[61] The Population Commission, meeting in open-ended session, acted as the Preparatory Committee of the Conference. At its two meetings in January and March 1984, more than 100 countries were represented.

[62] This chapter was the result of ardous negotiations initiated at the Preparatory Committee meeting and its resumed session. An initial version was included as a recommendation in the draft prepared by the Secretariat on the basis of the recommendations from the expert group meetings; it was considered by the Preparatory Committee, and one delegation presented an alternative version. These two versions were submitted to the Mexico City Conference in brackets (that is, as not approved by the Preparatory Committee). While some delegations considered that such recommendation was out of focus in a population meeting, others insisted in its inclusion in the document not only as an additional call for peace and disarmament but also as a request to divert part of the resources currently deployed in military programmes to social and economic development activities, including population. In that respect it is interesting to observe that the total amount provided to population assistance through UNFPA in the past 15 years (a little more than US $1 billion) is equivalent to 15 hours of armaments expenditure at current levels (see R. M. Salas, *Reflections on Population*, New York, Pergamon Press, 1984, p. 9).

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