Health, Population, and Economic Development

International health programs have an important role in promoting economic development and population control.

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No problem in international health is as important or as poorly understood as the complex interrelationship between health, population growth, and general economic development. Most traditional dogmas dealing with these interactions have proved to be oversimplifications. Causal relationships are not straightforward. Instead, they are buried in a complex matrix of multiple causes and feedback interactions. Findings and interpretations which are valid under certain conditions and at specific times may be totally reversed in somewhat changed situations and at other periods. A more valid and consistent conceptualization will become possible only as the interacting forces in the three-dimensional matrix formed by health, population growth, and general economic development are viewed as a whole.

The basic thesis of this analysis is that, in the dynamic equilibrium between the three major components of this matrix, optimum progress occurs when all elements move forward together, the general objective being improvement in the quality of life. Neither economic development nor health of itself is a sufficient goal. Economic improvement or better health can be measured in quantitative terms, such as growth in per capita income or lowered mortality rates. The general concept of an improved quality of life obviously cannot be readily measured. The social components of a better quality of life are benefits in themselves, but, more importantly, they can be used as instruments of change or as means of increasing productivity. Better health is both an objective of and an instrument for development. In this process population growth is an intermediary force of increasing relevance.

In the first section of this article the influences of health programs on population growth are analyzed in terms both of effects on mortality and effects on fertility. For comparison, the influences of other development activities on population growth are also summarized. The next section deals with the influence of health on socioeconomic development through effects on both material and human resources. The third section deals with the reverse effects of population growth on both health and socioeconomic development. The data here are so well known and so generally accepted that a detailed analysis seemed unnecessary. A simple conceptual model is, however, presented. The remaining relationship, the effects of socioeconomic change on health, is, again, not discussed in detail because this has, for so long, been a primary area of concern of public health workers. The final section deals with practical aspects of present planning for population control.

Influence of Health and Economic Development on Population

Until recently, health workers used their ability to reduce mortality as a major criterion of success. Old texts in public health described with pride instances in which health programs contributed to population growth (*1*). Since the hazards of rapid population growth have been recognized, health workers no longer seem proud of their achievements in reducing mortality. Many international health specialists welcomed with considerable relief reports which showed that other socioeconomic factors were primarily responsible for past reductions in mortality and that the effectiveness of mass disease-control efforts had been overrated (*2*).

In the early industrialization of Europe, mortality declined before specific health measures were effectively applied. Today, statistical analysis of data from many countries shows a strong correlation between per capita income per se and decreased mortality. In fact, most programs leading to any kind of development directly produce population growth. Improved agriculture, by providing more and better food, decreases mortality. Better transportation, by reducing the loss of food and decreasing isolation and ignorance, leads to the same result. Improved housing decreases crowding, and the more favorable home environment reduces the spread of communicable diseases. Improved water supply for agricultural, industrial, or other uses not primarily associated with health also reduces the spread of disease. Basic education increases understanding of personal hygiene and of the causes of disease. Mass media help diffuse knowledge and ideas. In some Asian countries child mortality for females is considerably higher than for males, largely because mothers and families take more conscientious care of sons than of daughters (*3*). The quality of a mother's care has been shown to be the most important identifiable factor influencing child health (*4*). Equal rights for women may substantially improve the health of girls and, secondarily, may lead to population growth by increasing the number reaching childbearing age. In Ceylon, after World War I, mortality rates fell approximately equally in the nonmalarious third of the island and in the much-publicized malarious area where mosquito control was dramatically effective (*5*, *6*). In both cases general economic and nutritional improvement were probably the dominant forces.

Even if it were politically possible to discontinue major disease-control activities, mortality would continue its downward trend, though perhaps more slowly. Writers on economic development have questioned whether the slower mortality-rate decline which would occur in the absence of modern health

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measures would be more conducive to economic development than the present rapid shift (*7*). Data have been accumulated which indicate that net population increase will be lower if maximum efforts to reduce death rates and birth rates are made simultaneously. A somewhat higher rate of natural population increase for a few years is better than a lower one for the much longer period that action of spontaneous balancing mechanisms would require.

Attention has been directed mainly to mortality. It must be recognized that the increase in population associated with general development may also be due to an increase in fertility. Such an increase has been described for the more-developed countries (*8*), and a similar increase in fertility is being recorded in several of the developing countries (*9*). Public health programs probably directly contribute to such trends. By decreasing female mortality and the incidence of widowhood, they increase the number of reproductive years in marriage. By reducing the prevalence of diseases which limit reproduction they increase reproductive capacity. The depressant effect on fertility of venereal disease (*10*) and malaria (*11*) is documented. Again, however, it is an oversimplification to ignore other factors in the development process which increase fertility (*12*). Better nutrition increases reproductive capacity by shortening postpartum amenorrhea (*13*) and lengthening the reproductive span (*14*). A community development project in Peru (*15*) and irrigation schemes in the Sudan (*16*) were associated with increases in fertility. The very optimism about the future which is engendered by an increase in per capita income may have the immediate effect of increasing fertility before slower retarding forces, such as education, have a chance to act (*17*).

Numerous and complex cultural values and norms developed as traditional ways of controlling fertility. Any modernizing influence which weakens these norms may increase fertility. Greater participation of women in industry, for example, may encourage bottle-feeding of infants, thus decreasing the prolonged period of lactation which is a major mechanism for child spacing (*18*). The weakening of local customs may diminish the force of taboos on sexual intercourse at specified times. In India, such taboos include almost one-third of the days of the year (*19*). Acceptance of the pattern of stable marriages in Latin America, where unstable temporary unions have been common, may make a woman's exposure to the risk of pregnancy more constant and increase fertility (*20*). The increased fertility observed in several developing countries can only partially be accounted for by improved statistical reporting.

We have made an attempt (Fig. 1) to summarize graphically our impressions of the net effect of individual development sectors on population growth. Each arrow in Fig. 1 represents, by its length, a summation of forces leading to increased or to decreased population growth, or to both. Under special circumstances different results will obviously ensue. The net effect indicated is purely impressionistic and is meant to indicate roughly the quantitative relationships in spontaneous situations where no organized efforts have been made to control population growth. The net effect of better health is to increase population growth markedly, while education contributes the most important net effect toward reducing population growth. As indicated later in this article, quite different results may be expected when these forces are deliberately used to control population growth.

Influence of Health on Socioeconomic Development

It has become fashionable to try to justify health programs in economic terms. This exercise is salutary for health workers in that it leads to more careful efforts to measure cost-versus-benefit returns from health services. The recent tendency of health workers to undertake economic analyses does not, however, mean that there is decreased recognition of the importance of better health for its own sake in improving the quality of human life. Much has been written about the relative importance of health as a consumption item versus its value as an investment. The argument is artificial. The major reason for health programs will continue to be the fact that people insist on, and are willing to pay for, better health as a basic right. Both officials and the public will continue to derive satisfaction from the many quantitative measures of lowered mortality and morbidity which have constituted the bulk of health statistics.

More sophisticated measures will permit definition of additional social and economic benefits of health programs. In the above consideration of the effect of health programs on population growth, attention is directed toward mortality and fertility. In this section, dealing with ways in which better health influences socioeconomic development, attention is directed to lowered morbidity. The fact that morbidity is harder to measure than mortality or fertility adds to the complexity of the analysis. Techniques will be needed for measuring improved health as a positive socioeconomic force (*21*).

An immediate effect of some health programs has been the release of previously unusable material resources for purposes of development. Reduction of a disease which had made settlement of a given area impossible directly increases access to material resources. Some data on malaria have been collected to help justify eradication programs. Because malaria has a clearly recognizable clinical picture and may be distributed throughout a community, it lends itself to the gross analyses which are so satisfying to economists. In Nepal a malaria barrier in the Terai along the southern border had for centuries reinforced the country's isolation. Control measures in the late 1950's initiated a wave of local migration from the overpopulated hillsides, leading to economic and social development of the country as a whole (*22*). In Ceylon, eradication of malaria was accompanied by migration from the crowded third of the island to what had been the malarious two-thirds, and to development of that fertile part of the country (*5, 23*). Sardinia was once described as "the hell hole of the Mediterranean" because of the almost universal prevalence of malaria. Since dramatically effective control started, in 1946, it has enjoyed agricultural development, economic growth, and a booming tourist trade (*24*). In the Mexican state of Tabasco, it was only after malaria had been eliminated that major agricultural development could occur (*25*). Similar examples could be given for other geographically defined diseases such as trypanosomiasis and schistosomiasis.

For maximum contribution to economic development, particular attention should be paid to conserving the health of economically active age groups. Increased productivity of the labor force augments returns on other investments. There have been many historical observations, such as those reported by

Winslow (*26*), of the effect of health programs on the quality of the labor force. In the Philippines in 1946 a survey of large enterprises revealed a daily absenteeism of 35 percent, attributed largely to malaria. After initiation of an antimalaria program, absenteeism due to the infection was reduced to between 2 and 4 percent, and 20 to 25 percent fewer laborers were required for any given task than had previously been needed (*26*, p. 22). In the Transvaal and in Natal, malaria control programs decreased worker absenteeism by at least 30 percent (*26*, p. 24). In Southern Rhodesia, an antimalaria campaign reduced absenteeism during the harvest season in the Mazoe Valley from 25 percent to almost negligible levels (*26*, p. 25). In Haiti, where yaws was widely prevalent among the rural population, 35,000 to 55,000 persons were treated monthly in a joint World Health Organization–UNICEF campaign. It was estimated that 100,000 incapacitated persons returned to work (*26*, p. 30).

It has become apparent that, where health conditions are worst, relatively simple and low-cost health programs can produce dramatic lessening of debility and disability of the labor force. In these situations major increments in productivity are most readily seen. It is precisely such programs, however, that cause the dramatic reductions in mortality which precipitate population growth. Whereas lowered morbidity is usually most evident in the increased productivity of working adults, the concomitant lowered mortality effect is more apparent in infants. There is no common standard of measurement which permits comparison of the essentially qualitative morbidity effects with the more quantitative mortality effects, from which a cost-benefit ratio may be derived. The mortality changes are more dramatic and easier to measure, and they now receive primary attention because of concern about population growth. However, in programs such as those against malaria, schistosomiasis, hookworm, malnutrition, yaws, trachoma, leprosy, tuberculosis, filariasis, and onchocerciasis, the net economic impact of lowered morbidity —through potential increase in productivity—almost certainly outweighs the demographic impact of reduced mortality.

Is there any way of determining quantitatively the increased productivity required to outweigh the negative economic effect of population increase? So far no actual data have been gathered, but preliminary estimates have been made on the basis of econometric models. Mushkin has estimated (*27*) the probability of occurrence of a gain in gross national product as a result of eradication of disease. She assumed (i) that a disease, such as malaria, affected 80 percent of the population of an agricultural area, prevalence being uniform among adults and children and among men and women, and (ii) that disability and debility reduced the productivity of agricultural workers by 30 percent during a 3-month period when the disease was at its peak. The output loss would be 6 percent for the agricultural sector. If agriculture accounted for one-third of the total output, elimination of the productivity loss attributable to this specific disease would increase the gross national product by 1.0 percent.

If the disease exerted its debilitating effect for the whole year rather than for 3 months, as would be the case, for instance, for schistosomiasis, the increase in national output which would result from its elimination could be as great as 4.0 percent. (Measures for controlling schistosomiasis are, unfortunately, not yet as effective as those for controlling malaria.) Enterline and Stewart estimated (*28*) that an increase in life expectancy at birth from 30 to 32.5 years would require an increase of 0.8 percent in output per worker to maintain per capita income, a marginal capital-output ratio of 3 to 1 being assumed. Using this estimate Mushkin concluded that, where eradication of a disease increased life expectancy at birth in the country by 2.5 years, gains in output due to reductions in morbidity would exceed the 0.8 percent increased productivity required to maintain living levels.

The economic value of reductions in morbidity depends mainly on other considerations (*29*). Most important is the extent to which expanding economic opportunities put to use the increased productive capacity of workers. As already noted, the same programs which decrease mortality and morbidity often also make previously unusable material resources available. Where such a synergistic effect occurs, the economic benefit is usually great. In postwar Ceylon, for example, the opening up of fertile areas for cultivation, in combination with increases in manpower resulting from decreased morbidity more than balanced any negative effect of population increase (*6*).

According to classical economic theory, however, in agrarian societies such increased productivity and expanded labor force will not be readily absorbed because unemployment and underemployment are already at high levels. Recent work has all but demolished this dogma. It is currently estimated that disguised unemployment probably does not exceed 5 percent of the labor force (*30*). What is more, recent comprehensive surveys of Indian agriculture show no labor surplus (*31*). The small land holdings are the most productive, a major factor in output being maximum utilization of family labor. Most surprising was the inability to demonstrate seasonal unemployment; the work-year of farmers in several states ranged from 266 to 329 days per year. Even where seasonal underemployment does exist, special climatic conditions tend to cause diseases such as malaria to strike most severely during the planting and harvest seasons. Even though unemployment may be high during the rest of the year, a severe labor shortage may occur during these critical seasons. The reports of apparent labor surpluses in agrarian regions appear to be spurious, since idleness during slack seasons has little bearing on total annual productivity (*32*). In British Guiana it was the Sugar Producers Association, not the government, which started malaria control in the 1940's, because a seasonal shortage of labor meant that many estates were having to close down (*25*). The malaria program in this case increased the ratio of the *effective* labor force to the population. An even more clear-cut example comes from the impact of the 1918–19 influenza epidemic on Indian agriculture. A more isolated and intensive single episode that would hit only human resources can scarcely be imagined. Nine percent of the total labor force died. This was followed by a 3.8-percent decline in the acreage sown, a decline which would scarcely have occurred had there been in fact a labor surplus. Furthermore, the decline in acreage was clearly highest in provinces which had the highest death rates (*33*).

Another important consideration is the fact that a healthier population is more likely to include individuals capable of growth-contributing activities—in Leibenstein's terminology (*34*), "growth agents": the entrepreneur who originates new investment opportunities,

the inventor of new production processes and techniques, the discoverer of new resources and commodities, the teacher of new skills, the learner of new skills, the disseminator of useful ideas, the saver. The factors which lead to attitudes favorable for the creation and spreading of knowledge, for accepting innovations, for acquiring new skills and for developing entrepreneurial perceptiveness are elusive and usually ignored in economics. Yet they are essential to the development process (*35, 36*). The required personal qualities are certainly multiple and probably have a synergistic action (*37*). Whatever the other conditions are, however, a minimum level of health must be essential. Galenson and Pyatt (*38*) of the International Labour Office analyzed some factors contributing to the quality of the labor force. Noting great variations among countries in the degree to which a given investment increased economic growth, they analyzed qualitative differences in the labor force. The relationships of four factors were measured: education, health, housing, and social security. Health, and more specifically per capita caloric consumption, proved to be the single factor most closely related to the observed differences in economic growth.

Innovative thinking is required in order to make use of labor to stimulate economic growth. Labor can be imaginatively used as an investment for social benefit rather than as a drag on progress. An example is seen in Ceylon (*39*), where social services, including health services, have for many years been at a higher level than in many other countries at comparable stages of development. Per capita income in Ceylon is approximately $150 per year; the gross national income increased each year by about 2.5 to 3 percent, essentially the same as the 2.8 percent annual increase in population. The level of unemployment and disguised unemployment has been seasonally high, especially in rural areas. Since 1948, the work potential of the healthy unemployed has been tapped by the Rural Development Department of the Ceylonese Government by means of the donation of labor and services for the common good, or "Shramadana" movement. Voluntary contributions of free labor have substantially helped community projects such as the construction of village roads, schools, textile centers, latrines, rural housing, and minor irrigation works. Particularly since 1960, the movement has systematically harnessed under-utilized manpower and has provided an inexpensive source of new capital formation. The psychological attitudes favorable to development which volunteer work promotes are an added benefit.

Influence of Population Growth on Socioeconomic Development

Economists generally have concluded that a moderate rate of population growth has been almost a precondition for development. Likewise, too rapid a rate of population growth is known to be damaging to the economy (*40*). The well-known negative relationships between excessive increments in population and the various indices of development, ranging from percentage increase in per-capita gross national product through the ratios relating population to such items as schools, hospitals, and doctors, are so familiar as to require only the briefest mention. When the population denominator grows too rapidly, progress in all the social numerators falls behind. The great lack, which economists and social scientists can presumably do most to fill, is a scale indicating, for each social and economic situation, the threshhold beyond which favorable effects of population growth shift to increasingly negative influences, and progress is overwhelmed by people.

Potential Use of Health Services in Modifying Population Growth

Population control has become too critical an issue to wait for the chance operation of spontaneous, self-adjusting mechanisms. In the past, population size was responsive to the wide range of social forces shown in Fig. 1. Most of these self-correcting mechanisms were indirect and therefore acted only after a significant lag. As is so often true in biological and social phenomena, an excessive lag in response tended to lead to overcorrection and damaging cyclic fluctuations. In planned change, adjustments should be made early enough to prevent excessive cyclic shifts.

Population control can be made more effective through better understanding and planned use of relevant social forces. In the spontaneous and uncontrolled situation (Fig. 1), better health contributed more than any other factor to increasing population growth. The balance is completely different when the same development sectors are impressionistically charted according to their potential usefulness in population control (Fig. 2). Health now makes the maximum contribution. Let us consider some of the reasons for this dramatic change in net effect.

Parents will not stop having babies until they have some assurance that children they already have will survive. Social and cultural norms are adjusted to produce the minimum replacement number of two children per family when allowance is made for the mortality patterns of past generations. Religious beliefs tend to reinforce such cultural norms. Hindu families expect to have at least one son survive longer than his parents, to assume important responsibilities pertaining to their funerals (*41*). In most agrarian societies security in old age depends on one's having surviving children, especially sons. Econometric models have shown the high number of births necessary to assure survivorship of sons either to age 65 (*42*) or until after the death of the father (*43*) under conditions of high infant and child mortality.

Fertility and infant mortality have always been highly correlated. Increasing evidence indicates that a lowered infant mortality must antedate lowered fertility (*44*). Parents will be encouraged to accept family planning if they are satisfied that health measures will provide the number of surviving children they want (*45*).

There is little prospect of fertility control being accepted where high mortality and morbidity make life so uncertain that the only faith in the future the individual can have is faith in an afterlife. Only as reduced mortality and morbidity provide some physical security can concepts such as planning, saving, or investing for the future have meaning, whether they are applied to one's own family or to the whole society. Improved levels of health encourage an orientation toward the future which is as essential for family planning as for planning other daily activities (*46*). The fatalism which slows the whole modernization process also delays acceptance of birth control. Mass disease-control programs have unique ability to provide rapid and dramatic demonstrations that change is possible and

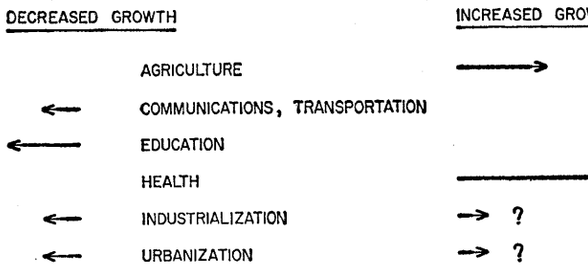

Fig. 1 (left). Spontaneous net effect of selected development sectors on population growth.

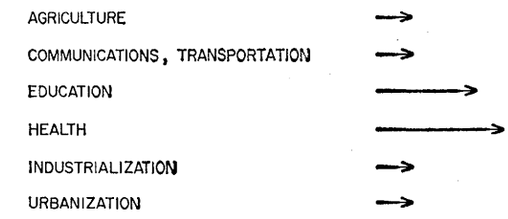

Fig. 2 (right). Potential influence of selected development sectors in promoting successful population control.

desirable. Spraying for mosquitoes rapidly reduces the prevalence of malaria. A few drops of an antibiotic in children's eyes promptly give tangible evidence that trachoma and conjunctivitis need not be part of growing up. The disfiguring lesions of yaws seem to melt away after injections of penicillin. Vaccinations convincingly prevent several dreaded diseases. Health programs can start the process of social education and increase people's willingness to take their destiny into their own hands, thus encouraging an orientation which is as necessary for control of fertility as for deciding to use a new type of seed, improving one's own house, or seeking to learn any new skill.

Many newly independent countries still associate a rapidly growing population with power and national prestige. Fertility control is then regarded as a device by which developed countries attempt to emasculate less-developed countries. The inevitability of demographic trends will eventually convince even the most nationalistic leaders. Until countries spontaneously ask for help with population control efforts, pressure from outside can only have a negative effect. Better statistics may, of course, accelerate such spontaneous recognition of the need for help.

For the individual, strong traditional associations continue between notions of adulthood, virility, proving one's worth in the world, and having many children. Marked geographic variations in readiness to accept family planning can often be related to intrinsic features of particular political traditions and cultural heritages. Where a combination of social and economic pressures has already led to some modernization of attitudes, the demand for control of fertility tends to be greater.

As pointed out by Taeuber (*47*), the dramatic decline in population growth in Japan can be attributed to appropriate preconditions. Fertility control programs in Taiwan and South Korea also developed within the context of a fair degree of literacy, some urbanization, a higher-than-subsistence living standard, and political events which had shaken faith in traditional ways of life. Most important, the health services were relatively highly organized. Even in these countries, initial successes in family planning are reaching a plateau and further activities will have to be even more health-centered than has been the case in the past.

Where modernizing influences are weak, the strong cultural support for high fertility continues to prolong the demographic lag after general socioeconomic improvement and health measures have produced a significant decline in mortality. In these societies, the limited demand for birth control services comes from the women already burdened by a "too large" family, who can be found in any society. These women are nearing the end of their reproductive years and have already made more than an average contribution to population growth. They are ready to do anything to stop having children, and their future fertility probably would not be high even in the absence of birth control services. The deceptively rapid initial acceptance of contraceptives in any program is due to these women switching eagerly to any new method that is offered.

How can family planning be introduced where it is among the first modern-day influences in a traditional rural culture? Missionaries, when faced with a similar problem, often chose medical services as a means of gaining acceptance. The fact that curative services win almost immedate acceptance suggests that an activity which is as little understood by villagers as family planning will be most readily accepted if it is included in a larger health program. Various field trials support this view.

The Singur project is an example. In this small rural town north of Calcutta the teaching health center of the All India Institute of Hygiene and Public Health is located. A family-planning program was superimposed on a local health services program which had been running more or less successfully for 20 years. Continued contact over this period had progressively built confidence and rapport between the inhabitants and health personnel. Acceptance of innovation was cumulative. Even though the only methods presented were the rhythm method, coitus interruptus, and the use of foam tablets, the birth rate was lowered from 45 per 1000 population in 1956, before the study, to 37 per 1000 in 1961, while in the control areas the decrease was only to 43 per 1000 (*48*). The fact that this difference then disappeared, due to decline in the birth rate in the control villages, probably indicates that the long-term effect on birth rate of the general health program was equal to that of the intensive family-planning program.

The experience of a family-planning pilot project in rural Ceylon was similar. The program was built around Family Welfare Centers where prenatal, postnatal, and child welfare clinics had been operating for many years. Practically all pregnant women attended the prenatal clinic, which provided an opportunity for preliminary discussion of family planning. Supplies and further information were given at the postnatal clinic. The birth rate dropped from 31 per 1000 in 1959 to 20.4 per 1000 in 1964 (*49*). Because the most notable decline in age-specific rates was among women between the ages of 25 and 35, it is probable that the lowered rate resulted directly from the project. The methods presented were diaphragm, foam tablets, rhythm, and condom.

In contrast to these two studies, the Khanna Study in the Punjab, India

(*50*), is an example of an attempt to introduce family planning without the preexisting base of a well-established general health program. A large staff made a real effort to gain the confidence of village people. The contraceptive method presented was use of foam tablets. There was much verbal acceptance, and the results at first were encouraging, with up to 40 percent of the eligible wives accepting contraception. Yet after 2½ years of sustained effort, only 17 percent of the couples were actually using the tablets. Whether because effective use of contraception was minimal or because the women using the method were only substituting foam tablets for methods previously used, there was no effect on the birth rate.

Other examples could be cited to show that with the relatively inefficient traditional contraceptive methods, which require a high level of continuing motivation, birth control has a better chance of acceptance when it is part of a general health program which people trust. We make this statement despite recognition of the fact that, once utilization is established, use of such methods as foam tablets and condoms does not require medical examination or supervision and the needed materials can be sold through regular marketing channels.

With development of the oral pill and the intrauterine device (IUD), methods have become available which promise to reduce the birth rate more rapidly. The IUD is particularly promising for mass use because it does not require repetitive use. These pills and devices cannot be obtained through regular commercial channels and require at least minimum medical services. The intrauterine devices have to be inserted by a physician or perhaps by a trained nurse or midwife, and the pill should be taken under medical supervision. Thus, the doctor, nurse, or midwife who can gain the people's confidence by helping in moments of physical need can also talk with them about preventing pregnancies and can personally provide the service. The major limitation on wide acceptance of IUD's is the fact that the small fraction of women who have complications tend to talk more than the women who don't; this negative publicity can be countered only through adequate follow-up and care.

Basic health services will probably continue to be important in family planning because the several most promising new contraceptive methods being studied in research laboratories also will require at least minimum medical supervision. Further research on hormones offers hope because controlled interference with the sequence of hormones required for the reproductive process offers multiple possibilities. Estrogen antagonists may interfere with normal passage of the zygote or with priming of the endometrium. Compounds which interfere with progestational changes may lead to methods which are effective until about the time of the first missed menstruation, when motivation to avoid pregnancy is probably particularly high. Research in immunology is directed toward inactivation of gonadotrophins and active immunization with sperm or testicular antigens (*51*). Such methods will probably require continuing medical supervision, which may have to be even more sophisticated than that now required for the pill and the IUD.

Health education has a unique role as a vehicle for family-planning information and can be directed at important target segments of the population. For female methods of contraception, women in the reproductive ages are the obvious target group. Especially where birth rates are high, the great majority of women are either pregnant, in the postpartum period, or the mothers of young children. Women before, during, or after pregnancy constitute the largest single group visiting local health units (*52*). As they come seeking medical care, they are a willingly captive family-centered audience. The high cultural value placed on children in their society can be turned into an asset for fertility control. Child-spacing can be presented as part of a comprehensive child health program. This process should begin during pregnancy and continue up to the postpartum period, when contraception can be started. Proof that spaced children are healthier children can be based on simple demonstrations from their own and their neighbors' experiences. To make this type of approach applicable on a national scale, more research is needed to determine what minimum level of maternal and child care will have the greatest impact in promoting acceptance of birth control.

In male-dominated societies men must also be reached. In many countries family planning can be included in the army's program of health education, as is being done in Turkey (*53*). Most countries have workers' insurance programs through which the labor force can be reached. In Chile, the employees' medical insurance program includes contraceptive services for the stated purpose of preventing induced abortions (*54*).

Lastly, if fertility control is to become an accepted social ideal in balance with death control, the subject must be discussed in schools. Appropriate health education must be introduced at this crucial level.

The various social and economic aspects of life can scarcely be separated. While a minimum health level in the community and minimum medical services are probably necessary preconditions for acceptance of present methods of family planning, the most successful programs are likely to include advances on many fronts. Research is needed to delineate which advances are most necessary, together with more projects of the type developed in Comilla, East Pakistan (*55*). With community development as a point of departure, the concept of family planning is introduced to women as one of many modernizing influences—along with instruction in reading and writing, home sanitation, child and maternity care, gardening, and the prevention of accidents. Local indigenous practitioners and midwives distribute foam tablets and condoms. Such measures will help us learn the balance between health care and general development activities which is appropriate to specific types of communities and likely to produce a favorable response to fertility-control efforts.

Summary

Health as a basic human value is particularly important to people in the developing world. Rates of economic development lower than had been hoped for and ever more steeply rising population growth have precipitated a reaction against public health programs. Among economists, agriculturalists, and even health professionals the philosophy arose that one should "hold back" on using modern weapons against disease because they are "too effective." To satisfy the recognized popular demand, simple and relatively ineffective measures of curative medicine could be substituted. It was said that the emphasis should be, instead, on agricul-

ture, community development, education, and industrialization and that family planning should be pushed as a separate program. Documentation presented here sharply challenges such a point of view. No segment of the total development process can be effective without the other sectors.

Among the major activities essential to socioeconomic development, the large-scale, effective, and relatively cheap public health programs have contributed and can continue to contribute substantially to human resources. Dramatic thrusts of economic development have occurred when the amount of land available for cultivation or the size of the labor force has been sharply increased by removal of a health bottleneck through a program such as malaria eradication. Even where there is seasonal underemployment, improvements in health and other social and economic changes can be synergistic, so that increased human resources and opportunities for employing these resources can develop together. Successful health programs tend to produce qualitative improvements in general attitudes, such as recognition that change is possible, and the innovative thinking and action that cannot be expected of the sick and debilitated. Such attitudes tend to generate the conditions necessary for economic growth. In many instances, these positive effects of health programs on development have outweighed the much-publicized negative influence of population increase.

Population growth results from the whole complex of modernizing influences. In the past it was caused more by general economic development than by health services. The great advantage of modern health programs is the fact that demographic effects are becoming direct, selective, and measurable rather than being secondary, uncontrollable, and cyclic.

Increasing evidence shows that health service may be indispensable for reducing population growth. A minimum level of health seems to be necessary for acceptance of the idea and practice of limiting or spacing births. Parents need assurance that children already born will have a reasonable chance for survival. In addition, readily accessible minimum health facilities are probably essential for providing modern contraceptive information and materials.

Maintenance of health activities at a high level in developing countries should not be justified only on humanitarian grounds. Sound demographic, economic, and scientific evidence indicates that health programs promote economic development and directly stimulate the demand for, and practice of, family planning.

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