

Population and Nutrition: A Case for Integration

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In operational terms, effective nutrition services can increase health worker credibility with mothers and increase their receptivity toward family planning. Among other synergistic program relationships, high IUD removal rates are related to nutritional anemia in women which could be corrected by nutritional supplementation. Finally, operating efficiencies might be attainable in some instances through the use of common personnel and facilities.

Integration, although desirable in many cases, faces several barriers: attempts to maintain separate programs in order to preserve independent institutional prestige and power; unequal priority assignment to the different programs; the lack of integrated approaches by international funding agencies.

Additional information would be useful on attitudes in the parental procreation decision-making process, managerial requisites of integrated delivery systems, biological and physiological linkages between fertility and nutrition, and impact assessment of integrated programs.

Two of the most critical problems facing low-income countries today are widespread malnutrition and burgeoning populations. Programs have been mounted to attack both of these interrelated problems, but little has been done to coordinate and integrate these efforts.

In many situations there appears to be strong rationale for such integration. Both are new programs trying to establish their places on the national development agenda. Population control is more readily justified by economic criteria while nutrition is more socially and politically acceptable. Their fusion can achieve a mutually reinforcing complementarity. There also exists a series of relationships (with varying degrees of evidential strength) among fertility, family size, and malnutrition: smaller families result in better nutrition which reduces malnutrition-related mortality, thus improving child survival probabilities and, in turn, enhancing family-planning motivation.

In a recent conversation with an executive of a foundation involved in family-planning activities, we inquired about the organization's interest in programs jointly addressing population and nutrition. He replied that the foundation has no interest in nutrition, but was interested in finding ways of making family-planning programs more effective.

Shortly thereafter we asked a nutrition-planning body in a Latin American country whether it might be worth considering a joint delivery system of nutrition and family-planning services. The group responded negatively, saying that successful nutrition programs are difficult enough to bring about and shouldn't be saddled with the additional burdens of a population-control program.

These comments are not atypical of the attitudes of many individuals and organizations operating in the fields of nutrition and population and reflect the significant gap in understanding and interaction which frequently separates them. Like professionals in every field, they tend to stand guard over their bailiwicks and view with suspicion any attempt at encroachment from outsiders. There are, of course, exceptions, and a few projects have genuinely attempted to bridge this disciplinary gap,¹ but these efforts usually have been relatively limited in scope and resources.

In this paper, aimed primarily but not exclusively at the planner, it is suggested that the complementarity of population and nutrition objectives and programs argues for an integration of inputs in some situations,² and that high research priority should be given to determining specifically the nature of such integration.³

The desirability of a closer interface between population-control efforts and nutrition-improvement programs stems from four existing or potential relationships.

1. Both population and nutrition are relatively new policy areas attempting to establish themselves as development priorities and to integrate themselves into broader national planning.
2. Evidence from various parts of the world suggests important relationships between family size and malnutrition and between malnutrition-related child mortality and high fertility.
3. The complementarity of program inputs suggests that their combination often would increase the effectiveness of both efforts.
4. Joint population-nutrition delivery systems can achieve important operating efficiencies, particularly given the similarity of program recipients and beneficiaries.

The paper examines each of these relationships and then attempts to identify operational research relevant to the effective integration of nutrition and population programs.

¹An important example is the Rural Health Research Center in Narangwal, India, affiliated with the Johns Hopkins University.

²There are, of course, many nutrition programs (e.g., food fortification, plant breeding, agricultural price policies) and some population activities which don't lend themselves to such interaction. The discussion here refers primarily to those population and nutrition efforts carried out in an institutional setting.

³Many of the comments made here would argue for inclusion of public health inputs as well, or at least of selective aspects of public health directed primarily at young mothers and children. Such inclusion is important, and is implied in the discussion which follows.

Establishing New Policy Areas

Unlike more established development programs (e.g., agricultural and industrial development and education), population and nutrition are relatively new policy areas in developing countries. Both have considerable flexibility in the form they assume as programs, and both are in need of sizable government and budgetary support. In this regard each might be strengthened by some degree of association with the other.

Population programs today, while better supported than nutrition activities, still are neither universally accepted nor adequately funded in most countries. As indicated in Table 1, fewer than half of the developing countries (although these included today's heavily populated countries) had an antinatalist policy or sizable family-planning program by 1970.⁴ Of the 14 countries with major programs, only two (India and Pakistan) allocated over 1 percent of their national budgets to population control.⁵ With respect to nutrition, about 100 low-income countries engage in some form of child feeding, but fewer than a half dozen have formal national nutrition objectives, policies, and programs.

TABLE 1

Governmental Positions on Family-Planning Programs and Policies—1970

	Developing Countries	Population	
		Millions	Percentage
Official antinatalist policy and family-planning programs	24	1,838	72
No official policy but support of family-planning programs	23	213	9
No policy or support for family-planning programs	55	491	19
Total	102	2,542	100

Source: Based on The Population Council (1971: Table 3).

One reason these programs have not fared better at the national level is their newness per se. The dynamics of population and nutrition

⁴A report from The Population Council (Stamper, 1973) reveals that, of 70 developing countries covering 45 percent of the world's population, only 27 countries recognize any population problem in their development plans and only 18 countries have explicit policies and programs in these development plans to reduce fertility.

⁵While India allocated 49 percent of its health budget to family planning, population programs in nine of the other 13 countries surveyed received less than 4 percent of health outlays.

programs are still relatively unfamiliar to government planners, who are generally economists, lawyers, or engineers by training. National planning bodies seldom include demographers or nutrition personnel, and there is an understandable reluctance to venture deeply into these uncharted waters, particularly when other important and more familiar sectors make claims on the same resources.

In building an economic case for accelerated investment, population advocates have a less difficult problem than nutritionists. Most basically, the case for population is increased per capita income resulting from lower birth rates as national income is spread among fewer people. Although the planner may not always respond to notions of net discounted value of averted births, he will see the obvious savings in stabilized capital outlays for schools, health facilities, transportation systems, and other forms of social infrastructure.⁶

The nutrition advocate orients his case toward human capital formation, postulating that malnutrition among adults reduces physical work capacity, and that malnutrition among young children may result both in physical stunting and decreased learning capacity. In both cases future labor productivity is reduced. It also is argued that investment in nutrition boosts the effectiveness of other development sectors, particularly public health, by reducing the demand for curative medicine, and education through increased mental capacity (Selowsky and Taylor, 1973).⁷

While nutrition consciousness has increased significantly among planners in many countries, expenditures still represent a tiny fraction of what is needed. In part this is because most planners and economists still regard nutrition expenditures as consumption (a taboo in traditional development models) rather than investment. In addition, governments often view the malnutrition problem as too unmanageable an undertaking and see no inexpensive solutions.

Although easier to justify in economic terms, population programs have encountered more serious political obstacles. Population control and artificial contraception are, for many, emotionally charged issues and often encounter strong resistance. In some cases there is a religious basis for this opposition. In others, political spokesmen attri-

⁶For a thorough discussion of the measurement techniques for quantifying the economic impact of birth-rate reductions see Robinson and Horlacher (1971).

⁷Wray and Aguire concluded from a survey of 1,094 children under six years of age in Colombia that "children from large families are more likely to be malnourished than those from smaller families." Also, see Ramathibodi Hospital Faculty of Medicine and Disease (1969); Wyon and Gordon (1962); Levinson (1974).

bute genocidal motives to national governments or to bilateral assistance agencies promoting family-planning programs. Nutrition programs, by contrast, are generally much less controversial, and in some countries, notably Chile and India, have been aggressively advocated in political party platforms.

Even though population and nutrition programs have been limited in magnitude thus far, they show every promise of commanding increasing shares of national budgets in the future. Domestic resources are likely to be augmented by a greater flow of population and nutrition assistance from international agencies, which already have played an important catalytic role in drawing attention and resources to these problems. Thus, it is important at this time to make rational decisions about the direction of these programs and about any interaction that should take place.

Aside from the often increased effectiveness of combined inputs, which is discussed below, the foregoing comments would suggest that government support for integrated programs may exceed that given for population and nutrition when pursued independently. Population provides a more compelling economic rationale than nutrition, while nutrition provides governments with great political capital and makes population programs more acceptable.

The Linkages:

Family Size — Malnutrition — Mortality — Fertility

An important justification for population-nutrition program interaction is their mutual reinforcement of program objectives. Smaller families result in better nutrition, which reduces malnutrition-related mortality, in turn enhancing family-planning motivation.

Looking first at the effect of increased population on malnutrition, it is reasonably clear that larger family size exacerbates nutritional status. Not only a given quantum of resources but also a limited availability of time and attention must be divided among a larger number of children. As a result, family size appears to have important effects both on food intake and morbidity, the direct determinants of malnutrition.

With respect to food intake, larger families lead to decreased per capita consumption unless the deficit is made up by additional income. With less food to go around, the vulnerable infants and young children

usually suffer most. (Gospalan, 1968) However, it is also likely that the nutritional status of mothers is adversely affected, especially high parity women who generally are more prone to anemia; poor maternal nutrition, in turn, contributes to complications in pregnancy, delivery, and puerperium (Siegel and Morris, 1967). Lactation can also be restrained, thus reducing a critical protein source for infants as well as removing the contraceptive effect present during lactation (Salber et al., 1965). As regards health, evidence from India, Colombia, and Thailand suggests that the general health status of children, and particularly the prevalence of diarrheal disease, is, to an important extent, a function of family size. This might indicate both that the spread of infection is facilitated by the crowding found in densely populated households, and that parents in a poverty situation often provide less care to later-born children (see Wray, 1971).

While population pressure aggravates nutritional status, the reverse also takes place, thus creating a vicious circle. Malnutrition has been cited as "the biggest single contributor to child mortality in the developing countries" (Cravioto and DeLicardie, 1970:25). In Latin America, for example, malnutrition has been identified as a major cause of 57 percent of the deaths of children aged one to four as well as "a contributor to the immaturity responsible for half to three-quarters of the deaths in the first month of life" (Berg, 1973:4). There is some evidence that the malnourished state of the child is related to virtually the entire child-mortality differential between low-income and industrialized countries. A study by Sloan (1971:58) of mortality data in Puerto Rico, Mexico, Costa Rica, and East Pakistan (Bangladesh) concluded that "the most clearly evident relationships are the effects of female literacy and nutrition on mortality of infants and pre-school children . . . sanitation and housing variables provide no explanation of variation in the mortality." The often cited five-year INCAP study of three Guatemalan villages (Scrimshaw et al., 1968) found that preschool child-mortality rates decreased more, both relatively and absolutely, in the village where supplementary feeding alone was used than in the control village or the village where various public health care measures and medical care services were employed.

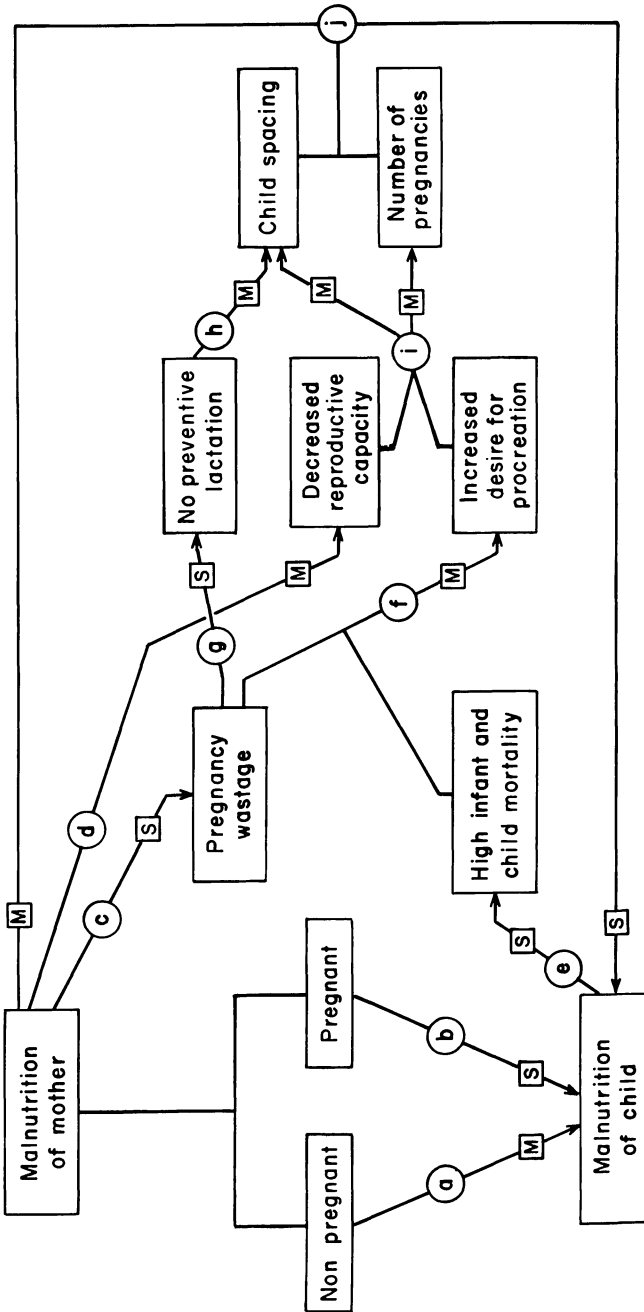
With malnutrition so important a contributing factor to child mortality, some might contend that improved nutrition and the resultant decrease in deaths, although desirable from a humanitarian point of view, would simply exacerbate the population problem. In fact, the limited evidence available suggests the reverse.

A major study carried out by Wyon and Gordon (1971), provides

considerable insight on this mortality-fertility relationship. This study, carried out in rural Punjab in North India between 1953 and 1959 with follow-up investigation in 1969, proposed to test the effectiveness of existing contraceptive methods in changing birth rates in a rural, low-income society and to identify other factors which influence population dynamics. The authors reported (Wyon and Gordon, 1971: 197, 200, 206) that their "findings leave no doubt that loss of children by death was a powerful influence controlling family size . . . Families apparently replaced children who died, or limited further births when they had the number of surviving children that satisfied them . . . The conclusion seems clear: until they have good assurance that live-born sons, and daughters, will survive, couples in Khanna are unlikely to be interested in restricting the numbers of their children beyond their present practice." Wray (1972), in an excellent survey of similar studies, cited research by Hassan in Egypt indicating that a mother who has lost at least one child will desire a larger number of surviving children and will have more subsequent births than women who have not lost children. Another study by Schultz and Vanzo in Bangladesh revealed a direct relationship between the death of a child and the probability of a birth in the same family during the subsequent year (Wray, 1972). Harrington (1971) presents similar data for West Africa which reveals that early experience of child loss tends to inflate fertility behavior.

Even those who argue that decreased child mortality will lead to lower fertility concede the inevitability of some lagtime for reproductive-age parents to recognize the lower mortality in the community and to relate this to their own procreative situation. The question is the length of the lagtime. Until recently it was assumed that the lag period might be a generation. There is some evidence, however, that at least in certain situations the period may be considerably shorter. Wray cites studies in Turkey and Puerto Rico that show a three-year lag period. Schultz's (1971) analysis of data from Taiwan, indicates a lag of two to four years.

These multifaceted and circular relationships between malnutrition and fertility are presented in Fig. 1. A rough approximation of the strength of existing research evidence is also indicated in the diagram. Starting with the malnutrition of the mother, line *a* suggests that non-pregnant women in an anemic status will have lower energy stores and thus be less apt to provide physical care and social stimulus which in turn can lead to or exacerbate a malnourished condition. While research to date is incomplete, studies on relationships between malnu-



Key: Strength of existing research evidence on relationships

[S] Strong [M] Moderate

FIG. 1. Nutrition-fertility relationships.

trition and mental development suggest that environmental and particularly parental stimulus is critical to a child's cognitive development. Line *b* indicates that malnourished pregnant women more frequently give birth to lower-weight babies who in turn have a higher incidence of malnutrition and mortality. Lines *c* and *d* indicate that poor maternal nutrition increases the likelihood of pregnancy wastage and decreased reproductive capacity. Line *e* is the relationship between infant and child malnutrition and higher mortality. Pregnancy wastage and infant mortality combine to create an increased desire to have more offspring (line *f*), i.e., the "child survival hypothesis." Pregnancy wastage means no lactation (line *g*), thereby losing the contraceptive effect of delayed return of ovulation and menstruation and thus narrowing child spacing (line *h*). Decreased reproductive capacity (due to irregular anovulatory menstruation) would tend to reduce the number of pregnancies and increase child spacing, while the increased desire for procreation would have the opposite effect (line *i*). Finally, the net increase in family size and the narrowing of child spacing take their toll on the nutritional status of the mother and her children through decreased per-capita availability of resources, and through further weakening of the mother's condition (line *j*). Of course, the diagram is not an isolated phenomenon; e.g., many other factors influence the malnutrition of mother and child and the procreation decision-making process.

While the complementarity of nutrition and population program objectives suggested by these relationships does not argue for integration per se, it does underline the need to pursue both programs even if the community or country concerned is only interested in one of them.

Complementarity of Program Inputs

In a practical, operational sense, the integration of population and nutrition inputs may increase the effectiveness of both. Many population programs around the world have run into difficulties because services provided were limited exclusively to loop insertions and vasectomies, sometimes pursued in a heavy-handed manner in order to meet program quotas. Often the result has been to antagonize potential recipients and to decrease the effectiveness and morale of the workers. A center capable of caring for a young mother's children with demonstrable results through better nutrition will be in a far better position to successfully disseminate the family-planning message. The Narangwal

Rural Health Research Center in India (Berg, 1973:36), for example, "found that with nutrition services 'the dramatic improvement in a child with marasmus has more impact on general rapport and relationships with village families than anything else which we have tried to do in active medical care. The change in the children is so obvious, and the whole process is so readily understood, that such efforts do lend considerable credibility to what our village workers say on other matters.' "

In addition to increasing credibility, ongoing nutrition services may facilitate acceptor follow-up. Dropout rates in family planning programs are one of the most serious problems. It has been demonstrated that mothers are most receptive to family planning advice during post partum; however, the favorable psychological milieu subsequently disappears and often contributes to the cessation of contraceptive practices. More frequent contact with the mother might help to reinforce the desirability of contraception. Because nutrition programs generally have such high patient-contact frequency (unlike the three- to six-month intervals of family-planning programs), they might be used to reiterate the family-planning message and thus help reduce the acceptor dropout rate.

There is other specific interaction of inputs relating to contraception per se. High removal rates of intrauterine devices may be largely related to nutritional anemia in women, which could be reduced by iron and vitamin supplementation at an integrated center (Wishik, 1972). Careful monitoring of nutrition and health status at such a center could decrease the likelihood of vaginal bleeding (which further exacerbates malnutrition) from IUDs or of reduced lactation (and hence decreased infant nutrition) which can accompany the use of birth control pills high in estrogen (Chopra et al., 1970).

Maternal education concerning breast feeding is an important aspect both of family-planning and nutrition programs. From the nutrition perspective, early weaning denies the child a high-quality protein source which is difficult to replace for low-income families. The result is a high incidence of nutritional marasmus and subsequent child mortality. From the family-planning viewpoint, as noted earlier, nursing lengthens the time of anovulatory cycles after parturition, and thus serves as a partial contraceptive mechanism. This could help avoid closely spaced births which often result in lower birth weights, and which in turn are associated not only with high child mortality but also with a greater incidence of neurological and physical handicaps than is found at normal birth weights (Frisch, 1971). Educating pregnant and

lactating mothers on the importance of breast feeding represents an area of logical overlap between nutrition and family planning.

Another link may be the following: improved nutrition may decrease the educational dropout rate, which might in turn lead to a delay in the age of marriage. Such a postponement may have a dampening effect on population increase. The increased educational level may also increase receptivity to family-planning services or the ability to benefit more quickly from the educational dimensions of such services.

Operating Efficiencies

Population and nutrition programs basically are aimed at the same target group: the lower-income reproductive-age mother and her young offspring. Both programs may depend significantly on the dissemination of sufficient understanding and technical skill to permit, on a long-term basis, application of the necessary preventive measures in the home. Given the magnitude of these program undertakings it seems clear that considerable economies could result from the use of common personnel, transportation, equipment, and physical facilities in many programs. Common educational materials also might be designed for the young mother in need of both kinds of information. In addition, integrated coordinated inputs could economize on what is often the scarcest resource of all, namely, skilled and experienced administrative talent (Austin, 1973). Commonly operated programs could result in important savings by reducing bureaucratic duplication and administrative hierarchy. Finally, the client could make better use of her time by dealing with two family problems simultaneously instead of having to incur the extra time, inconvenience, and transportation costs of separate visits.

Barriers to Program Integration

Even if planners, policy makers, and advisers recognized (and many have) the aforementioned interrelationships and potential benefits from integrating certain types of nutrition and population programs, there are some additional barriers in translating this recognition into program action.

One such barrier to integration, referred to earlier, is a desire on the part of country program officials (by no means unique to the development context) to maintain their areas as separate, in order to retain the prestige and power associated with organizational independence and identity. Institutions, once created, have an amazing tenaciousness.

A second problem inherent in integration is unequal priority assignment and resource allocation among the components, e.g., family planning, nutrition, and curative medicine. In one Central American country, family planning was incorporated into an ongoing maternal-child health care program, but received only sporadic attention from the medical personnel. These personnel, already in short supply, were caught up in their more immediate curative responsibilities, knew little about family planning, and had little additional funding to provide the new services. Thus, the integration was in name only, and the quality of family-planning services became less adequate than before the integration. It is quite possible that in some instances integration will not increase the effectiveness of both programs, but will benefit one program considerably while the impact of the other remains largely unchanged or will be reduced somewhat. The task of the planner is to evaluate the net *overall* impact on the two programs.

A third problem relates to the international assistance agencies. These institutions have played a critical funding role for population and nutrition programs, but have rarely integrated their assistance packages. Funds have flowed to population and nutrition programs from separate organizations or departments, and this, in turn, has had some influence on the manner in which recipient countries have organized their programs in these fields. In this regard, present exploration of integration possibilities by several of the assistance agencies is a promising development.

Research Agenda

While findings to date on population-nutrition linkages indicate the potential benefits of program integration, there is a need for further research to clarify the dynamics of population-nutrition interaction and to determine the form such integration should take.

This needed research and experimentation cuts across several disciplines and has an applied orientation. In most cases it would take the form of field operations delivering benefits to clients while gathering needed information and experience. Such research might fall into these general categories.

Attitudes

One of the most critical dimensions of the population-nutrition, or more broadly, the population-health care relationship is the previously discussed effect of decreased child mortality on fertility. The handful of micro-level studies which have probed mortality-fertility relationships in different countries, usually after the fact, have been useful but not yet conclusive, as was suggested in Fig. 1.

Additional research is needed to corroborate these findings with explicit longitudinal investigation. In addition, there is need for sensitive inquiry into the nature of parental attitudes when mortality rates decline, specifically in the context of the complex socioeconomic and cultural factors (i.e., everything from religious ritual to anticipated social security in old age) which constitute the parents' procreation decision-making process. Such an inquiry also would assess the likelihood of affecting such factors through governmental policy and programs. Here the disciplines of sociology, anthropology, and psychology are particularly relevant. Finally, utilizing the above information, it would be possible to focus directly on means of organizing and timing programs and information dissemination in ways which will have the greatest influence on procreation decisions. Efforts then could be made to design integrated educational packages and to carry out necessary training for field personnel.

Management

Research in the management area would attempt to determine the potential economics and impact of various types of integrated delivery systems. The relative efficiency and effectiveness of alternative organizational forms (e.g., multipurpose centers and mobile clinics) could be examined as well as the administrative implications of different degrees of program decentralization.

In addition, the need for low-cost delivery systems and the scarcity of professional medical personnel suggests the need for systematic comparison of physician-centered, Western-oriented health delivery with that of paramedical or volunteer-systems which have been employed in China, Colombia, Guatemala, and elsewhere (Popkin and Latham, 1973; Scrimshaw, 1973).

Biological-Physiological Dimensions

The previously discussed interaction between nutritional status and fertility clearly requires further investigation as indicated in Fig. 1. Of particular relevance to program integration are the effects of different

types of pills on lactation and the effects of nutritional status on the retention of IUDs. Research might also be desirable on the technological feasibility and the nutritional desirability of using contraceptive pills as carriers of certain vitamins or minerals.

Total Program Impact

While research in the specific areas discussed above is vital, it also is important to be able to assess the impact of integrated as opposed to nonintegrated programs. This requires longitudinal studies, such as that carried out at Narangwal, which compare integrated programs with those providing only population inputs and those providing only nutritional inputs, and using appropriate control groups.⁸ The critical need in this context is to design program-evaluation methodologies which can measure changes in outcome variables (e.g., fertility and nutritional status), quantify program costs, and translate these into cost-effectiveness ratios. Although longitudinal studies are expensive and time-consuming, they are necessary to provide the policy maker with returns on investment in nutrition and population pursued separately and in combination.

With the likelihood of increased interest and program activity in population and nutrition, the additional experience and information gained from this research will be useful to planners and assistance agencies and will facilitate what could be important interaction between these disciplines.

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⁸Two such additional nutrition studies are currently being conducted: one in Bogota, Colombia by the Instituto Colombiano de Biniestar Families, by the Department of Nutrition of the Harvard School of Public Health, and by the Institut für Ernährungswissenschaft I der Justus Liebig Universität; and a second study in Guatemala in four ladino villages by the Division of Human Development, Institute of Nutrition of Central America and Panama.

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