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Commentary

Population and Food: Metaphors and the Reality

William W. Murdoch and Allan Oaten

Should rich countries provide food, fertilizers, technical assistance, and other aid to poor countries? The obvious answer is "yes." It is natural to want to fight poverty, starvation, and disease, to help raise living standards and eliminate suffering.

Yet, after 25 years of aid, diets and living standards in many poor countries have improved little, owing partly to the population explosion that occurred during these same years. Death rates in poor countries dropped sharply in the 1940's and 1950's, to around 14/1,000 at present, while their birth rates declined very little, remaining near 40/1,000. Some populations are now growing faster than their food supply.

As a result an apparently powerful argument against aid is increasingly heard. Its premise is simply stated. "More food means more babies" (Hardin 1969). Our benevolence leads to a spiral that can result only in disaster: aid leads to increased populations, which require more aid, which leads. . . . This premise mandates a radically new policy: rich countries can perhaps provide contraceptives to poor countries, but they should not provide food, help increase food production, or help combat poverty or disease.

This policy would result in the agonizing deaths, by starvation and disease, of millions of people. Consequently, one expects its advocates to have arrived at it reluctantly, forced to suppress their humanitarian feelings by inexorable logic and the sheer weight of evidence. Its apparent brutality seems a sure guarantee of its realism and rationality.

We believe that this allegedly realistic "nonhelp" policy is in fact mistaken as well as callous; that the premise on which it is based is at best a half-truth; and that the arguments adduced in its support are not only erroneous, but often exhibit indifference to both the complexities of the problem and much of the available data. We also believe that the evidence shows better living standards and lower population growth rates to be complementary, not contradictory; that aid programs carefully designed to benefit the poorest people can help to achieve both of these ends; and that such programs, though difficult to devise and carry out, are not beyond either the resources or the ingenuity of the rich countries.

In the next two sections, we analyze some of the standard arguments in support of nonhelp policies, by focusing first on the article "Living on a Lifeboat" (Hardin 1974) and then on "The Tragedy of the Commons" (Hardin 1968). We will consider the long-term effects of nonhelp policies and some possible reasons for their widespread appeal. Then we will summarize some of the evidence about birth rates that is available and seems relevant. This evidence suggests that if we are serious about halting the food-population spiral and minimizing deaths from starvation and disease (in the long-term as well as the short), then it may be more rational to help than to stand back and watch. Finally, we will estimate the costs of some aid and discuss some difficulties in achieving reduced birth rates.

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MISLEADING METAPHORS

The "lifeboat" article actually has two messages. The first is that our immigration policy is too generous. This will not concern us here. The second, and more important, is that by helping poor nations we will bring disaster to rich and poor alike:

> Metaphorically, each rich nation amounts to a lifeboat full of comparatively rich people. The poor of the world are in other, much more crowded lifeboats. Continuously, so to speak, the poor fall out of their lifeboats and swim for a while in the water outside, hoping to be admitted to a rich lifeboat, or in some other way to benefit from the "goodies" on board. What should the passengers on a rich lifeboat do? This is the central problem of "the ethics of a lifeboat." (Hardin 1974, p. 561)

Among these so-called "goodies" are food supplies and technical aid such as that which led to the Green Revolution. Hardin argues that we should withhold such resources from poor nations on the grounds that they help to maintain high rates of population increase, thereby making the problem worse. He foresees the continued supplying and increasing production of food as a process that will be "brought to an end only by the total collapse of the whole system, producing a catastrophe of scarcely imaginable proportions" (p. 564).

Turning to one particular mechanism for distributing these resources, Hardin claims that a world food bank is a commons—people have more motivation to draw from it than to add to it; it will have a ratchet or escalator effect on

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population because inputs from it will prevent population declines in overpopulated countries. Thus "wealth can be steadily moved in one direction only, from the slowly-breeding rich to the rapidly-breeding poor, the process finally coming to a halt only when all countries are equally and miserably poor" (p. 565.). Thus our help will not only bring ultimate disaster to poor countries, but it will also be suicidal for us.

As for the "benign demographic transition" to low birth rates, which some aid supporters have predicted, Hardin states flatly that the weight of evidence is against this possibility.

Finally, Hardin claims that the plight of poor nations is partly their own fault: "wise sovereigns seem not to exist in the poor world today. The most anguishing problems are created by poor countries that are governed by rulers insufficiently wise and powerful." Establishing a world food bank will exacerbate this problem: "slovenly rulers" will escape the consequences of their incompetence—"Others will bail them out whenever they are in trouble"; "Far more difficult than the transfer of wealth from one country to another is the transfer of wisdom between sovereign powers or between generations" (p. 563).

What arguments does Hardin present in support of these opinions? Many involve metaphors: lifeboat, commons, and ratchet or escalator. These metaphors are crucial to his thesis, and it is, therefore, important for us to examine them critically.

The lifeboat is the major metaphor. It seems attractively simple, but it is in fact simplistic and obscures important issues. As soon as we try to use it to compare various policies, we find that most relevant details of the actual situation are either missing or distorted in the lifeboat metaphor. Let us list some of these details.

- Most important, perhaps, Hardin's lifeboats barely interact. The rich lifeboats may drop some handouts over the side and perhaps repel a boarding party now and then, but generally they live their own lives. In the real world, nations interact a great deal, in ways that affect food supply and population size and growth, and the effect of rich nations on poor nations has been strong and not always benevolent.

First, by colonization and actual wars of commerce, and through the international marketplace, rich nations have arranged an exchange of goods that has maintained and even increased the economic imbalance between rich and poor nations. Until recently we have taken or otherwise obtained cheap raw material from poor nations and sold them expensive manufactured goods that they cannot make themselves. In the United States, the structure of tariffs and internal subsidies discriminates selectively against poor nations. In poor countries, the concentration on cash crops rather than on food crops, a legacy of colonial times, is now actively encouraged by western multinational corporations (Barraclough 1975). Indeed, it is claimed that in famine-stricken Sahelian Africa, multinational agribusiness has recently taken land out of food production for cash crops (Transnational Institute 1974). Although we often self-righteously take the "blame" for lowering the death rates of poor nations during the 1940's and 1950's, we are less inclined to accept responsibility for the effects of actions that help maintain poverty and hunger. Yet poverty directly contributes to the high birth rates that Hardin views with such alarm.

Second, U.S. foreign policy, including foreign aid programs, has favored "pro-Western" regimes, many of which govern in the interests of a wealthy elite and some of which are savagely repressive. Thus, it has often subsidized a gross maldistribution of income and has supported political leaders who have opposed most of the social changes that can lead to reduced birth rates. In this light, Hardin's pronouncements on the alleged wisdom gap between poor leaders and our own, and the difficulty of filling it, appear as a grim joke: our response to leaders with the power and wisdom Hardin yearns for has often been to try to replace them or their policies as soon as possible. Selective giving and withholding of both military and nonmilitary aid has been an important ingredient of our efforts to maintain political leaders we like and to remove those we do not. Brown (1974b), after noting that the withholding of U.S. food aid in 1973 contributed to the downfall of the Allende government in Chile, comments that "although Americans decry the use of petroleum as a political weapon, calling it 'political blackmail,' the United States has been using food aid for political purposes for twenty years—and describing this as 'enlightened diplomacy.' "

- Both the quantity and the nature of the supplies on a lifeboat are fixed. In the real world, the quantity has strict limits, but these are far from having been reached (University of California Food Task Force 1974). Nor are we forced to devote fixed proportions of our efforts and energy to automobile travel, pet food, packaging, advertising, corn-fed beef, "defense," and other diversions, many of which cost far more than foreign aid does. The fact is that enough food is now produced to feed the world's population adequately. That people are malnourished is due to distribution and to economics, not to agricultural limits (United Nations Economic and Social Council 1974).

- Hardin's lifeboats are divided merely into rich and poor, and it is difficult to talk about birth rates on either. In the real world, however, there are striking differences among the birth rates of the poor countries and even among the birth rates of different parts of single countries. These differences appear to be related to social conditions (also absent from lifeboats) and may guide us to effective aid policies.

- Hardin's lifeboat metaphor not only conceals facts, but misleads about the effects of his proposals. The rich lifeboat can raise the ladder and sail away. But in real life, the problem will not necessarily go away just because it is ignored. In the real world, there are armies, raw materials in poor nations, and even outraged domestic dissidents prepared to sacrifice their own and others' lives to oppose policies they regard as immoral.

No doubt there are other objections. But even this list shows the lifeboat metaphor to be dangerously inappropriate for serious policy making because it obscures far more than it reveals. Lifeboats and "lifeboat ethics" may be useful topics for those who are shipwrecked; we believe they are worthless—indeed detrimental—in discussions of food-population questions.

The ratchet metaphor is equally flawed. It, too, ignores complex interactions between birth rates and social conditions (including diets), implying as it does that more food will simply mean more babies. Also, it obscures the fact that the decrease in death rates has been caused at least as much by developments such as DDT, improved sanitation, and medical advances, as by increased food supplies, so that cutting out food aid will not necessarily lead to population declines.

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The lifeboat article is strangely inadequate in other ways. For example, it shows an astonishing disregard for recent literature. The claim that we can expect no "benign demographic transition" is based on a review written more than a decade ago (Davis 1963). Yet, events and attitudes are changing rapidly in poor countries: for the first time in history, most poor people live in countries with birth control programs; with few exceptions, poor nations are somewhere on the demographic transition to lower birth rates (Demeny 1974); the population-food squeeze is now widely recognized, and governments of poor nations are aware of the relationship. Again, there is a considerable amount of evidence that birth rates can fall rapidly in poor countries given the proper social conditions (as we will discuss later); consequently, crude projections of current population growth rates are quite inadequate for policy making.

THE TRAGEDY OF THE COMMONS

Throughout the lifeboat article, Hardin bolsters his assertions by reference to the "commons" (Hardin 1968). The thesis of the commons, therefore, needs critical evaluation.

Suppose several privately owned flocks, comprising 100 sheep altogether, are grazing on a public commons. They bring in an annual income of $1.00 per sheep. Fred, a herdsman, owns only one sheep. He decides to add another. But 101 is too many: the commons is overgrazed and produces less food. The sheep lose quality and income drops to 90¢ per sheep. Total income is now $90.90 instead of $100.00. Adding the sheep has brought an overall loss. But Fred has gained: *his* income is $1.80 instead of $1.00. The gain from the additional sheep, which is his alone, outweighs the loss from overgrazing, which he shares. Thus he promotes his interest at the expense of the community.

This is the problem of the commons, which seems on the way to becoming an archetype. Hardin, in particular, is not inclined to underrate its importance: "One of the major tasks of education today is to create such an awareness of the dangers of the commons that people will be able to recognize its many varieties, however disguised" (Hardin 1974, p. 562) and "All this is terribly obvious once we are acutely aware of the pervasiveness and danger of the commons. But many people still lack this awareness. . ." (p. 565).

The "commons" affords a handy way of classifying problems: the lifeboat article reveals that sharing, a generous immigration policy, world food banks, air, water, the fish populations of the ocean, and the western range lands are, or produce, a commons. It is also handy to be able to dispose of policies one does not like as "only a particular instance of a class of policies that are in error because they lead to the tragedy of the commons" (p. 561).

But no metaphor, even one as useful as this, should be treated with such awe. Such shorthand can be useful, but it can also mislead by discouraging thought and obscuring important detail. To dismiss a proposal by suggesting that "all you need to know about this proposal is that it institutes a commons and is, therefore, bad" is to assert that the proposed commons is worse than the original problem. This might be so if the problem of the commons were, indeed, a tragedy—that is, if it were insoluble. But it is not.

Hardin favors private ownership as the solution (either through private property or the selling of pollution rights). But, of course, there are solutions other than private ownership; and private ownership itself is no guarantee of carefully husbanded resources.

One alternative to private ownership of the commons is communal ownership of the sheep—or, in general, of the mechanisms and industries that exploit the resource—combined with communal planning for management. (Note, again, how the metaphor favors one solution: perhaps the "tragedy" lay not in the commons but in the sheep. "The Tragedy of the Privately Owned Sheep" lacks zing, unfortunately.) Public ownership of a commons has been tried in Peru to the benefit of the previously privately owned anchoveta fishery (Gulland 1975). The communally owned agriculture of China does not seem to have suffered any greater overexploitation than that of other Asian nations.

Another alternative is cooperation combined with regulation. For example, Gulland (1975) has shown that Antarctic whale stocks (perhaps the epitome of a commons since they are internationally exploited and no one owns them) are now being properly managed, and stocks are increasing. This has been achieved through cooperation in the International Whaling Commission, which has by agreement set limits to the catch of each nation.

In passing, Hardin's private ownership argument is not generally applicable to nonrenewable resources. Given discount rates, technology substitutes, and no more than an average regard for posterity, privately owned nonrenewable resources, like oil, coal and minerals, are mined at rates that produce maximum profits, rather than at those rates that preserve them for future generations.

Thus, we must reject the temptation to use the commons metaphor as a substitute for analysis. Not all commons are the same: they differ in their origin, their nature, the type and seriousness of the problems they cause, the solutions that are appropriate for them, and the difficulty of implementing those solutions. In particular, we cannot rule out a proposal just because someone calls it a commons; a "solved" or benign commons may be the correct approach to some problems.

ON MALIGN NEGLECT

Hardin implies that nonhelp policies offer a solution to the world population-food problem. But what sort of solution would in fact occur?

Nonhelp policies would have several effects not clearly described in "Lifeboat" (Hardin 1974). First, it is not true that people in poor countries "convert extra food into extra babies" (p. 564). They convert it into longer lives. Denying them food will not lower birth rates; it will increase death rates.

These increases might not take effect immediately after the withdrawal of aid. Increases in local food production and improvements in sanitation and medicine would probably allow populations to continue growing for some time. (Death rates would need to increase almost three-fold to stabilize them.) Thus, in the future we could expect much larger populations in poor countries, living in greater misery than today. The negative relation between well-being and family size could easily lead to even higher birth rates. A "solution" that puts us back to prewar birth and death rates, at even higher population levels, is certainly not a satisfactory permanent solution.

Second, the rich countries cannot remain indifferent to events in poor countries. A poor country or a group of poor countries that controls supplies of a vital raw material, for example, may

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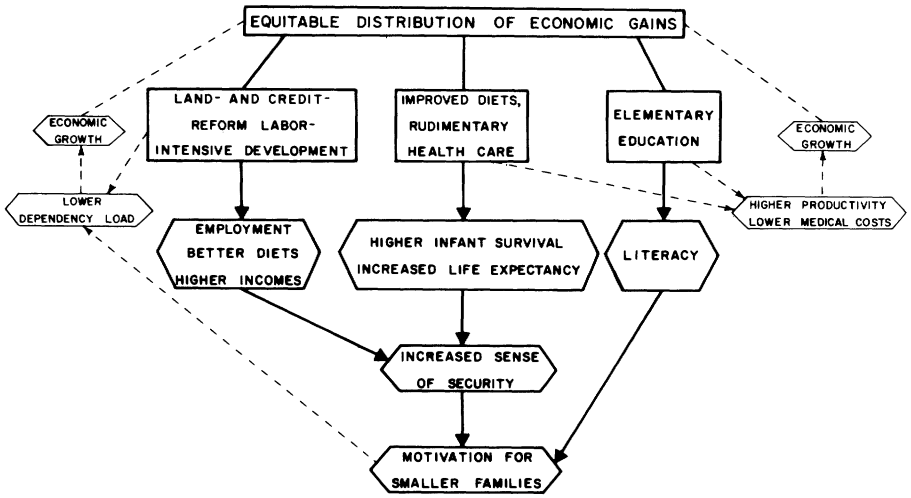

Fig. 1. A diagram of the factors affecting birth rates. Positive feedback upon economic growth is indicated by dashed lines and smaller boxes.

well want to use this leverage to its advantage; it may be very uncompromising about it, especially if its need is desperate and its attitude resentful, as would be likely. Just how intolerable this situation would be to the rich countries can be guessed at by recent hints of war being an acceptable means for the United States to ensure itself adequate supplies of oil at a "reasonable" price.

War is an option open to poor countries, too. China and India have nuclear weapons; others can be expected to follow. With Hardin's policies, they may feel they have little to lose, and the rich countries have a great deal to lose.

Thus we could look foward to continuing, and probably increasing, interference in and manipulation of the increasingly miserable poor countries by the rich countries. We do not believe this is a stable situation. One or more poor countries will surely want to disrupt it; recent events show that our ability to prevent this is limited. Alternatively, in the future, one or more of the rich countries may decide to help poor countries reduce their birth rates, but will then be faced with an even greater problem than we face today. In sum, malign neglect of poor nations is not likely to cause the problem to go away.

If Hardin's proposals are so defective, why are they attractive to so many people? We have already discussed Hardin's use of oversimplified metaphors, but there are other temptations.

An obvious one is the presentation of false choices: either we continue what we are doing, or we do nothing. Aid is either effective or ineffective; much of our aid has been ineffective, so all aid is, and it always will be. Such absolute positions are tempting because they save thought, justify inaction, never need reconsideration, and convey an impression of sophisticated cynicism. But they do not conform to the facts. Intelligent and effective aid, though difficult, is possible.

The apparent callousness of Hardin's proposals is itself a temptation. There is an implication that these policies are so brutal that they would not be proposed without good reasons. Conversely, those who argue for increased aid can be dismissed as "highly vocal humanitarian apologists" or "guilt addicts" (Hardin 1974, pp. 563 and 562). The implication is that these views *could* arise from unreasoning emotion, so therefore they *must* arise this way. Proposals for increased aid are then "plaintive cries" produced by guilt, bad conscience, anxiety, and misplaced Christian or Marxist idealism. But such argument by association is plainly misleading. Benign policies can also be the most rational; callous policies can be foolish.

BIRTH RATES: AN ALTERNATIVE VIEW

Is the food-population spiral inevitable? A more optimistic, if less comfortable, hypothesis, presented by Rich (1973) and Brown (1974a), is increasingly tenable: contrary to the "ratchet" projection, population growth rates are affected by many complex conditions beside food supply. In particular, a set of socioeconomic conditions can be identified that motivate parents to have fewer children; under these conditions, birth rates can fall quite rapidly, sometimes even before birth control technology is available. Thus, population growth can be controlled more effectively by intelligent human intervention that sets up the appropriate conditions than by doing nothing and trusting to "natural population cycles."

These conditions are: parental confidence about the future, an improved status of women, and literacy. They require low infant mortality rates, widely available rudimentary health care, increased income and employment, and an adequate diet above subsistence levels (Fig. 1). Expenditure on schools (especially elementary schools), appropriate health services (especially rural paramedical services), and agricultural reform (especially aid to small farmers) will be needed, and foreign aid can help here. It is essential that these improvements be spread across the population; aid can help here, too, by concentrating on the poor nations' poorest people, encouraging necessary institutional and social reforms, and making it easier for poor nations to use their own resources and initiative to help themselves. It is *not* necessary that per capita GNP be very high, certainly not as high as that of the rich countries during their gradual demographic transition. In other words, low birth rates in poor countries are achievable long before the conditions exist that were present in the rich countries in the late 19th and early 20th centuries.

Twenty or thirty years is not long to discover and assess the factors affecting birth rates, but a body of evidence is now accumulating in favor of this hypothesis. Rich (1973) and Brown (1974a) show that at least 10 developing countries have managed to reduce their birth rates by an average of more than one birth per 1,000 population per year for periods of 5 to 16 years. A reduction of one birth per 1,000 per year would bring birth rates in poor countries to a rough replacement level of about 16/1,000 by the turn of the century, though age distribution effects would prevent a smooth population decline. We have listed these countries in Table 1, together with three other nations, including China, that are poor and yet have brought their birth rates down to 30 or less, presumably from rates of over 40 a decade or so ago.

These data show that rapid reduction in birth rates is possible in the developing world. No doubt it can be argued that each of these cases is in some way special. Hong Kong and Singapore are

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TABLE 1. Declining birth rates and per capita income in selected developing countries. (These are crude birth rates, uncorrected for age distribution.)

Country	Time span	Births/1,000/year: Ave. annual decline in crude birth rate	Births/1,000/year: Crude birth rate 1972	$ per capita per year 1973
Barbados	1960-69	1.5	22	570
Taiwan	1955-71	1.2	24	390
Tunisia	1966-71	1.8	35	250
Mauritius	1961-71	1.5	25	240
Hong Kong	1960-72	1.4	19	970
Singapore	1955-72	1.2	23	920
Costa Rica	1963-72	1.5	32	560
South Korea	1960-70	1.2	29	250
Egypt	1966-70	1.7	37	210
Chile	1963-70	1.2	25	720
China			30	160
Cuba			27	530
Sri Lanka			30	110

relatively rich; they, Barbados, and Mauritius are also tiny. China is able to exert great social pressure on its citizens; but China is particularly significant. It is enormous; its per capita GNP is almost as low as India's; and it started out in 1949 with a terrible health system. Also, Egypt, Chile, Taiwan, Cuba, South Korea, and Sri Lanka are quite large, and they are poor or very poor (Table 1). In fact, these examples represent an enormous range of religion, political systems, and geography and suggest that such rates of decline in the birth rate can be achieved whenever the appropriate conditions are met. "The common factor in these countries is that the *majority* of the population has shared in the economic and social benefits of significant national progress. . . . [M]aking health, education and jobs more broadly available to lower income groups in poor countries contribute[s] significantly toward the motivation for smaller families that is the prerequisite of a major reduction in birth rates" (Rich 1973).

The converse is also true. In Latin America, Cuba (annual per capita income $530), Chile ($720), Uruguay ($820), and Argentina ($1,160) have moderate to truly equitable distribution of goods and services and relatively low birth rates (27, 26, 23 and 22, respectively). In contrast, Brazil ($420), Mexico ($670), and Venezuela ($980) have very unequal distribution of goods and services and high birth rates (38, 42, and 41, respectively). Fertility rates in poor and relatively poor nations seem unlikely to fall as long as the bulk of the population does not share in increased benefits.

We have tried briefly to bring the major evidence before the reader. However, there is a large literature, well summarized by Rich, and the details of the evidence are well worth reading in their entirety.

This evidence is certainly not overwhelming. Its accuracy varies. There are many unmeasured variables. Some measured variables, like income and literacy, are highly interrelated. We have no evidence that we can extrapolate to other countries or to still lower birth rates. By the standards of scientific experiment, these data are not conclusive. But policy decisions such as those discussed here are always based on uncertainty, and this evidence is at least as convincing as simple projections of average birth and death rates now prevailing in poor nations. Certainly the evidence is good enough that we need to treat the reduction of birth rates as a viable alternative to nonhelp.

A useful evaluation of the demographic transition hypothesis is provided by Beaver (1975), whose book became available only after we had completed the final revision of this article. Beaver restates the hypothesis as a set of assumptions, yielding specific predictions that can be tested against recent population data. These assumptions are similar to those given here, with some additional details and emphases. In particular, Beaver stresses the importance of a time lag of about 10 to 15 years before factors which tend to reduce birth rates can take effect. For example, both mortality decline and economic development reduce birth rates in the long run by raising expectations and confidence in the future, but both can increase birth rates in the short run by simply making it possible, physically and economically, for parents to have more children. The demographic transition hypothesis receives "strong empirical support" from a variety of statistical tests using recent Latin American data. Furthermore, the recent declines in natality in Latin America have been much more rapid than the declines in Europe during its demographic transition (See also Teitelbaum 1975).

COSTS, GAINS, AND DIFFICULTIES

We have neither the space nor the expertise to propose detailed food-population policies. Our main concern has been to help set the stage for serious discussion by disposing of simplistic proposals and irrelevant arguments, outlining some of the complexities of the problem, and indicating the existence of a large quantity of available data.

However, some kind of positive statement seems called for, if only to provide a target for others. We approach this task with trepidation. A full discussion of aid possibilities would require detailed consideration of political, social, and cultural complexities in a wide variety of recipient and donor countries. A thorough cost accounting would require detailed, quantitative knowledge about the relation between social conditions and the motivation for smaller families. Here we merely list some forms of aid, crudely estimate their costs, indicate some of their benefits and briefly discuss their feasibility.

Brown (1974a) estimates that $5 billion per year could provide:

- family planning services to the poor nations (excluding China, which already provides them); the cost includes training personnel and providing transportation facilities and contraceptives;
- literacy for all adults and children (a five-year program); and
- a health care program for mothers and infants (again excluding China).

To this we could add the following:

- 10 million metric tons of grain at an annual cost of $2 billion;
- 1.5 million metric tons of fertilizer, which is the estimated amount of the "shortfall" last year in the poor countries (U.N. 1974); the cost, including transportation, is roughly $1 billion; and

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• half of the estimated annual cost of providing "adequate" increases in the area of irrigated and cultivated land in the poor countries (U.N. 1974), about $2 billion.

These costs may well be too low, although, according to Abelson (1975), the annual cost of an "effective" global food reserve is only $550 million to $800 million, compared with the $2 billion cited above. The estimates do suggest that aid on this scale, *properly designed and properly used in the recipient nations,* could make a sizeable improvement in social well-being.

The total cost is $10 billion. Still, these estimates are very crude. Let us suppose the real cost is $20 billion. Other wealthy countries could (and should) provide at least half of this. This leaves about $10 billion to be provided by the United States. Can the United States afford it?

In the past, U.S. aid has not normally been free. Indeed, India is now a net exporter of capital to the United States because it pays back more interest and principal on previous aid loans than it receives in aid. However, even giving away $10 billion is likely to have only minor effects on the U.S. economy and standard of living. It is about 1% of the GNP, about 10% of current military expenditure. It would decrease present and future consumption of goods and services in the United States by slightly more than 1% (because the cost of government accounts for about 25% of the GNP). It could result in a slight lowering of the value of the dollar abroad, unless other rich nations were also contributing proportionately. The most noticeable effects within the United States would be on the relative prices of goods and services and, as a consequence, on the poor in this country. Those items most in demand by poor countries would increase in price relative to "luxury" goods, so that the poor in the United States would be hurt more than the rich unless countermeasures were taken.

In short, although we must take care that the burden is equitably borne, the additional aid could be provided with only minor effects on the well-being of the U.S. population. Such a reduction in living standard is hardly "suicidal" or a matter of "human survival" in the United States, to use Hardin's terms. It is not a question of "them or us," as the lifeboat metaphor implies. This simple-minded dichotomy may account for the appeal of Hardin's views, but it bears no relation to reality.

The six measures suggested above should encourage economic growth as well as lower birth rates in poor countries (see Fig. 1). Adequate diet and health care improve work performance and reduce medical costs and lost work days. There is evidence (Owens and Shaw 1972) that agricultural improvements made available to small farmers can lead not only to improved diets and increased employment but also to greater productivity per hectare than occurs on large, capital intensive farms, and that the poor can save at very high rates provided they own or rent their economic facilities (e.g., farms) and are integrated into the national economy through a network of financial institutions. Since small farms are labor-intensive, agricultural improvements that concentrate on them are not only well suited to poor countries but make them less vulnerable to fluctuations in energy supplies and costs.

Improved living conditions probably would first decrease the death rate. Does this mean that the decrease in the birth rate must be very great just to compensate? Infant mortality is the major part of the death rate that can still be decreased easily in poor countries. Suppose a poor country has a birth rate of 40/1,000 per population and an infant mortality rate of 150/1,000 live births; India is close to this. These six dead infants (15% of 40) help motivate parents to have many babies. Suppose, in the next decade, conditions improve so much that infant mortality drops to zero—a ludicrous hope. This decrease would be exactly balanced if the birth rate dropped from 40/1,000 to 34/1,000. All 10 of the countries in Table 1 dropped this many points (and greater percentages) in five years or less. Further, once mortality rates are very low, every reduction in the birth rate reduces population growth. These calculations are oversimplified, but they illustrate that even a great decrease in poverty-related deaths can be balanced by a modest decrease in births.

We can gauge the effect of lowered birth rates upon the food-population ratio. Table 2 shows currently projected rates of population growth and food production for the major areas of the world (U.N. 1974). These projections assume continued improvement in food production at previous rates; they do not assume increased success in programs against high birth rates. For the next decade, the annual percentage increase of population would be 0.2 to 0.4 greater than that of food supply in Africa, noncommunist Asia, and Latin America (although for the world in general food grows faster than population). A successful program that reduced births by 0.5/1,000 or more per year would quickly remove the projected imbalance between food and population, even allowing for increased survival. This effect would accelerate as gains in survival gradually declined, thus vastly reducing the amount of aid that would be needed.

TABLE 2. Projected annual growth in food supply and population until 1985 in selected areas (U.N. 1974).

Area	Food	Population
Rich countries	2.8	0.9
Poor countries (excluding communist Asia)	2.6	2.7
Africa	2.5	2.9
Asia	2.4	2.6
Latin America	2.9	3.1
Near East	3.1	2.9
Communist Asia	2.6	1.6
World	2.7	2.0

Will the aid in fact be used in ways that help reduce birth rates? As a disillusioning quarter-century of aid giving has shown, the obstacles to getting aid to those segments of the population most in need of it are enormous. Aid has typically benefitted a small rich segment of society, partly because of the way aid programs have been designed but also because of human and institutional factors in the poor nations themselves (Owens and Shaw 1972). With some notable exceptions, the distribution of income and services in poor nations is extremely skewed—much more uneven than in rich countries. Indeed, much of the population is essentially outside the economic system. Breaking this pattern will be extremely difficult. It will require not only aid that is designed specifically to benefit the rural poor, but also important institutional changes such as decentralization of decision making and the development of greater autonomy and stronger links to regional and national markets for local groups and industries, such as cooperative farms.

Thus, two things are being asked of rich nations and of the United States in particular: to increase nonmilitary foreign aid, including food aid, and to give it in ways, and to governments, that will

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deliver it to the poorest people and will improve their access to national economic institutions. These are not easy tasks, particularly the second, and there is no guarantee that birth rates will come down quickly in all countries. Still, many poor countries have, in varying degrees, begun the process of reform, and recent evidence suggests that aid and reform together can do much to solve the twin problems of high birth rates and economic underdevelopment. The tasks are far from impossible. Based on the evidence, the policies dictated by a sense of decency are also the most realistic and rational.

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