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THE HUNGER REPORT: UPDATE 1989

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The hungry of the world are those whose food intake or absorption is insufficient to provide the energy and nutrients essential for health, activity, and human development. Among the hungry are the quarter or more of the world's population resident in food-short countries, the fifth of the world's population resident in food-poor households, and the third of the world's small children who are food deprived.

Reports of food shortage are the tip of an iceberg of desperation. Drought in China, North America, and Tunisia, floods in Bangladesh and Sudan, hunger wars in Afghanistan, Ethiopia, Mozambique, and Sudan, and food-price riots in Panama, Sudan, Venezuela, and Yugoslavia dominated the news reports of 1988 and early 1989. Less-noticed was the quiet desperation of the recently food-impoverished populations in countries grappling with the debt crisis or of the chronically hungry billion people in food-poor households. And least-noticed were the continuing wasting, stunting, and death of small children, the anemia of their mothers, and the visual and mental impairment of the nutritionally deprived.

Famine lessened somewhat in 1988 as rain fell in drought-stricken regions of Africa and was prevented by timely food aid in some settings, but it continues in zones of armed conflict. Food production increased in many countries, particularly in South Asia, which recovered from the ravages of last year's monsoon. But household food poverty, the cause of chronic hunger for as many as a billion people, persists, and is reportedly on the increase in coun-tries struggling with burdens of debt repayment, slashed health and nutrition expenditures, unfavorable terms of trade, and rampaging inflation. Forms of food deprivation related to disease in children should diminish with the growing success of efforts to immunize and to treat diarrhea. Overall, although some hunger retreats in a few regions, it persists in most and worsens in some where it previously diminished. Still, widespread hunger is an anach-ronism in a world of overall food-sufficiency. Thus many look to the 1990s as an opportu-nity for a renewed effort to overcome hunger.

The concepts of *food shortage*, *food poverty*, and *food deprivation* serve to organize the scattered data on hunger and its prevention and to bridge the differing perceptions of hunger's cause held by those who focus on the supply and availability of food, those who focus on its distribution, and those who focus on the symptoms of undernutrition. In this 1989 update, a profile of hunger—first presented in its predecessor *The Hunger Report: 1988* (Kates *et al.*, 1988)—is developed into a ten-indicator measure of global hunger that provides a quantitative picture of food shortage in countries, food poverty in households, and food deprivation among individuals. And we also elaborate upon the efforts to prevent hunger, sketchily presented in *The Hunger Report*, by addressing the opportunities to over-come hunger in the 1990s.

Global Food Shortage

In 1988, following the drought in Canada, China, and the United States, it is thought that the world supply of cereal reserves dropped to an estimated 54 days of supply, lower than the previous low of 1973 (Brown, 1988). For the first time, grain production fell below con-sumption in North America and exports were maintained only by drawing upon the large reserves in storage. Current forecasts of world cereal stocks place levels below the mini-mum of 17-18% that the Food and Agriculture Organization of the United Nations (FAO) stipulates as necessary to safeguard world food security (FAO, 1989:11).

Table 1. Global Food Shortage

Population Potentially Supported by 1986 Primary Food Supply

FOOD-SHORTAGE INDICATOR	TOTAL POPULATION
Basic Diet (principally vegetarian)	**6 billion people** **120% of world population**
Improved Diet (about 15% of calories from animal products)	**4 billion people** **80% of world population**
Full-But-Healthy Diet (about 25% of calories from animal products)	**3 billion people** **60% of world population**

This dramatic occurrence, coming after more than a decade of surpluses in Europe and North America, poses the recurrent question of a possible food shortage at the global scale. In recent years, it has been frequently stated that hunger is not caused by absolute scarcity but by inequity in distribution. Whether inadequate *food availability* or imperfect *food distribu-tion* is the central cause of hunger is a deeply divisive question. Thus, *The Hunger Report* seeks to track the long-term availability of food in the world.

Drawing upon the most recent estimates of primary food supply, the world's vegetative food supply and the products of range-fed animals would provide an adequate diet for some six billion people or 20% more than the current population of the world (Table 1), if distributed according to need.[1] Indeed, by this standard there has probably been enough food to feed the world's population since the early 1960s.

1. Estimates of the primary food supply are based on production data for cereals, roots and tubers, vegetables, fruit, oil seeds, and other crops as reported in the *1986 FAO Production Yearbook* (FAO, 1987). The total tonnage of roots, tubers, vegetables, and fruit has been converted to *grain equivalent* by applying a factor of 0.15 (Blaxter, 1986). The resulting totals were increased by 5% to account for animal and fish products derived from forage or waste. Estimates of food demand are based on annual population estimates provided by the USDA (USDA/ERS, 1985) and the Population Reference Bureau (1988) and an average "basic" diet of 2,350 food calories (kcal) per person per day. The latter figure is based on average caloric needs per kilogram of body weight set by the FAO and the World Health Organization (WHO), average body weights by age reported by the FAO, and the present world age distribution based on UN data. Average caloric needs in the future remain essentially the same. The dietary requirements are converted into grain-equivalent demand by assuming 3,500 food calories per kg of grain and an overall loss of 40% between food production and food consumption (FAO, 1971, 1984; BOSTID, 1978). This includes a 10-15% loss *after* food leaves retail establishments (U.S. Panel on the World Food Supply, 1967).

But given a modest improvement beyond what is essentially a near-vegetarian diet to one similar to what many South Americans eat today, a real food shortage exists in the world. For at that standard, there is only food enough to feed about *four* billion, or 80% of the current world population. And to provide a full-but-healthy diet, one that incorporates the desires most people have for richer and more varied foods, then there is only sufficient food in the world to feed about three billion people or 60% of the world population.[2] Of course, it is important to note that much more food probably could and would be produced if more people had the means to purchase it.[3]

A Profile of Hunger

Hunger in profile is a set of indicators of three situations of hunger that emphasize different causes—shortage, poverty, and deprivation—and that focus on different units of organization—countries, households, and individuals. These indicators combine or reanalyze existing measures of hunger developed by international and national institutions with additional World Hunger Program data.[4] They reflect the three major foci of disciplinary and professional hunger attention: food production and availability, distribution and entitle-ment, and the consequences of underconsumption. The use of a profile rather than a single measure takes into account what we know of hunger: that the situations of hunger are varied, the causes of hunger are multiple, and efforts to alleviate or prevent hunger need to

2. The "improved" diet assumes a 10% increase in the share of food calories provided by animal products. The "full but healthy" diet assumes a 20% increase. The latter increase is lower than that assumed in *The Hunger Report: 1988* for a full-but-healthy diet in light of recent discussions by nutrition experts (Scrimshaw, personal communication). This translates into an increased demand for primary foods by assuming an overall efficiency of 1/6 (16.7%) for the conversion of primary food calories into animal products; i.e., 600 kcal of primary foods produce 100 kcal of meat, milk, eggs, or other animal products (Blaxter, 1986, based on data from Miller, 1980). This assumption is high in comparison to observed net efficiencies of breeding populations of farm animals, which range from 3-6% for sheep and beef to 11-12% for pig meat, milk, and eggs (Holmes, 1980), due in part to the utilization of forage and waste products in animal production. The overall effect of the better diets is to increase primary food demand by 50% for the improved diet and 100% for the full-but-healthy diet.
3. But one issue this raises is whether increases in primary food production, intended to meet both desired dietary improvements and the needs of growing populations, can in the long run be sustained in the face of possible limitations in natural resources and growing stresses on the environment.
4. The indicators used are measures, readily available for nation-states, that indicate the prevalence of the three hunger situations and the direct consequences of hunger on individuals. Most indicators of hunger prevalence seek to estimate the numbers of people or households who are *actually* hungry at the time of measurement. In a sense they understate the problem. Measures of vulnerability, i.e., the numbers of people or households *at risk* of hunger (or "food insecurity" in current international jargon) even though they may not be hungry at the time of measurement, may be more useful when considering appropriate ways to prevent hunger. The current profile mixes both prevalence and at-risk estimates.

Table 2. Profile of Food Shortage

National Populations in Countries with Food Shortages

FOOD-SHORTAGE INDICATOR	TOTAL POPULATION
Dietary Energy Supply Less Than Nutritional Requirements, 1984-86	**1,570 million people 31% of world population**
Dietary Energy Supply Less Than Usual Consumption, 1988-89	**480 million people 9% of world population**
Famines Reported, 1988	**205 million people 4% of world population**

address this complexity. Thus it is likely that in a given year, some hunger situations may worsen, while others improve.

Food-Short Countries

Those who suffer food-short hunger endure absolute shortage, the scarcity or unavailability of food within a bounded region, most often because of natural disaster, war, or societal disruption. The profile presents three different indicators of food shortage based on data available for most countries (Table 2). These measure increasing levels of food shortage, need, and desperation: an absolute shortage of food needed to meet nutritional requirements, needed to maintain current consumption, and needed to prevent famine.

Using data prepared by the FAO, with the most recent available being for the years 1984-86, we find that in 1986 1,570 million people, 31% of the world's population, lived in countries where the total dietary energy supply, including imports, was less than that required for health, growth, and productive work.[5] Of these 49 countries, 31 were located in sub-Saharan Africa, 6 in South and Southeast Asia, and 6 in the Western hemisphere. Another measure of food shortage is to estimate the amount of food needed just to maintain the currently inadequate *status quo* in food availability. Using data from the U.S.

5. Dietary energy supplies are estimates of the total food calories available at retail level after allowing for animal feed, seed, storage and marketing losses, and waste. These are usually expressed as calories available per capita and can be compared to a caloric per-capita requirement. The requirement used here is based on 1985 WHO/FAO/UNU estimates of national requirements for child growth, reproduction, and active adult work. These requirements, when expressed as a national average, take into account national differences in the population of age, sex, and gender and of climate and work requirements. The estimates of 1984-86 dietary energy supply are taken from computer tapes of the FAO *Agristat* data base, and of minimum daily calorie requirements from *World Resources 1988-89* (WRI/IIED, 1988:250-51).

Department of Agriculture available for 55 countries, in this current crop year (USDA/ERS, 1988a, 1988b, 1989), an estimated 480 million people (9% of the world's population) live in countries where crops and import capacity will fail to meet their usual levels of consumption.[6] These 35 countries are the countries at highest risk for national food shortage in 1989 *unless* they receive food aid.

But the most poignant faces of hunger are the faces of *famine*. These are often the large and persistent food shortages that by visible impact attract the attention of the media and that for many laypeople are synonymous with global hunger. Last year, as reported in *The New York Times*, at least 5 countries with a combined population of 204 million people—4% of the world's population—failed to prevent famine within their national territory.[7]

These faces of famine are also the faces of the victims of *war*. For the most difficult famines to alleviate or to prevent are those created or exacerbated by violent conflict and war. In

6. The estimate is based on the *World Food Needs and Availabilities* reports for the 1988/89 (July to June) crop year (USDA/ERS, 1988a,b, 1989). The 55 countries covered in these reports account for 37% of the world's population, 48% of the population of developing countries (GNP per capita less than $835), and 67% of the population of developing countries excluding China. Thus, the coverage of the chronically food-deficit, low income countries is reasonably complete. Based on the data updated in the February 1989 report, 480 million people live in 35 countries where food availability from production, stocks, and expected commercial imports (or import capacity based on financial indicators) is expected to be less in 1988/89 than the average consumption of recent years. The "status quo" estimate of consump-tion is projected from the average per capita food availability of the 4 most recent years that deviate less than 1 standard deviation from the mean of the most recent 8 years. This measure of food shortage differs from the USDA/ERS "additional needs" statistics, which do not include stocks and projected imports, and thus is a more "severe" estimate of need.

7. Famine, operationally defined as a widespread absence of food over an extended period of time, is identified in a FAMINDEX developed by Brown University students from reports since 1950 in *The New York Times* (NYT). Reports of famine are usually indexed under "famines" but are also listed under "food" in the *New York Times Index*. The FAMINDEX itself consists of the total estimated population residing in countries in which a famine has been reported during the year of the famine's occurrence. These data are averaged over 7-year periods to smooth annual differences. Since most famines span several years, reports that continue to appear in the NYT are counted for each year of occurrence. The population of a country affected by a famine is used, rather than the actual population directly affected, since the latter is not estimated or reported consistently. However, as a result, if two famines in different countries affect the same number of people, the famine in the larger country will count more in this index than the famine in the smaller country. Thus, the populations referred to in the FAMINDEX are almost always larger than the actual population subject to famine, and the FAMINDEX should therefore be used primarily to compare countries and years, rather than as an actual measure of exposed population. Efforts are under way to validate the FAMINDEX by comparing it with other media, international newspapers of record, and listings by international agencies. A limitation of any index based on media such as the NYT is that reporting coverage may vary over time. However, it seems likely that the tendency would be towards more complete coverage over time due to the increasing interconnectedness of the modern world and more widespread news reporting. Thus, if anything, the observed downward trend would be *underestimated*, not overestimated.

Table 3. Profile of Food Poverty

Population in Developing-Country Households Too Poor to Obtain Dietary Energy	
FOOD-POVERTY INDICATOR	TOTAL POPULATION
Energy Insufficient for Work	**1,015 million people** **20% of world population**
Energy Insufficient for Minimal Adult Activity and Healthy Child Growth	**455 million people** **9% of world population**

1987, wars were fought in 23 countries (Sivard, 1987:28).[8] In 17 of these countries, there was significant disruption of food systems, either as an intentional act of aggression or incidental to the destructiveness of the conflict.[9] In 1988-89, the continuing armed conflict in the southern Sudan took the lives of an estimated 260,000 people by starvation (Sukop, 1989) and relief agencies were forced to suspend operations at various times in Afghanistan, Ethiopia, and Sudan under threat of attack.

Food-Poor Households

The food-poor hungry live in households that are unable to pay for food or that lack access to the resources needed to feed themselves even when food is generally available within their region. Their poverty may take the form of insufficient land, unemployment or low wages, excessive rents or taxes, poor prices for produce or handicrafts, or the failure of customary food-security entitlements. Their numbers swell when food shortages—even shortages in distant lands that have greater purchasing power—drive up the prices of whatever food they need to purchase or when a natural disaster reduces the productivity of the land they farm.

Calculations of food poverty begin with the FAO data used to measure national food shortages, but they also attempt to incorporate the wide discrepancies in access to food.

8. Data for 1988 are not yet available (Sivard, personal communication). Wars are defined as conflicts with more than 1,000 deaths.

9. Data on wars are derived from various editions of *World Military and Social Expenditures* authored by Ruth Leger Sivard and now in its 12th edition. She in turn credits William Eckhardt (Research Director, Lentz Peace Research Laboratory, St. Louis, Missouri), who has also assisted us directly in compiling data on food wars. The judgment as to which wars have involved substantial disruption of civilian food systems is our own. In general, we include cases where there is overt diversion or destruction of food supplies or of the potential to produce food, even if, in the case of continuing hostilities, the actions are undocumented during the current year. More difficult are cases where repressive measures and government policy meld together to, in effect, deny or restrict access to productive resources and income as, for example, in the case of forced relocation in South Africa.

Even countries with supplies greater than basic requirements have substantial numbers of hungry people—people too poor in money to purchase food, too poor in resources to raise food, and too poor in political power to claim food.

The numbers of people in households with insufficient access to food are estimated by examining income distribution, household expenditures, or household food consumption. Households whose ability to obtain food falls below some threshold of required dietary energy are considered at risk of hunger or undernourished. The thresholds used to calculate the numbers of hungry range from the energy required for sedentary survival to the requirements for growth and reproduction to the requirements for various levels of functioning and work. These extremes from near-maintenance to high levels of activity differ by almost a factor of two. Thus it is not surprising to find that estimates of the population residing in households too poor to obtain the energy they need also differ by a similar factor (Table 3).

We draw upon older World Bank and FAO studies and, using these as a base, estimate that, in 1988, 1,015 million people in developing countries lived in households too poor to obtain the energy sufficient for work and 455 million lived in households too poor to obtain the energy sufficient for minimal activity among adults and for the healthy growth of children.[10]

The World Bank (WB) employed a threshold considered adequate for work and calculated that 730 million people in 87 developing countries (excluding China) lived in households that were too poor to obtain the energy sufficient for work in 1980 (World Bank, 1986). At that time, these 87 countries had a combined population of 2,100 million. Updating this propor-tion to the 1988 population of the developing world and adding a current estimate of China's food-poor population (70 million), we estimate that 1,015 million people, or 20% of the world population, were food poor in 1988.[11]

10. The second estimate incorporates a correction to the estimate for 1985 given in *The Hunger Report: 1988* (Kates *et al.*, 1988). The corrected value for 1985 is 414 million people (9% of world population) who live in households too poor to obtain energy sufficient for minimal activity among adults and for the healthy growth of children (see errata sheet available from the World Hunger Program).

11. The method used by the WB and developed by Reutlinger and Selowsky (1976) allocates the per capita dietary energy supply as estimated by the FAO for 1980 to different income groups, taking into account the share of income that different groups spend on food. The analysis is performed for 87 developing countries, which contained 92% of the developing world's population excluding China. However, for these 87 countries, data on income distribution are available for only 35 countries with 70% of the developing world's population. The estimated shares of income for the remaining countries are extrapolated from the 35. Income is then allotted to the purchase of a per capita energy diet, and those income groups unable to purchase 90% of the estimated required dietary energy are considered to have an energy-deficient diet. Thus, there are three major assumptions: *1)* that income is a good estimator of household food supply; *2)* that the estimates of income distribution, many collected in the early 1970s, provide an adequate measure of income inequity; and *3)* that the WHO/FAO requirements for dietary energy (WHO, 1973) used in the study provide an appropriate threshold of food poverty. We update these estimates by applying the regional share of the population with insufficient calories for an active working life in 1980 in 87 developing countries to the entire 1988 population of developing countries. This further extends the range of the already inadequate estimates of income distribution another 8

Notes (continued)

The FAO, in contrast to the World Bank, favors the combination of a food-energy threshold for the maintenance of bodily functions and minimal activity for adults and adolescents with requirements for normal growth in children. Combining these two criteria yielded an esti-mate of 361 million undernourished in 93 developing countries in 1983-85 (ACC/SCN, 1987a). Updating these figures and adjusting similarly for the absence of China, we esti-mate that, in 1988, 455 million people lived in households too poor to obtain the energy suf-ficient for minimal activity among adults and for the healthy growth of children.[12] These food-poor individuals—using either standard of food poverty—live primarily in South Asia and Africa.

These numbers, which may reflect the magnitude of food poverty, are insensitive to recent fluctuations in hunger since they rely on measures of food availability that are years old and of income and consumption that are decades old. Major efforts are under way by inter-national agencies to make the statistical base more sensitive to current conditions, especially to improve the ability to monitor the effects of structural adjustment policies on food poverty. These include the World Bank effort to undertake studies of basic living standards in selected developing countries, the UNICEF/WHO efforts to monitor child undernutrition in 20 countries, and national efforts to measure change in nutritional status through the use of "sentinel sites," as in Mexico. But even without these studies, worldwide reports indicate deteriorating living standards in many countries and civil disorder in countries as diverse as Panama, Sudan, Venezuela, and Yugoslavia in response to increases or anticipated increases in the prices of foodstuffs and other necessities.

Food-Deprived Individuals

All hungry people are *food-deprived*. Theirs is the hunger of individual people who live in regions of food scarcity or reside in food-poor households. But theirs is also the hunger of individuals deprived of nutrition that may be available within the household. Such depriva-tion may result from misunderstanding of need, from intentional abuse or

years, i.e., it is implicitly assumed that no change has taken place since the 1970s. To this is added a current Chinese estimate of food-poor hungry of 70 million people (*China Daily*, 12/31/88).

12. The FAO (1985) method also attempts to allocate the per capita dietary energy supply to different groups of households using not only income distribution data but, where available, household survey data on food intake or food expenditure. These are then used to estimate a coefficient of variation for a log-normal distribution around the estimated per capita dietary energy supply. Using the estimated coefficient, the population in households below a required threshold is estimated. In this case, the threshold selected is considerably lower than that chosen by the WB. It is set at 1.2 times the basal metabolism rate for adults and adolescents, a rate sufficient for minimal activity (described by the FAO as a "maintenance" requirement), but not for productive work. Added to this requirement is one for children that will provide the estimated energy required for adequate growth based on actual intakes of healthy children. This method, employed by the FAO in the *Fifth World Food Survey* and in earlier variants, has been updated for the ACC/SCN *First Report on the World Nutrition Situation* (1987a) by using the dietary energy supply estimates for 1983-85. We further extend the data slightly beyond the original 93 countries. The regional proportions of the population falling below the threshold are applied to 1988 regional estimates of population for all the developing countries except China, and half of the estimated Chinese food-poor hungry (35 million) is added to account for China (*China Daily*, 12/31/88). Note that this estimate for China is less than that used by Grigg (1985) and incorporated into Figure 2.

incidental neglect, from self-denial by diet or fast, or from disease that hampers food intake, food retention, or nutrient absorption.

Hunger's toll on *children* is in their low birthweights, in the stunting of their growth, in their diarrheal-related deaths, and, especially in Asia, in Vitamin A-deficiency blindness and iodine-deficiency neurological disorders (Table 4). About 16% of the world's infants are born underweight,[13] and 29% of the world's small children are underweight for their age.[14] Some five million children under five years old die each year because they cannot hold food and water.[15] Three million children under the age of 10 are blind because of insufficient intake of Vitamin A[16] and a similar number suffer from iodine-deficiency cretinism.[17]

The prevalence of different types and categories of food deprivation varies markedly by region. An extraordinarily high percentage of South Asian children under age five—67%—are underweight relative to Western standards of growth. Controversy continues over the appropriateness of these U.S.-based standards in judging nutritional adequacy in other populations.[18] Relatively high proportions of underweight children are also found in South-east Asia and in sub-Saharan Africa. China, with a still high estimate of 18% underweight-for-age, has made considerable progress in recent decades—data for older

13. Using figures from 1982 surveys (WHO, 1984), updated with birth estimates from 1986, it is estimated that 20.3 million infants had low birthweights of under 2,500 grams out of an estimated 129 million births, or 15.7% (Grant, 1987:116).

14. Data for underweight by region come from the ACC/SCN (1987a:8-31). These data use the criterion of two standard deviations below the mean for 40 countries where representative sample surveys are available. The data are extended to 94 countries by regressing the proportion underweight-for-age on dietary energy supply, infant mortality rates, and other less-significant variables and by using the resulting estimation equation to impute proportions underweight for countries in which it was not measured directly.

15. Total annual deaths of children under five years of age in developing countries are estimated to be 14.1 million, of which 35.7% or 5 million were due to diarrhea (Grant, 1987:111).

16. This estimate by the ACC/SCN (1987b:33) is based on the WHO (1985b) estimate of up to 500,000 new cases of eye damage per year for Asia. Applying this rate worldwide to countries with known Vitamin A deficiencies results in an estimated prevalence of some 700,000 new cases per year among pre-school children. Of these eye-damaged children, it is estimated that 60% die, 25% of the survivors are totally blind, and 50-60% of the survivors are partially blind (IVACG, 1981:8). This implies that roughly 250,000 become blind or partially blind each year (Mason, 1987:4).

17. Some 3.15 million people of all ages are said to suffer from cretinism (ACC/SCN, 1987a:40). No estimates have been offered for the number of children newly afflicted by cretinism in any one year.

18. Certain economists and statisticians have suggested that Western standards for growth—used as the basis for judging nutritional adequacy worldwide—may be inappropriate for some populations. They argue that small size may be adaptive to the lowered dietary energy available, and that South Asians in particular may be more able to limit growth in response to limited diet without adverse effects on health and development. South Asian children therefore may grow less than well nourished, less disease-impaired Western children, but are not "undernourished" by their alternative criterion (see, e.g., Seckler, 1982). Nutritionists respond that growth retardation, as a response to the interactive effects of poor diet and infection, may serve to lower nutritional requirements, but coping with nutrient scarcities does not occur without functional impairment (Martorell, 1988; see also Beaton, 1988, and Scrimshaw and Young, 1988).

children (7-10

Table 4. Profile of Food Deprivation

Adults and Children Affected by Food Deprivation

FOOD-DEPRIVATION INDICATOR	TOTAL POPULATION
Infants Born Underweight	**21 million infants** **16% of the world's infants**
Children Underweight for Age	**168 million children** **29% of the world's children less than 5 years old**
Iodine Deficiency	**190 million people** **4% of world population**
Iron-Deficiency	**600 million people** **12% of world population**
Vitamin A Deficiency	**42 million children** **15% of the world's children 1-4 years old**

years old) show increases in height of an inch or more (2.5-3.6 cm) per decade over the three decades 1950-80 (Piazza, 1986:138).

All over the world, but particularly in mountainous inland regions, areas of naturally occurring iodine deficiency exist. Here goiter is endemic and, in severe cases, results in iodine-related cretinism. An estimated 190 million people suffer from iodine deficiency.[19] Anemia caused by iron deficiency affects an estimated 600 million people, but none more than pregnant women—an estimated 51% of the world's pregnant women are deficient in blood iron.[20] Vitamin A deficiency, most predominant in South and Southeast Asia,

19. Hetzel (1988) estimates that, of some 800 million people worldwide at risk to iodine deficiency disorders by virtue of living in iodine-deficient environments, 190 million suffer from goiter, 3 million from overt cretinism, and millions more from intellectual deficit.

20. Estimates exclude China and were made by WHO with reference to over 500 studies on the prevalence of anemia available around 1980. Anemia is defined as hemoglobin concentration below WHO reference values for age, sex, and pregnancy status (DeMaeyer and Adiels-Tegman, 1985; ACC/SCN, 1987a:36-38).

affects the vision and health of adults—mainly pregnant and lactating mothers—and some 42 million preschool children.[21]

The Hunger Profile: 1989

Taken together, these ten indicators provide a comprehensive profile of hunger at present and in the recent past, based on data available in early 1989 (Figure 1). The profile is a composite of the myriad ways that hunger affects people worldwide and includes measures of *food shortage*, *food poverty*, and *food deprivation:*

- *Food shortage* affects the *4%* of the world's population who live in countries that have recently experienced famine within their borders; the 9% of the world's population who suffer a shortage relative to usual consumption unless met by food aid; and the 31% who in 1986 lived in countries where the *total* food supply failed to meet nutritional require-ments.

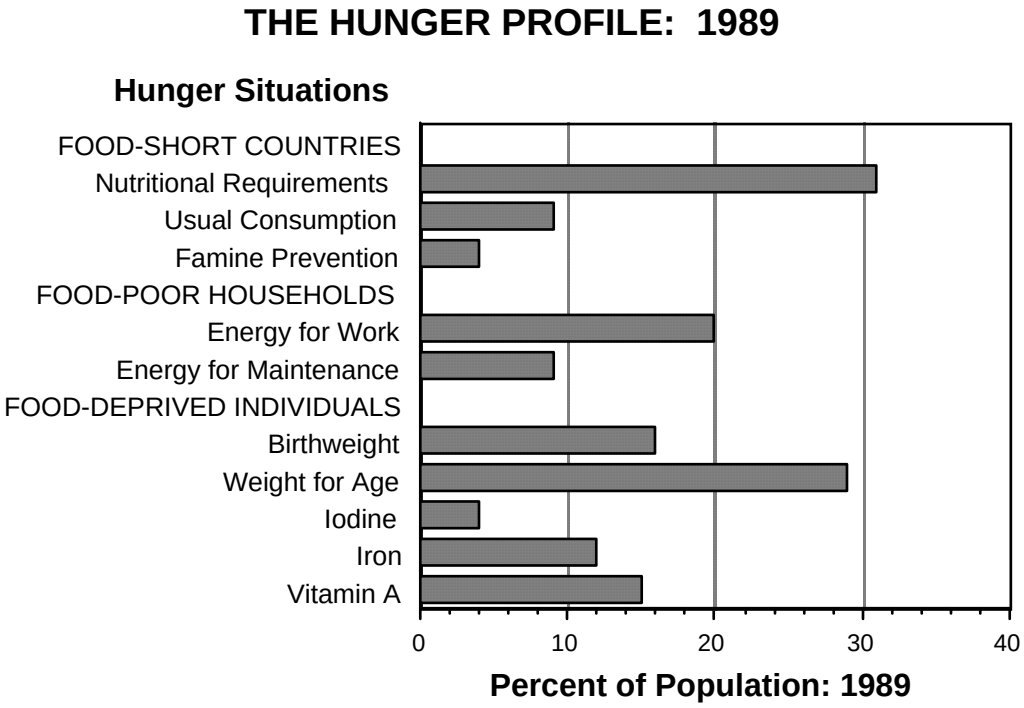

Figure 1. A ten-dimensional profile of hunger. See text for definition of indicators.

- *Food poverty*—depending on the standard adopted—affects as few as 9% of the world's population or as many as 20% of the world's population who live in households that are food poor and unable to obtain a minimal diet.

21. Based on assumed 15% prevalence rates in 34 countries with regions of Vitamin A deficiency (Mason, 1987:7).

- *Food deprivation* affects the 16% of the world's infants who were born underweight; the 29% of small children who are underweight for their age; the 4% of the world's population who suffer from iodine deficiency; the 12% who suffer from iron deficiency; and the 15% of small children who suffer Vitamin A deficiency.

If the Hunger Profile is read as humanity's report card, we have failed more than a billion of our people.

Overcoming Hunger in the 1990s

Progress in the elimination of world hunger has slowed. Progress in reducing the *proportion* of hungry people in the world has followed a reverse "S"-shaped curve over the last forty years: slow reduction in the 1950s, accelerated reduction in the 1960s—almost halving the estimated proportion of hungry people—and again slow progress since then (Figure 2). At the same time, the *absolute number* of hungry people by this minimal standard of energy sufficiency has fluctuated around a half billion. And this rough estimate is insensitive to more current conditions that may include a worsening in recent years.

Conventional wisdom attributes the recent lack of progress in preventing hunger to the worldwide slowdown of economic growth and development and to the failure of growth, where it has taken place, to benefit the poorest segments of society. In the case of Africa, unique issues of agricultural decline, population growth, and environmental degradation are often cited as well. But the persistence of hunger in a world of food sufficiency is an anachronism. Even in very poor countries, much hunger can be eliminated. Even wealthier

Figure 2. Numbers (columns) and proportions (line) of world population in households with dietary energy less than that required for minimal activity, 1948-1985. Source: Grigg (1985) and ACC/SCN (1987a).

countries need to learn to feed their poorest people and those with special needs. It should be possible to do much better—perhaps, over a decade, to cut in half the number of the world's hungry.

Overcoming Food Shortage

Some success has been achieved in overcoming food shortage. Between 1964 and 1985, food production increased at a rate significantly greater than population in countries with 73% of the developing world population.[22] There is evidence that this remarkable and sustained progress is faltering, as production increases have slowed in Asia, and Latin America has joined Africa in a decline in per capita food production (Brown, 1988). But the most serious concerns are for Africa, where increasing and sustaining agricultural productivity pose a major challenge for the 1990s. But even in Africa, there are success stories. In Zimbabwe, a combination of improved technologies, government policies, credit availability, favorable prices, and marketing activities enabled 900,000 communal farmers to triple maize production between 1979 and 1985 (Rohrbach, 1988).

Also promising have been the improvements in the ability to prevent famine. The trend in famines since the end of World War II is clearly downward, reflecting a lessening of the prevalence of famine and a major shift in famine location from populous Asia to less-populated Africa. In the period 1957-63, the population residing in countries where famine was reported in *The New York Times* averaged almost 790 million, but by 1978-84 had declined to an average of 265 million (Figure 3). This decline has continued over the last four years (1985-88), when the population of famine-plagued countries averaged 178 million.

In the 1990s, it may be possible to achieve the virtual elimination of deaths due to famine. Most of the tools to prevent and alleviate famine deaths are already in place. Efforts to cope with drought, flood, war, and famine in the 1980s have led to major improvement in the global system for providing emergency food aid. Early-warning systems, dispersed

22. Based on the FAO index of food production per capita for 1964-66 and 1983-85 reported in *World Resources 1987* (IIED/WRI, 1987). An average increase of 0.5% per year in per capita food production during this period (equivalent to about a 10.5% cumulative increase over the period) is taken as evidence of significant production increase over the rate of population growth.

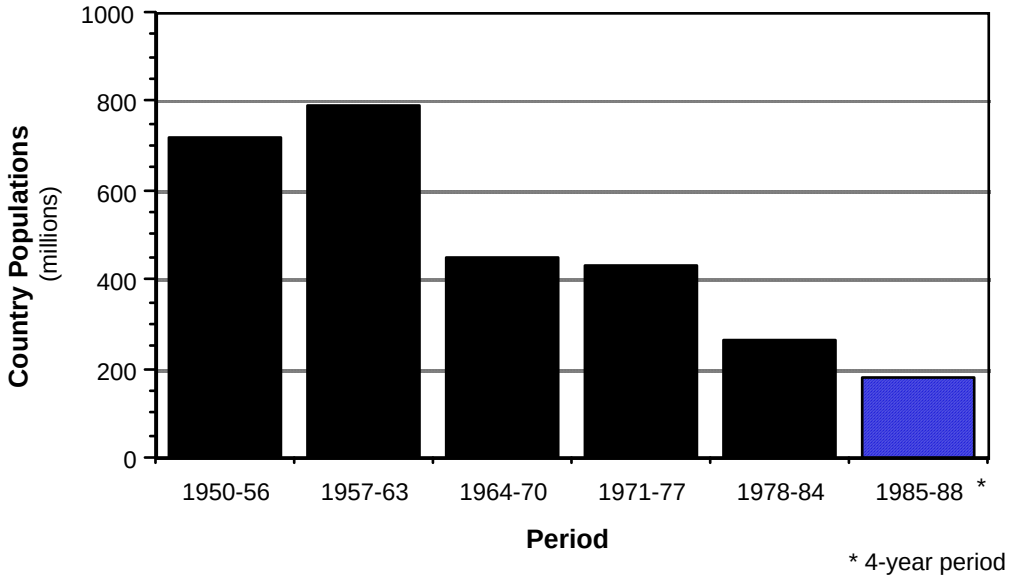

Figure 3. Average population residing in countries with famine as reported in *The New York Times*, 1950-1988.

emergency stocks, continuing donor commitment, and improved logistical and distributional capabilities are readily available. The major obstacle—an extremely difficult one to over-come—remains the destruction or interdiction of civilian food supplies in zones of armed conflict. As a beginning, an international covenant for the sanctity of civilian food supplies and the safe passage of emergency food relief must be fully implemented. This could bind nations to provide safe passage and to permit convoy by United Nations peacekeeping forces within their national territory.[23]

Overcoming Food Poverty

For household food poverty, there is little progress to report. The numbers of the food poor may have actually risen in the 1980s due to the increasing pauperization of many households in Latin America and Africa during a period of worldwide economic restructuring and retrenchment. Unfortunately, the available data are much too sparse and unreliable to be used to detect trends in food poverty over time.

Nonetheless, ample experience exists with food welfare programs that employ such devices as food subsidies, coupons, ration shops, and feeding programs to demonstrate that careful targeting and effective application of such measures (Pinstrup-Andersen, 1988; Reutlinger, 1988) could reduce much of urban food poverty. Addressing rural food poverty is more difficult since it is harder to reach rural households on a sustained basis

23. Discussions of this possibility have already begun within a number of different international venues, e.g., in the disaster relief community (Gordenker and Weiss, 1989).

with food welfare programs. For rural areas, a key need is to increase agricultural productivity and income opportunities in the countryside while providing needed wage and food income (Mellor, in preparation). This is achievable by greatly expanding efforts to provide wage and food income in return for labor that can be used to construct needed agricultural infrastructure and restore environmental resources and by making imaginative use of local institutions. Employing the successful elements of programs found in places as diverse as the state of Maharastra in India (Ezekiel, 1988) or Botswana in Southern Africa (Morgan, 1988) could reduce food poverty in the short term through direct income supplementation and in the long term through sustained increases in agricultural productivity and income.

Overcoming Food Deprivation

There is encouraging news in the effort to eliminate individual food deprivation. A massive worldwide program to immunize infants and to provide access to oral rehydration therapy (ORT) to treat and prevent diarrheal disease holds forth the promise of severing the pernicious linkage between disease and undernutrition in small children (Grant, 1989). There is also progress to report on breastfeeding. Recent evidence suggests that the prevalence of breastfeeding is stable or even increasing in many developing countries (Millman, 1987). There has been more limited success in the adoption of the fourth of UNICEF's targeted innovations, the monitoring of child growth through regular weighing to detect wasting and stunting. But major local and regional successes can be found, including the targeted supplemental feeding programs combined with extensive growth monitoring in Tamil Nadu, India (Berg, 1987) and the community weighing adopted by villagers in Iringa, Tanzania (Grant, 1989). These examples suggest that widespread application and adaptation of this approach could help ensure that mothers and their communities throughout the developing world understand and address the growth needs of their children.

Selected regions and countries have also made major progress in eliminating two of the three major nutritional deficiency diseases: iodine deficiency disorders—which is marked by goiter, mental impairment, and, in the extreme, cretinism—and Vitamin A deficiency disease. China, for example, now provides ionized salt to most areas endemic with the disease and injections of ionized oil for inhabitants of more remote mountain and desert regions (Hetzel, 1988). For Vitamin A deficiency, a vitamin capsule taken two or three times a year can protect a child throughout the preschool years. Fortification with Vitamin A of such standard condiments as monosodium glutamate in the Philippines and sugar in Central America is an alternative strategy. And increasing evidence suggests wide-ranging health benefits beyond eye protection for Vitamin A therapy (West and Sommer, 1987).

Taken together, these recent successes suggest that it may be possible to eliminate most diarrheal deaths, prevent new cases of Vitamin A and iodine deficiencies, and reduce by half the common forms of childhood wasting and stunting in the 1990s.

Preventing "New" Hunger

To make progress in the 1990s also requires that, regardless of changes in the global economy, strong efforts be made to prevent further aggravation of the condition of the hungriest and the poorest (Cornia *et al.*, 1987; George, 1988). A massive economic

restructuring is under way around the world: in socialist countries, in the developing world, and in industrialized and newly industrializing nations. Too often, these radical and often painful shifts fall most heavily on the needs of those least able to cope with them. At a minimum, what is required is restructuring in the form of "adjustment with a human face" and a universal ethic for all to do no additional harm to the poorest and hungriest.

Renewing the Effort

With the possible exception of the innovative UNICEF child survival program, there have been few successful international initiatives to eliminate hunger for large numbers of the hungry since the World Food Conference in 1974. Currently, three major food and hunger research groups are completing or have under way research that reviews the interventions that have been tried in the recent past and that searches for new initiatives for public action.[24] In addition, a number of international and national agencies have studies under way to identify needed directions for the 1990s. These include the recent North-South Roundtable/ United Nations Development Program Amman meeting on the fourth development decade, the World Bank/World Food Programme Initiative on Food Security in Africa, the develop-ment of a UNICEF strategy for the 1990s, the World Food Council's Cyprus Initiative, and the U.S. National Research Council study of food aid requirements for the 1990s undertaken for the U.S. Agency for International Development.

This year's Hunger Research Briefing and Exchange in Providence, Rhode Island, USA on 5-8 April 1989 (cosponsored by the World Hunger Program and InterAction, The American Council for Voluntary International Action) is dedicated to the search for new initiatives. A highlight of the Briefing is a symposium in which participants representing a diversity of viewpoints have agreed in advance to seek the common ground needed for a renewed international effort to overcome a major share of world hunger.

The Briefing also serves as an occasion to plan for a conference to bring together major figures in the international community, developing countries, private voluntary organizations, and the science and public policy field to chart a renewed attack on hunger for the 1990s. This conference will attempt to forge a comprehensive program to reduce world hunger by half during the 1990s, using the better and the best of programs and projects that have worked well in the recent past and applying them appropriately with the needed persistence and enlarged effort, involvement, and funding.

An integrated attack on famine, rural and urban food poverty, the nutritional deficiency diseases, and childhood wasting and stunting, while differing in regional emphasis and

24. The International Food Policy Research Institute (IFPRI), drawing on its sustained research effort on food and nutrition policies is preparing a set of recommendations for increasing agricultural income using food surpluses to build needed infrastructure and for large-scale supplementary feeding for the most needy. The United Nations University/World Institute for Development Economics Research (UNU/WIDER) pro-gram on hunger and poverty is nearing publication of its findings on previous experience and new policy initiatives distilled in the forthcoming volume on *Hunger and Public Action* (Dreze and Sen, 1989). The Alan Shawn Feinstein World Hunger Program (WHP) at Brown University is engaged in a year-long faculty study entitled "Ending Hunger: Halfway There" to see if it is possible to end hunger for half the world's hungry.

national application, can constitute a comprehensive effort to end half the world's hunger within a decade. Such a program will require renewed social energy and political will, the creative employment of local institutions and underutilized resources, the avoidance of hunger-aggravating policies, and billions of dollars more per year in additional financial and food resources. It thus challenges both the summit and the grassroots to aim for a major human achievement: overcoming hunger—halfway there!

REFERENCES

ACC/SCN (Administrative Committee on Coordination/Subcommittee on Nutrition). l987a. *First Report on the World Nutrition Situation.* Rome: ACC/SCN, United Nations.

ACC/SCN (Administrative Committee on Coordination/Subcommittee on Nutrition). 1987b. *A Global Strategy for the Prevention and Control of Iodine Deficiency Disorders: Proposal for a Ten-Year Programme of Support to Countries. Report of the l3th session, ACC Subcommittee on Nutrition, Washington DC, 2-6 March 1987*. Coc. SCN87/IODA. Rome: FAO.

Beaton, George H.. 1988. "Small but healthy?" Are we asking the right question? *Human Organization* **48**(1):30-38.

Berg, Alan. 1987. *Malnutrition: What Can Be Done?* Baltimore: Johns Hopkins University Press for the World Bank.

Blaxter, K. 1986. *People, Food and Resources*. Cambridge: Cambridge University Press.

BOSTID (Board on Science and Technology for International Development). 1978. *Postharvest Food Losses in Developing Countries*. Washington: National Academy of Sciences.

Brown, Lester R. 1988. *The Changing World Food Prospect: The Nineties and Beyond*. Worldwatch Paper 85. Washington: The Worldwatch Institute.

Cornia, Giovanni Andrea, Richard Jolly and Frances Stewart, Eds. 1987. *Adjustment with a Human Face*, Vols. 1-2. Oxford: Clarendon Press.

DeMaeyer, E.M., and M. Adiels-Tegman. 1985. The prevalence of anaemia in the world. *World Health Statistics Quarterly* **38**:302-16.

Dreze, Jean, and Amartya Sen. 1989 (Forthcoming). *Hunger and Public Action*. Oxford: Oxford University Press.

Ezekiel, Hannan. 1988. Hunger and famine monitoring in Maharasta. Paper presented at First Annual Hunger Research Briefing and Exchange, Brown University, Providence RI, 8 April.

FAO (Food and Agriculture Organization of the United Nations). 1971. *Food Balance Sheets, 1964-66 Average*. Rome: FAO.

FAO (Food and Agriculture Organization of the United Nations). l984. *Food Balance Sheets, 1979-81 Average*. Rome: FAO.

FAO (Food and Agriculture Organization of the United Nations). l985. *The Fifth World Food Survey*. Rome: FAO.

FAO (Food and Agriculture Organization of the United Nations). 1987. *1986 FAO Production Yearbook, Vol. 40*. Rome: FAO.

FAO (Food and Agriculture Organization of the United Nations). 1989. *Food Outlook* 1/2 (February). Rome: FAO.

George, Susan. 1988. *A Fate Worse Than Debt*. New York: Grove Press.

Gordenker, Leon, and Thomas G. Weiss. 1989. Issues for discussion. Paper prepared for an international workshop on Humanitarian Relief and Conflict Resolution: Consultations on Africa, Harare, Zimbabwe, 7-9 March.

Grant, James. 1987. *The State of the World's Children 1987*. Oxford: Oxford University Press.

Grant, James. l989. *The State of the World's Children 1989*. Oxford: Oxford University Press.

Grigg, David. l985. *The World Food Problem 1950-1980.* Oxford: Basil Blackwell.

Hetzel, Basil S. 1988. *The Prevention and Control of Iodine Deficency Disorders*. ACC/SCN State-of-the Art Series, Nutrition Policy Discusion Paper No. 3. Geneva: United Nations Administrative Committee on Coordination/Subcommittee on Nutrition.

Holmes, W. 1980. Secondary production from land. In *Food Chains and Human Nutrition*, K. Blaxter, Ed. London: Applied Science, pp. 109-34.

IIED/WRI (International Institute for Environment and Development and World Resources Institute). 1987. *World Resources 1987*. New York: Basic Books.

IVACG (International Vitamin A Consultative Group). 1981. *The Symptoms and Signs of Vitamin A Deficiency and Their Relationship to Applied Nutrition*. Washington: IVACG.

Kates, Robert W., Robert S. Chen, Thomas E. Downing, Jeanne X. Kasperson, Ellen Messer, and Sara R. Millman. 1988. *The Hunger Report: 1988*. Providence: World Hunger Program, Brown University.

Martorell, Reynaldo. 1988. Body size, adaptation and function. *Human Organization* **48**(1):15-19.

Mason, John B. 1987. Introduction and policy implications. In Keith P. West, Jr. and Alfred Sommer. *Delivery of Oral Doses of Vitamin A to Prevent Vitamin A Deficiency and Nutritional Blindness: A State-of-the-Art Review*. ACC/SCN State-of-the-Art Series, Nutrition Policy Discussion Paper No. 2. Geneva: United Nations Administrative Committee on Coordination/Subcommittee on Nutrition.

Mellor, John W. 1988 (in preparation). Ending hunger: An implementable program for self-reliant growth. Draft paper dated 6 December 1988. Washington: International Food Policy Research Institute.

Miller, D.S. 1980. Man's demand for energy. In *Food Chains and Human Nutrition*, K. Blaxter, Ed. London: Applied Science, pp. 23-45.

Millman, Sara. 1987. *Breastfeeding in 18 Developing Countries.* Research Triangle Park, NC: Family Health International.

Morgan, Richard. 1988. Drought-relief programmes in Botswana. In *Preventing Famines: Policy and Prospect for Africa*. D. Curtis *et al.*, Eds. London: Routledge, pp. 112-120.

Piazza, Alan. 1986. *Food Consumption and Nutritional Status in the PRC*. Boulder: Westview Press.

Pinstrup-Andersen, Per, Ed. 1988. *Food Subsidies in Developing Countries*. Baltimore: Johns Hopkins Press.

Population Reference Bureau. 1988. *1988 World Population Data Sheet.* Washington: Population Reference Bureau.

Reutlinger, Shlomo. 1988. Efficient alleviation of poverty and hunger: A new international assistance facility. *Food Policy* **13**(1):56-66.

Reutlinger, Shlomo, and Marcelo Selowsky. l976. *Malnutrition and Poverty: Magnitude and Policy Options*. World Bank Staff Occasional Paper No. 23. Baltimore: Johns Hopkins University Press.

Rohrbach, David D. 1988. The Growth of Smallholder Maize Production in Zimbabwe: Causes and Implications for Food Security. Ph.D. Dissertation, Michigan State University, East Lansing MI.

Scrimshaw, Nevin, and Vernon R. Young. 1988. Adaptation to low protein and energy intakes. *Human Organization* **48**(1):20-29.

Seckler, David. l982. Small but healthy: A basic hypothesis in the theory, measurement, and policy of malnutrition. In *Newer Concepts in Nutrition and Their Implications for Policy.* P.V. Sukhatme, Ed. Pune: Maharashtra Association for the Cultivation of Science, pp. l27-l37.

Sivard, Ruth Leger. l987. *World Military and Social Expenditures 1987-88*. l2th Edition. Washington: World Priorities.

Sukop, Sylvia. 1989. Sudan's uncivil war. *Oxfam News*, 12 March, pp. 1, 2.

USDA/ERS (United States Department of Agriculture/Economic Research Service). 1985. *World Indices of Agricultural and Food Production, 1975-84*. Statistical Bulletin No. 730, Doc. No. 1985-460-941:20096-ERS. Washington: U.S. Government Printing Office.

USDA/ERS (United States Department of Agriculture/Economic Research Service). 1988a. *World Food Needs and Availabilities, 1988-89: Summer*. Doc. No. 1988-201-089/80264/ERS. Washington: U.S. Government Printing Office.

USDA/ERS (United States Department of Agriculture/Economic Research Service). 1988b. *World Food Needs and Availabilities, 1988-89: Fall*. Doc. No. 1988-241-852/80311/ERS. Washington: U.S. Government Printing Office.

USDA/ERS (United States Department of Agriculture/Economic Research Service). 1989. *World Food Needs and Availabilities, 1988-89: Winter*. Doc. No. 1989-241-852:00074/ERS. Washington: U.S. Government Printing Office.

United States Panel on the World Food Supply. 1967. *The World Food Problem: A Report of the President's Science Advisory Committee. Volume II, Report of the Panel on the World Food Supply*. Doc. No. 1967 O-263-888. Washington: U.S. Government Printing Office.

West, Jr., Keith P., and Alfred Sommer. 1987. *Delivery of Oral Doses of Vitamin A to Prevent Vitamin A Deficiency and Nutritional Blindness: A State-of-the-Art Review*. ACC/SCN State-of-the-Art Series, Nutrition Policy Discussion Paper No. 2. Geneva: United Nations Administrative Committee on Coordination/Subcommittee on Nutrition.

World Bank. l986. *Poverty and Hunger: Issues and Options for Food Security in Developing Countries*. Washington: The World Bank.

WHO (World Health Organization). l973. *Energy and Protein Requirements. Report of a Joint FAO/WHO Ad Hoc Expert Committee*. WHO Technical Report Series No. 522. Geneva: WHO.

WHO (World Health Organization). 1984. The incidence of low birth-weight: An update. *WHO Weekly Epidemiological Record* **59**(27):202-12.

WHO (World Health Organization). l985a. *Energy and Protein Requirements. Report of a Joint FAO/WHO/UNU Expert Consultation*. WHO Technical Report Series No. 724. Geneva: WHO.

WHO (World Health Organization). 1985b. *Prevention and Control of Vitamin A Deficiency and Nutritional Blindness. Proposal for a Ten-Year Programme of Support to Countries*. Doc. Nut/84.5 Rev.1. Geneva: WHO.

WRI/IIED (World Resources Institute and International Institute for Environment and Development). 1988. *World Resources 1988-89*. New York: Basic Books.