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# Investing in Child Nutrition in Asia

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and Urban Jonsson

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**Abstract.** *Child malnutrition is pervasive and persistent in Asia, and at present rates it will take decades to halve the prevalence—a goal common to many national plans. Nutrition-oriented programs are familiar in most countries, but have far too low coverage and resources, which is wasteful as well as ineffective. A massive expansion of community-based programs is feasible, with well-established activities (usually including support to: antenatal care, breastfeeding, caring practices including complementary feeding, growth monitoring, access to health care). Networks of local workers, ensuring individual contact with families, are the essential feature. Requirements including costs are proposed. Micronutrient deficiency control programs must also be expanded towards universal coverage. Context is crucial to success, important examples being women’s status, social exclusion, political commitment, community organizations, and literacy; policies should be directed to improving these. Assessing and building local capacity, and resolving certain generic issues, are early priorities.*

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**A**bout half the preschool children in Asia are malnourished, ranging from 16 percent underweight in the People’s Republic of China (PRC) to 64 percent in Bangladesh, and a similar percentage are deficient in one or more micronutrients. This burden of malnutrition exacts a huge toll in sickness and premature mortality, in intellectual development and future productivity. It is virtually all preventible.

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Approaches to malnutrition and micronutrient deficiencies that work are known and can be applied. The most effective programs that have grown in Asia are community-based and deal with a range of local needs, as well as micronutrient deficiency control programs, which have both local and central aspects. These methods are estimated to have good benefits related to costs, especially in the long term, when prevention of child malnutrition leads to healthier, better educated, and more productive adults. Current programs are seen to have too low coverage and level of resources for widespread impact, but in many cases these can be built on. Supporting policies are required to provide a favorable context. Of crucial importance are women's status and education, social exclusion, political commitment, community organizations, and literacy. The main costs of program expansion are in personnel and training, and external finance will be needed to contribute in investing in people to enhance human capital. The main recommendations that emerge from the ADB-UNICEF Regional Technical Assistance Project on Reducing Child Malnutrition in Eight Asian Countries (hereafter referred to as the Project) are the following:

- (i) increase support to local programs, as well as expand micronutrient programs;
- (ii) analyze capacity (at national and local levels) to define gaps and needs;
- (iii) undertake policy dialogue and design supporting policies to induce a favorable context for nutrition and for programs;
- (iv) meet program needs in terms of organization, training, and resource mobilization; and
- (v) solve generic issues for planning and program design through research.

### **The Nutrition Problem in Asia**

Poor diet and infectious disease interact to cause growth failure in children, physiological damage especially to the immune system, and specific clinical conditions like anemia, leading to impaired development and death. This interaction and its biological results are called "malnutrition", or the "malnutrition-infection complex". Malnutrition is the largest risk factor in the world for disability and premature mortality, especially in developing countries, and is entirely preventable. Eliminating malnutrition would cut child mortality by more than 50 percent, and reduce the burden of disease in developing countries by about 20 percent (Tomkins and Watson 1989, FAO/WHO 1992, Pelletier et al. 1993, Murray and Lopez 1997).

Malnutrition in early childhood retards intellectual development, through both general and specific nutrient deficiencies, notably iodine. Some of these effects are irreversible, but all are preventable with current knowledge and technology. They have serious impacts both on individuals' capabilities, and on socioeconomic development overall (Grantham-McGregor 1995, Brown and Pollitt 1996).

Human development has emerged as a concept that focuses the overall aims and aspirations of development efforts, and "weaves development around people, not people around development". Adequate nutrition is an integral part of human development. Indeed, nutritional criteria are used to measure human development; for example the United Nations Development Programme's (UNDP) "capability poverty measure" uses nutritional status as one of three components. In concrete terms, good nutrition leads to fitter and better educated people. Malnutrition in childhood, even if later corrected, affects educability and eventual school achievements. Nutrition thus improves human capital. This effect extends to future generations: much child developmental failure is perpetuated because small baby girls grow up to become small mothers, in turn having low birth weight infants. Breaking this inter-generational cycle requires ensuring better growth, health, and nutrition throughout the lifecycle, particularly for women. This is urgent, especially in Asia, as nearly one third of babies are underweight, and more than half the adult women in South Asia weigh less than 45kg, the level at which risk in utero and on delivery increases rapidly. The persistence of malnutrition is a waste of human potential, and reducing it represents a great opportunity for bringing resources to bear on people-centered development, alleviating suffering and increasing productivity—as an investment, in other words (UNDP 1992, UNDP 1996, ACC/SCN 1992, Brown and Pollitt 1997).

Both economic growth and human development must proceed together for either to be sustainable. Countries like Egypt, Mexico, and Brazil have achieved high economic growth rates in the past, but because little was done for human development, this growth was not sustainable. Other countries, such as Tanzania, have achieved high levels of human development, despite poverty; but because Tanzania failed to grow economically, social services broke down, and the growth could not be sustained. Only those countries that have combined investment in human development through public services and investment in production have achieved high growth rates in both economic and human development; in other words, sustained development. Japan, Korea, and Malaysia are examples of this achievement (UNICEF 1999).

Everyone has a right to adequate nutritional status. Nutrition is a prerequisite for human development, and therefore for development as a whole. This is recognized in many key conventions and international agreements, from the United Nations' (UN) Declaration of Human Rights to the Convention on the Rights of the Child. Both the causes and the consequences of malnutrition impinge on human rights. The deprivations that directly cause malnutrition—hunger, ill health, and

neglect—must be prevented in any humane society. Their converse is food, health, and care, which form the focus of the United Nations Children’s Fund’s (UNICEF) strategy and are central to the improvement of nutrition in Asia. Recognizing children’s rights means that all parts of society are obligated to realize them (Jonsson 1996).

Reducing malnutrition brings multiple benefits. Mortality and disability (calculated as disability affected life years [DALYs] lost) would be reduced by eliminating malnutrition by 20-30 percent in Asia. The economic benefits from preventing lost production and ill health due to malnutrition are estimated to be substantial, certainly greater than the investment required to reduce malnutrition (the benefit-cost ratios are considerably greater than one). Improving intellectual and physical abilities—human capital—is important in its own right, and will ensure sustainability. Many of these economic benefits are long-term, being realized in adults following prevention of malnutrition in childhood. They are thus a long-term investment, analogous to other investments in people, like education (Mason et al. 1995, Phillips and Sanghvi 1996).

The immediate causes of malnutrition are poor diet and infectious disease, and underlying these are inadequacies of food security (Bouis 1999), caring practices (Engle 1999), and basic health services. This is shown as part of Figure 1, which provides the conceptual framework for understanding the causes of nutrition problems in society. Interventions can also be seen in relation to the life cycle: specific interventions are appropriate during pregnancy and lactation, for the infant and child, through adolescence, adulthood, and into old age. Many of these are now seen to involve care of children and women, stemming from the UNICEF (1990) framework, and adopted by the International Conference on Nutrition (FAO/WHO 1992). These concepts are elaborated in other papers in this issue.<sup>1</sup>

The present situation in the study countries—here synthesized from country reports<sup>2</sup> commissioned from institutions in each country—can be described in terms of indicators of malnutrition, and of causal factors that may then be addressed by programs and supporting policies.

In Asian countries, about half the preschool children are underweight—the usual measure of general malnutrition—and this is the highest level in the world. With the large population share, some 120 million children are malnourished, three quarters of the global total. The distribution of malnutrition among the eight Asian

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<sup>1</sup>See papers in this issue by Bouis (1999) on household food security; Engle (1999) on caring practices; Haddad (1999) on women’s status; Horton (1999) on opportunities for investment in nutrition; Mason, Mannar, and Mock (1999) on micronutrients; Mock and Mason (1999) on information systems; Tontisirin and Gillespie (1999) on community-based programs.

<sup>2</sup>Information in this section is from the country reports, and from the overview paper chapters 2 & 3 (Mason, Jonsson et al. 1999). Country report references are: ADB (1998) for People’s Republic of China; Administrative Staff College of India (1997); Applied Economics Research Centre (1998); Government of Cambodia (1998); Government of Sri Lanka (1997); Government of Viet Nam (1998); INFS and Department of Economics, University of Dhaka (1998). Data for the Philippines (which eventually withdrew from the Project) is retained from a report prepared for this purpose (Guillermo-Tuazon and Briones 1997).

countries is displayed in Figure 2. Here the prevalences are on the vertical axis, ranging from 16 percent in the PRC to 64 percent in Bangladesh, and the child population is on the horizontal axis: this means that the area shown for each country is proportional to the numbers underweight. The predominance of India, with an estimated 62 million underweight children, is evident, as is the continued problem in the PRC, with 17 million underweight. At the same time, high prevalences persist in Bangladesh, Cambodia, and Pakistan, all above 40 percent (data from Mason, Jonsson et al. 1999, ch. 1).

Figure 1: Conceptual Framework for the Causes of Malnutrition in Society

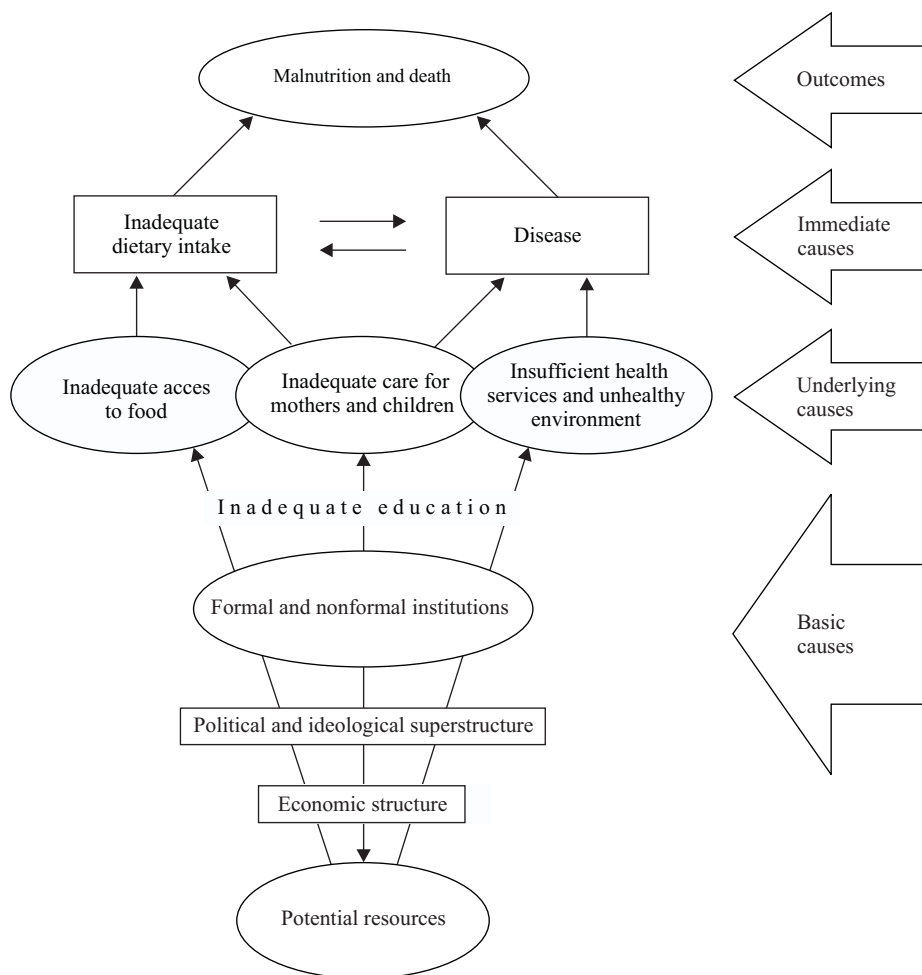
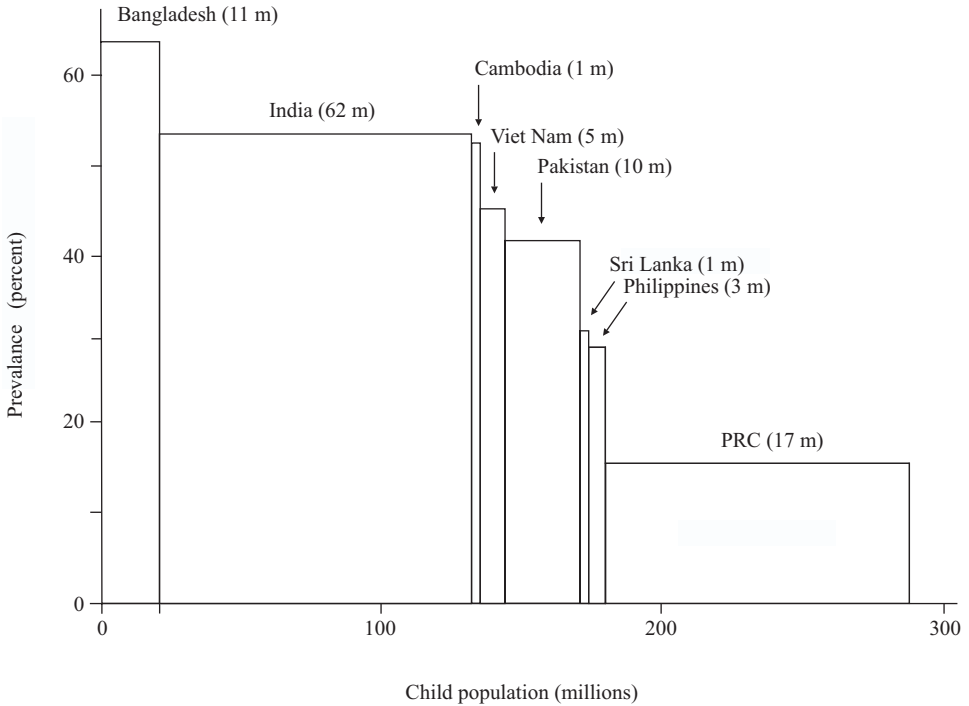


Figure 2: Underweight Prevalences and Numbers in Preschool Children



Note: Children aged 0-5 years, < -2 SDs by NCHS/WHO standards.

Trends in underweight prevalences can be estimated from recent observations, and converted to likely projections into the future if similar changes continue (for instance with economic growth, developments in education, and so forth). Targets originally set at the World Summit for Children aimed at halving the prevalence of underweight, and nearly eliminating vitamin A and iodine deficiencies by the year 2000 (UN 1990). We can estimate the years in which this halving is expected to occur at the present rate, without significant additional actions. These are illustrated in Figure 3, using linear estimates of the underlying trend, in percentage points per year (proportional changes give longer estimates, but the same ranking); the expected rates are shown, ranging from 0.3-0.8 percentage points per year reduction, with 0.5 percent per year typical. These estimates do not take into account recent evidence

of a slowdown in malnutrition improvement rates, as well as the impact of the Asian financial crisis, so are likely to be optimistic. At one end of the scale, Bangladesh is projected to halve the prevalence of underweight, at this rate, in around 70 years (by 2070); Cambodia might be similar, but trends are not known. Most countries are projected to take 30-40 years. At the other end, the PRC is projected to reach this target by 2008. Even the lower-prevalence countries will still see a considerable number of children die and fail to develop as a result of malnutrition, and in the higher prevalence countries the waste and suffering implicit should be quite unacceptable. A major acceleration in the improvement rate is needed, of around an additional 1 to 2 percent per year, sustained over decades. An example of how this would look is shown in Figure 3c, for Bangladesh, the prevalence of underweight would be halved in about 15 years (at 2 percent per year improvement). How to achieve this acceleration is what the country studies are about.

**Figure 3a: Years to Halve Prevalences of Underweight Preschool Children at Present Rates, South Asian Countries**

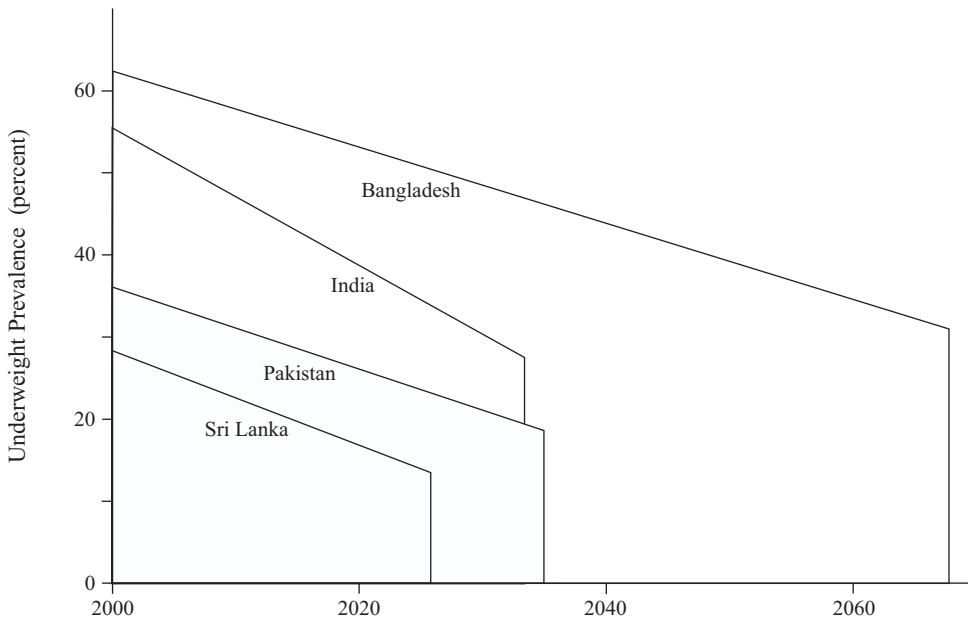
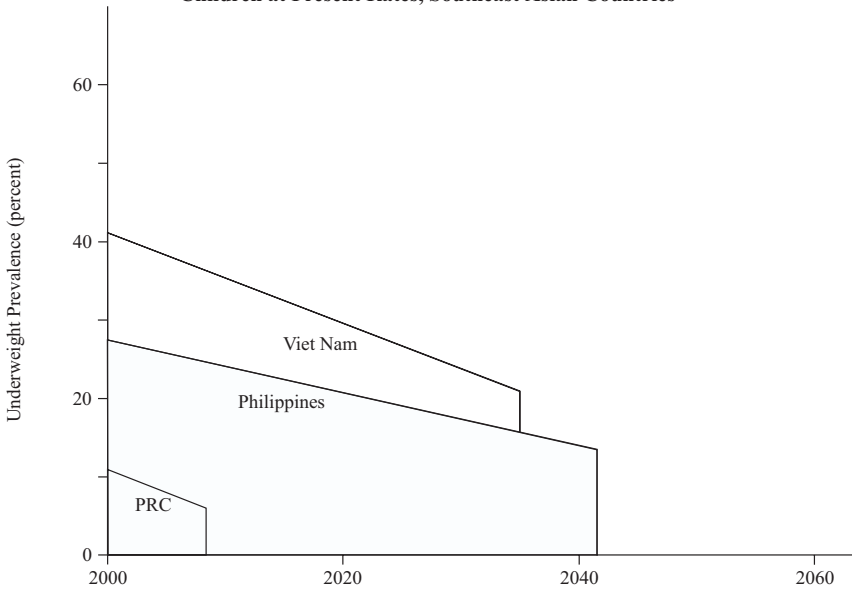
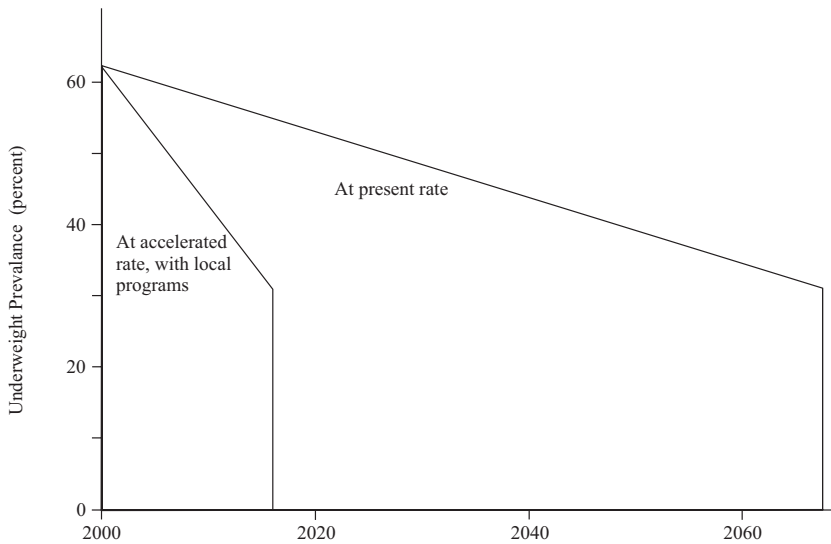


Figure 3b: Years to Halve Prevalences of Underweight Preschool Children at Present Rates, Southeast Asian Countries



Note: Rates of change are estimated from recent observed trends.

Figure 3c: Years to Halve Prevalences of Underweight Preschool Children at Present Rates, Bangladesh

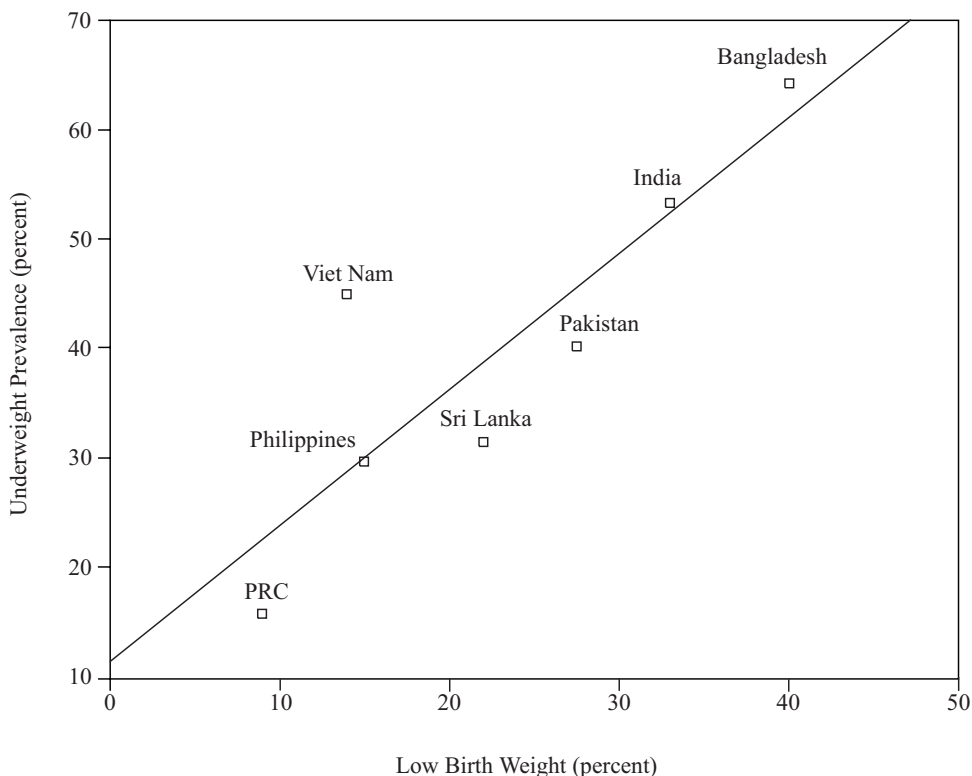


Note: At present rates (0.5 percentage points/year) and at an accelerated rate expected with investment in local programs (2.0 pp/year).

One demonstration that malnutrition is far from inevitable is the wide variation within countries. The underweight prevalence at least doubles between best-off and worst-off areas. As examples, in India the best state is at 28 percent, the worst at 63 percent; in Viet Nam, underweight prevalence in different provinces range from 33 to 58 percent; in rural PRC from 7 to 27 percent. Differences are seen by income group as well (quintiles here): 19 percent (lowest quintile) vs. 43 percent (highest) in Sri Lanka; 29 vs. 69 percent in Viet Nam, as examples. Similar divergence is seen by location (urban or rural), season, education level, and other factors. This emphasizes that nutrition is in no way inherent in the population. Nutrition will improve with socioeconomic development, but this will take decades and investments in deliberate measures can be effective and are needed now (Mason, Jonsson et al. 1999, Table 1.2).

Children are at risk even before birth, and birth weight has a strong effect on subsequent development. The correspondence between reported levels of low birth weight and underweight in these countries is striking—see Figure 4. Eliminating low birth weight for a generation would probably eliminate underweight for all time.

Figure 4: **Relation of Birthweight and Preschool Underweight in Asia**



Micronutrient deficiencies, measured by specific signs, are very widespread, in fact more so than general malnutrition, in part because the poor first meet energy needs, and the cheapest energy sources are the lowest in micronutrients (Allen 1994). The three of most concern are vitamin A deficiency (VAD), iron deficiency, usually assessed as anemia, and iodine deficiency disorders (IDDs). Each of these has different characteristics. In general, deficiencies of vitamin A and iodine are decreasing worldwide, while anemia appears to be showing no improvement. Recent estimates of the extent of the main deficiencies are given in Table 1 (MI/UNICEF/Tulane 1998, IOM/NAS 1998, Mason, Sethuraman et al. 1999).

Vitamin A deficiency in clinical form is relatively rare and decreasing steadily, but subclinical deficiency, as assessed by low serum retinol, affects from 10 to 30 percent of children. Subclinical deficiency is dangerous, and studies have demonstrated that vitamin A supplementation in populations with such levels of deficiency can produce major reductions, by about one quarter in child mortality, and half in maternal mortality. While current trends are improving, it will still take several decades to eliminate the problem without renewed efforts (Mason, Jonsson et al. 1999, Table 1.3; Beaton et al. 1993; Underwood 1998; West et al. 1999).

In contrast, anemia resulting from iron deficiency is highly prevalent and showing no signs of declining in Asia. More than half the women of reproductive age are anemic, and children are similarly affected (Table 1). Iron deficiency also causes impaired cognitive development. Iron deficiency presents a particular challenge because not only is it the most widespread deficiency, but also effective interventions are not yet well established. There is no fundamental reason why these should not be developed, but this will require determination and investment in research (Mason, Jonsson et al. 1999, Table 1.4; Viteri 1998).

Iodine deficiency disorders, usually assessed by goiter, have a prevalence of 20-50 percent in the population in Asia (Table 1); subclinical deficiencies are even more common and carry a risk of disability, most worryingly to the unborn child. In populations with high prevalences of goiter, it has been calculated that iodine deficiency depresses IQ by an average of 13 points. The deficiency is decreasing with the expansion of iodization of the salt supply, now available to well over half the population. Quality control is now the key issue, and empowering communities to monitor their salt supply with testing kits is a promising contribution to solving this problem (Mason, Jonsson et al. 1999, Table 1.5; Bleichrodt et al. 1996; Stanbury 1998).

Many people undoubtedly suffer from multiple deficiencies. Estimates of the numbers thus affected by region are suggested in Table 1. Few direct estimates of multiple deficiencies have been made, and the range is based on assumptions: that for the lower end that there is no correlation, and at the top end that there is complete overlap. The truth should be within this range, probably nearer the higher end. Thus estimates of 27-36 percent of children in South Asia (including Bangladesh, India,

Table 1: Prevalences of Nutritional Problems and Multiple Deficiencies in Preschool Children, by Region

Region	Underweight (1995)		Anemia (1975-97)		Vitamin A Deficiency (subclinical) 1995		IDD Affected 1985-1996		With 2 or More Nutritional Deficiencies	
	Prevalence (%)	Estimated Affected (millions)	Prevalence (%)	Estimated Affected (millions)	Prevalence (%)	Estimated Affected (millions)	Prevalence (%)	Estimated Affected (millions)	Prevalence (%)	Estimated Affected (millions)
South Asia	52	87.4	52.7	93.8	35.6	59.5	25.3	42.5	27.4-35.6	46.1-59.8
Sub-Saharan Africa	30	30.9	33.1	34.1	35.3	36.0	29.2	30.1	11.7-35.2	12.1-36.3
Middle East/ North Africa	16	7.4	38.3	17.7	9.8	4.2	24.0	11.1	9.2-24.0	4.3-7.4
East Asia / Pacific	23	39.3	14.1	20.0	18.2	29.6	18.2	31.1	4.2-18.2	8.2-31.1
Latin America/ Caribbean	11	6.2	22.9	13.0	19.6	10.2	15.6	8.8	4.5-19.6	2.5-11.1
<b>TOTAL</b>	<b>31</b>	<b>171</b>	<b>35</b>	<b>190</b>	<b>26</b>	<b>140</b>	<b>23</b>	<b>124</b>	<b>13-27</b>	<b>73-146</b>

Notes: *Underweight*: Figures are based on ACC/SCN (1996), calculated for regions from country estimates.

*Anemia*: Data are from WHO (1997, Table 8). Some approximations were used for regional aggregation, including: South Asia is the approximation for the WHO Southeast Asia; Eastern Mediterranean approximates to Near East/N Africa; East Asia /Pacific is approximated by WHO Western Pacific Nonindustrialized; Latin America and Caribbean are approximated by WHO Americas nonindustrialized.

*VAD*: Prevalence of subclinical VAD as given above and in MI/UNICEF/Tulane (1998). For SSA: weighted the E. & S. Africa and W. & C. Africa figures to collapse into SSA. E & S. Africa was 37.1 % VAD and 18.6 million affected, W & C. Africa was 33.5% VAD and 17.4 million affected, the combined region of SSA is 35.3 % VAD and 36 million affected.

*IDD*: Prevalences calculated from the nationally representative data from MN-Net etc. (see annex table A3), as used for Figure 6 in this paper, by averaging all data points by region. These results were for schoolage children, and have not been adjusted for age here, but differences with preschool children are relatively minor (WHO 1993, 49).

*With 2 or more deficiencies*: Lower figure assumes no correlation, so that in the highest prevalence group the prevalence of the second highest deficiency in the overall preschool population is applied, i.e., the two highest prevalences are multiplied; the higher figure assumes complete overlap, so that all the second highest prevalence group is taken as having the deficiency represented by the highest prevalence, i.e., this equals the second highest prevalence. These two estimates are likely to bound the actual prevalence. Underweight is taken here as a deficiency, e.g., as PEM meaning protein-energy deficiency.

Pakistan, and Sri Lanka) and 4-18 percent of those in the East Asia/Pacific (WHO) region (Cambodia, PRC, Philippines, Viet Nam) probably represent the range of prevalences with at least two deficiencies, amounting to some 50-90 million children (Mason, Mannar, and Mock 1999).

Nutrients often interact: for example both iron and vitamin A are needed to prevent anemia (Schultink and Gross 1996). Thus provision of micronutrients singly may not be effective, and programmatically makes sense only in a few specific cases (like massive vitamin A doses). Multiple micronutrient supplementation and fortification of staples and complementary foods is thus indicated on both biological and operational grounds.

Underlying causes of malnutrition can be measured, and these both help to explain the situation, and point to opportunities for intervention. Access to antenatal care, birth delivery by trained staff, and immunization coverage, as examples, indicate many unmet needs among the populations. Antenatal care is reportedly as low as 17 percent in rural Pakistan, compared with 90 percent in PRC, Sri Lanka, and Viet Nam. Measles immunization was still below 50 percent in rural India, Pakistan, and Cambodia in the mid-90s. Rural areas in the South Asian countries have very limited access to adequate sanitation (about 20 percent). While access to safe water is better and has been rising, it is still only 30-50 percent in rural Cambodia, PRC, and Viet Nam. Education itself is a crucial factor in improving nutrition, particularly for women; and the ratio of female/male secondary school enrollment is an indicator of women's status. This ratio is about 0.5 in Bangladesh, India, and Pakistan, and near 1.0 in the other countries, starkly reflecting differences in women's status with major importance for the context of nutrition programs (Mason, Jonsson et al. 1999, Tables 1.6, 1.7).

Nutrition-relevant actions need to address the underlying causes, both because they affect the success of programs, and because of their effects in their own right. Successful nutrition policies and programs will thus tend to include components having broader impact at the local level, on health, environment, and community development. While such programs may not be undertaken solely for nutritional reasons, there is a convergence toward multifaceted activities that should be attractive investments from several points of view.

### **Possibilities for Achieving Major Reductions in Malnutrition**

Rapid rates of nutrition and health improvement have been achieved in certain places and times, in Asia and elsewhere. Understanding these successes supports the idea that major reductions in malnutrition could be realized more widely. These have all come about with a combination of favorable context and deliberate local actions, and are not primarily dependent on overcoming poverty. Kerala is as poor as other

Indian states, but has half the malnutrition prevalence, and much higher levels of women's education, literacy, and access to services. In Thailand in the 1980s and early 1990s, malnutrition was reduced from around 40 percent to less than 10 percent, and much of this preceded the economic take-off. Steady progress, from a worse situation, took place in Indonesia. Experiences elsewhere confirm what can be done: for instance in Costa Rica malnutrition has essentially been eliminated; and in Tanzania, despite severe poverty, significant reductions were achieved (Gillespie, Mason, and Martorell 1996; Munoz and Scrimshaw 1995).

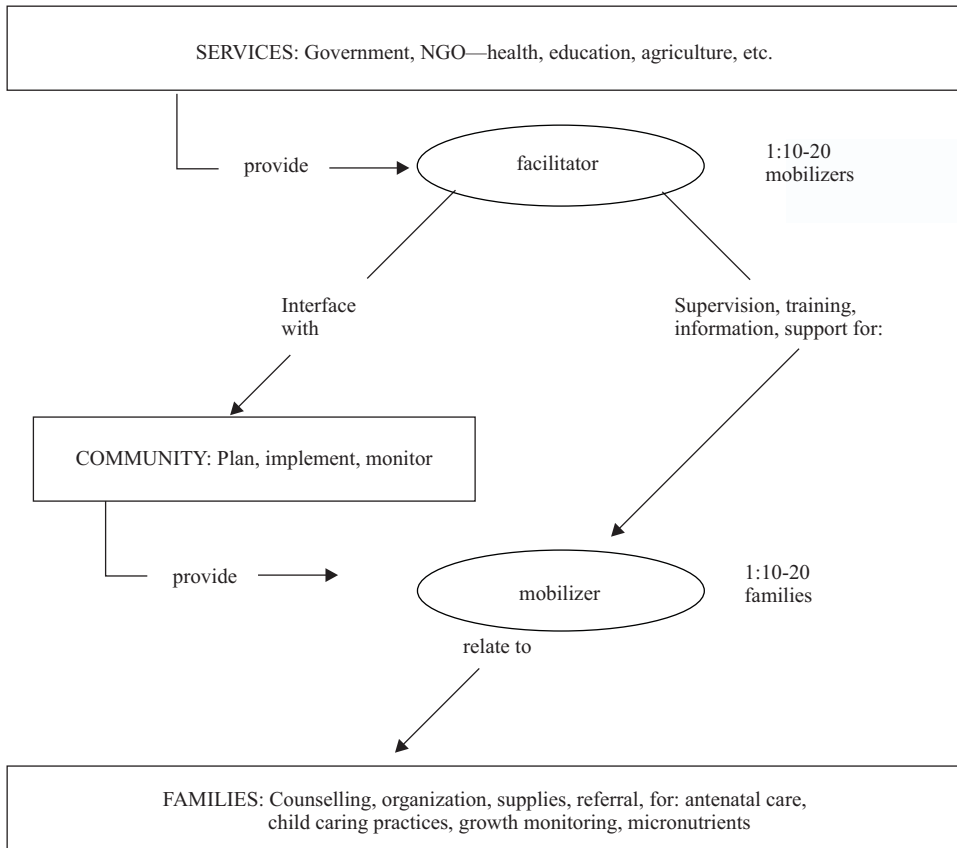
The common feature of these successes is that the ratio of local workers to families is high enough for individual contact to begin to solve the problems. This is probably the single most important conclusion. It has been supported by smaller scale studies within Asia, and is implicit in the country studies, because all the promising programs reported (many at pilot scale) have this feature. It makes sense, too, since the social services in industrialized countries (notably in Europe) essentially operate in this way, through individual contact, supported by the state. From this premise, the capacity to establish the required structure for major improvement can be worked out. The ideas now use the terminology of "facilitators", as the local level government or NGO employees, and "mobilizers", as the village level workers, often volunteers. Mobilizers function as part of community organizations, supported by facilitators who act as the interface with the community leaders. This concept underpinned the Thai programs, and here is generalized, based on this, for the region in Figure 5 (Jonsson 1995, Tontisirin and Gillespie 1999, Winichagoon et al. 1992).

Of particular importance are the ratios of facilitators and mobilizers to each other and to population that are estimated to be required for programs to be effective. These are: facilitators to mobilizers 1:10-20; mobilizers to families 1:10-20; thus mobilizers to population 1:50 - 100; and facilitators to population 1:500-2000. These ratios were reached in Thailand by the early 1990s, when nearly 1 percent of the population (500,000 people) were trained as village health workers. A similar ratio of mobilizers to families was reported from Indonesia, through the *posyandu* system (village level health and nutrition posts). In other countries, such as Cambodia and Viet Nam, substantial numbers of potential facilitators exist, and the gap is more of workers at the village level. Reaching these ratios is likely to be a necessary, although not alone sufficient, condition for attaining rapid reductions in malnutrition (Tontisirin and Winichagoon 1999).

Results from national and regional community-based programs show a pattern of rapid initial fall in overall underweight, with near elimination of severe cases. The initial drop may be up to 10 percentage points within the first year or so. After this initial fall (the precise cause of which is not known), the trend flattens out to give a slower but sustained reduction of 1-3 pp/year. This pattern was seen in Thailand, in Tanzania (Iringa and other program regions), India, and very recently with the Bangladesh Integrated Nutrition Project (BINP) (unpublished results). The fall in

underweight prevalences (severe and moderate) takes place at the same time as, or sometimes just prior to, an increase in the proportion of normal weight children, showing that the programs are benefiting the whole child population (Kachondham, Winichagoon, and Tontisirin 1992; Winichagoon et al. 1992; Kavishe 1992; and Measham and Chatterjee 1999, Tables 2 and 20).

Figure 5: Support Structure for Community-based Programs, based on Thailand's



Source: Adapted from Tontisirin (1996).

Most of this experience is from rural areas, and most thinking still defaults onto the village as the focus of community-based programs. In the ideas from the country studies themselves, rural areas predominate. However, urbanization is rapidly shifting the problems of malnutrition to towns and cities, and simply transferring some of the concepts is not always feasible. For example, the community may be very differently perceived, and the organization of community-based programs quite distinct, in urban compared to rural areas. The questions arise of how nutrition can be improved in urban areas, and how approaches developed in rural settings can be transferred.

The second way in which major reductions in malnutrition have been achieved is through micronutrient deficiency control programs. This applies particularly to vitamin A and iodine deficiencies. In the early 1990s, distribution of high doses of vitamin A, as capsules or dispensed in oil (India) for administration once every six months, expanded dramatically to the point that by 1996 roughly enough were available to cover the needs of all children in Asia. The exceptions were in Pakistan and Sri Lanka, where the problem at that time had not been fully recognized. The emerging importance of subclinical vitamin A deficiency, affecting many more children (about one third), means that even if capsule coverage cannot be complete, it will still reach a significant proportion of those at risk. Persisting with high-dose capsule distribution and other means of supplementation, and pursuing opportunities for fortification (which is how the deficiency has been overcome in the industrialized world), can undoubtedly sustain progress toward the eventual elimination of vitamin A deficiency. For iron, research is likely to lead to means of fortifying widely-consumed foods such as rice, and this can be expanded without delay. (MI/UNICEF/Tulane 1998).

The salt supply in Asia is becoming universally iodized, which will eventually eliminate iodine deficiency disorders. But there is still a long way to go, and quality control at the community and other levels is urgently needed. Nonetheless, there has been much success, by 1997 on average 60 percent of the salt supply was iodized, and a similar proportion of households was estimated to be using iodized salt. This is a huge increase in coverage in just a few years—in fact many countries only started salt iodization during the 1990s. Coverage continues to increase, and is bringing about a transformation in the situation. Often this expansion is supported by external finance to public–private sector partnerships; for example a World Bank loan has helped the PRC reach 95 percent coverage with iodized salt (UNICEF 1998).

A move toward multiple micronutrient supplementation, on a daily or weekly basis, while more difficult than infrequent massive vitamin A doses or iodization of salt, is efficacious at pilot level and can be expected to bring populationwide results. Similar considerations apply to multiple fortification.

The key to effective programs is the context in which they operate. We have seen that the successful experiences were built on a favorable base, which depended on factors such as women's status and education, and the existence of suitable

community organizations and structures. In other cases, the situation is less favorable—where groups are socially excluded, and societies are fractured by caste and class. In some cases, policy decisions and their implementation can modify the situation. There are many social environments in Asia where the context is already favorable, and the ground is fertile for rapid expansion of programs: PRC, Sri Lanka, and Viet Nam, for example. These provide readymade opportunities for investment in programs. In others, some initial policy actions may be needed, and programs may have to be tailored to the constraints while the environment changes. But there is no doubt about the potential for effective local programs, plus some more centrally run initiatives especially in the micronutrient field, to accelerate malnutrition reduction (Mason, Jonsson et al. 1999, ch. 3).

Urban or rural environment is a particular example of context. Programs will need to be adapted because of differing environmental and social factors, and organizational aspects. For example, the equivalent of the village and the health/nutrition worker is not always clear; and the equivalent of the community may be better defined in terms of people working together but not necessarily living in the same place.

The level of effort required to accelerate nutritional improvement can be estimated in principle. In terms of numbers of trained people required, the facilitator and mobilizer ratios discussed above provide some guidance. Financially, estimates are that programs take somewhere in the range of US\$5-15 per participant per year (if supplementary food is not used, which roughly doubles the cost). Knowing the population affected, and taking some account of current likely efforts (assessed in more detail from the country reports later), we can estimate, for all the countries considered in the Project, that around \$1,000 million per year of additional investment over a ten-year period would be likely to bring substantial impact, getting on for the target of halving the prevalence of malnutrition in this time. This would bring expenditure per child per year up to US\$5 from the estimated present levels (see next section). In addition, support to micronutrient programs, notably vitamin A and iodine, would need an estimated \$110 million per year. For iron, prior research is warranted, at lesser cost, before implementation of deficiency control programs.

In terms of people for implementing programs, a conservative calculation (at 1:20 mobilizers:families, and 1:20 facilitators:mobilizers) gives a figure of 26 million people to be trained at community level, with more than 1 million facilitators.

These numbers are to give starting in-principle estimates and will be returned to later in the light of the programs proposed by countries. Focusing on five countries (Bangladesh, Cambodia, Pakistan, Sri Lanka, and Viet Nam) gives estimates, from these population-based calculations, of \$180 million per year, 3.6 million mobilizers, and 180 million facilitators.

## **Current Policies and Programs and Future Opportunities**

Programs aimed at reducing general malnutrition (usually measured as child growth failure) are familiar and quite widespread in Asia, but usually not very effective. This is partly due to inadequate resources, partly due to varying coverage (which relates also to targeting), and in some cases to a need to rethink program content. As a basis for identifying opportunities for future investment in nutrition, current programs were chosen for review either as large-scale efforts that could be built on, or as smaller-scale and pilot projects that might be particularly informative for planning.

For example, in Bangladesh, the World Bank-supported Bangladesh Integrated Nutrition Project (BINP) aimed to cover about 7 percent of the population in the first few years at an intensity of about 1 mobilizer per 200 children (although this was not reached), at US\$18 per child per year. Potentially relevant national programs (for family welfare, diarrheal disease control) have around 50 percent coverage but a much lower intensity. In India, the Integrated Child Development Services (ICDS) reached 74 percent of the blocks in the country, but with low intensity, whereas the Tamil Nadu Integrated Nutrition project (TINP, also World Bank supported) was much more focused, with 1 mobilizer per 300 children, and costing US\$9 per head per year. Similar patterns of coverage and intensity are seen in most of the countries. For instance, the Community Action for Social Development in Cambodia covers around 20 percent of villages; in Viet Nam the National Program for PEM Control covered 15 percent of children. Expenditures in national (or wide-scale, primarily government-supported) programs, was generally around US\$0.5-2 per child per year, which is probably too low to give a major impact (Mason, Jonsson et al. 1999, ch. 2).

While evaluation results are scarce, some principles can be applied here. One important principle is that the response in terms of improved nutrition is probably not linearly related to program inputs. A critical level of effort is likely to be needed before useful results can be achieved, and if too low a level of resources is used, no impact may be achieved. If this is so, it is not that the problem is simply solved more slowly, but that resources may be wasted and not much gained. This is the risk at the low levels of resources, as worker to child ratios or US\$ per child per year, seen in national programs. Theoretically, targeting may help. But, in practice, it seems that, first, little effective targeting toward the most needy is achieved; and second, the more common aim is to try to expand toward national coverage, and only when that is being reached and improvements are established, to begin to concentrate resources down by targeting. This may not be in line with common theory, but seems to happen, and again Thailand is a good example where this was indeed the pattern (Winichagoon et al. 1992)

The content of local nutrition programs is fairly stable and similar across countries. The main evolution recently is to focus more at an earlier stage in the life cycle,

with increased attention to antenatal care, birth weight and infancy, and women's status, nutrition, and health. The more crucial shift is the realization that the key factor is how local programs are run, typically by local community organizations, often with local government. Common factors in most programs, at present and proposed, tend to be the following: women's health and nutrition; antenatal care; support for breastfeeding (initiation, exclusive for four to six months, continuing into the second year); complementary feeding practices (introduction of suitable foods at four to six months—for a large proportion of babies in Asia this is delayed to nine months or later); growth monitoring as feasible, including birth weight; micronutrient supplementation (high-dose vitamin A capsules, iron/folate, now starting to move to multiple micronutrient supplements); ensuring immunization, access to oral rehydration for acute diarrhea; and deworming. Support for the infant formula code, fortification, and nutrition information systems are important components more centrally. These activities may also be undertaken in health facilities (sometimes supported by the IMCI program), and in schools (WHO 1997).

Supporting policies are needed for several purposes, including to facilitate and commit resources to programs; to affect context; to release funds that could be better spent (e.g., instead of on inappropriate food subsidies); and to address the fundamental causes of malnutrition. In many cases, the policy decisions appear to have been made but not implemented, often by not being funded. Policies addressing women's concerns in Pakistan are a case in point—they are on the books, but have not been vigorously applied according to the country report. Much stress must be put on inappropriate context, and the need for policies to change it where necessary. Here, five factors emerged as particularly significant: women's status, social exclusion, political commitment, community organizations, and literacy. Of these, social exclusion was perhaps the newest concern. Significant parts of the populations in Asia are so much out of the mainstream—for instance in remote areas (Cambodia, Viet Nam), excluded by social discrimination (India, Pakistan), or as migrant workers (the PRC)—that even if services and programs are strengthened, they do not or cannot make use of them or participate. This seems crucial, even though the practical solutions are unclear, at least in the short term.

However, awareness of such issues may now be increasing, and it might be possible to initiate a policy dialogue between the government concerned and the potential lending agency that will promote an appropriate level of investment.

In strategic terms, regarding potential investment of internal and external resources, we can distinguish three types of situation in terms of program design and supporting policies:

- (i) Lack of resources—when it is correctly understood what to do, decisions have been made, but resources are inadequate: this is a clear opportunity for investment (provided the likely return is attractive, which it is here).

- (ii) Lack of policies—when it is known what to do, but the policies needed are not decided. Dialogue to move on policy decisions is the obvious option for the agencies concerned, then this again becomes an investment prospect. A subset of this is when some contextual factors cannot be changed (or not soon enough) by policy, then programs may have to be targeted to groups with a more favorable context, and/or programs redesigned to take account of negative contextual factors. The principle, clearly, is to foster the participation of those who can respond, otherwise there will be no effect.
- (iii) Lack of knowledge—when it is not clear what to do, and research is indicated. Iron fortification is a case here, but there are broader examples—social exclusion perhaps. These situations may co-exist in a country, and indeed do across the countries studied in the Project. Deciding which set of conditions applies is itself an important early step.

Some country examples of this categorization are given in Mason, Jonsson, and Csete (1995).

An issue that now arises concerns who should invest, and in what type of expenditure. Investment in human capital is likely to have an attractive benefit-cost ratio, notably in the long term since interventions in early childhood (and *in utero*) yield economic benefits during productive adult life. This is similar to investing in education, and indeed has similar benefits for society beyond the individual involved. Country reports put the benefit-cost ratios between 1 and 6 (Mason, Jonsson et al. 1999, ch. 5). Agency and government policies impinge on the level and type of investment that can be made. The level of investment envisaged may be moderate in relation to GDP (around 0.1-0.5 percent), but is more substantial when related to governmental social sector budgets (e.g., 5-10 percent of health budgets, typically) (Mason, Jonsson et al. 1999, Table 2.3, ch. 5). While some reallocation of national resources may be applied, the country proposals generally envisage a significant proportion to be provided by external finance.

The proposed projects focus on local programs, and most of the activities and costs (perhaps two thirds) are for remuneration of people working at the local level. The facilitators are employees, while the mobilizers may be primarily volunteers, although some costs for incentives should be envisaged. This raises some issues for those considering external financing, as the tendency among lenders is to avoid recurrent costs such as those for personnel. This needs to be addressed: a program is being considered which should generate economic returns acceptable in investment terms, from increased productivity and decreased losses due to ill-health and premature mortality. From this standpoint, it is fairly comparable with other investments in which much of the funds invested go to people's wages. So the issue may be more

the recurrent nature, which we should examine. A 20-year investment in nutrition would tend to become self-sustaining in the sense that the benefits will begin to be realized toward the end of this period, and thus the economic returns in theory would support the continuation of the program. Better than that, the intergenerational effect will begin to apply over this time, so malnutrition will begin to diminish multiplicatively.

United Nations agencies and nongovernment organizations (NGOs) are more familiar with support for recurrent personnel costs than IFIs, in part precisely because they tend to work more with the social sector, and more at local levels. This was part of the rationale for the collaboration between ADB and UNICEF in the development of the Project. Further imaginative collaboration on these lines might help address this issue. In any event, the issue of financing recurrent personnel costs needs to be recognized as quite central, and resolved.

In sum, the proposed activities are likely to represent an economically justifiable long-term investment. In many cases, external finance will be needed; this may be of a somewhat nontraditional nature for the ADB (or other international financial institutions); so some innovative and far-sighted policy decisions may be required.

### **Some Key Issues in Nutrition and Development Strategy**

Understanding of both nutrition and the broader development context has advanced in recent years, which improves the prospects for success. Here are some issues pertinent to nutrition actions in Asia.

Attention has shifted to intrauterine growth and the development of the infant and young child. The implications of impaired biological development go well beyond growth (which may best be seen as a marker rather than as the objective itself), since intellect and educability may be affected by malnutrition. This shift in thinking stresses the need to ensure good nutrition from conception onwards, as recent research suggests that malnutrition *in utero* may impair organ development, predisposing to chronic noncommunicable diseases in later life (diabetes, hypertension, cardiovascular disease, and stroke). Diabetes is typically the first of these to appear, and alarming levels of diabetes and impaired glucose tolerance are being reported among adult populations (e.g., in Pakistan). Connected to this, the persistence of effects from parent to child is now recognized as contributing to malnutrition, so that the need to cut the intergenerational cycle is becoming a policy objective (UNICEF 1998, Barker 1995, Jervell 1995, Shera et al. 1995.)

Concerns for biological damage, with new research on the role of specific nutrients in the diet, lead to a more complex view of nutrition. A preoccupation with dietary energy intake is misleading. Dietary quality issues cannot be left to take care of themselves if total food energy intake is adequate. For instance, most children in

Asia grow in jumps, with periods of tissue loss from sickness followed by catch-up growth. Tissue loss means nutrient loss which must be replaced from a better quality diet. Interactions between nutrients must be taken into account, for example, preventing anemia needs both vitamin A and iron (Savage King and Burgess 1993, Schultink and Gross 1996).

The care of children has emerged as crucial, both in the more obvious way, for feeding and hygiene, but now also considering the direct effects of stimulation and affection on growth and development. Equally, care for women, including alleviating work loads and burdens on time, is of high priority. Support for caring practices is now included in all effective nutrition programs (Engle 1999).

Political and social factors impinge on issues from the role of the state to that of families. Many nutrition and health problems affect more than the individual concerned, so there is a gain to society from fixing them. Equally, without society undertaking some responsibility, the poor have less chance—education is a well-known parallel. Thus the effective involvement of the state is important. At the same time, it is recognized that most of the resources for change are with families and communities, and the policy should be to build on these resources through a synergy of central and local efforts (“top-down” and “bottom-up”). Communication and connectedness within and between communities is an engine for change (Kauffman 1995; Gillespie, Mason, and Martorell 1996, ch. 6; Jonsson 1997).

Policies for improving nutrition should strike a balance between the more technology-driven interventions (particularly for micronutrients) and those that depend on local programs with individual contact, which focus on behavior and simple interventions. Both the center and the local level have strengths to contribute: the center for supporting policies, for supplies, training, etc; the local for implementation, motivation, and organization.

Programs are less differentiated at the local level, if they meet local needs. Fragmentation into nutrition, health, or community development is not very helpful to communities; and thus efforts must be made to minimize bureaucratic divisions as they impinge on local organizations. The most effective programs that have grown up in Asia are multi-faceted, dealing with a range of local needs.

Nonetheless, governments (and agencies) are organized by sectors. Where an outcome, such as nutrition, is affected by the actions and priorities of a number of sectors, issues of organization between the sectors arise and roles must be defined. Similar considerations apply to gender, environmental, and population concerns. Thus food security relates particularly to agriculture and to economic development and employment; health services and environment relate to health and to public works for water and sanitation. Influences on caring practices pervade many sectors, and are particularly related to women’s status and education. Education has a key role throughout. In specific country conditions the more precise roles can be determined, and this framework can provide a basis for discussion.

In considering support for nutrition programs, external agencies need to decide whether these should be self-standing or integrated into broader activities. In principle, linkage with other sectors is clearly better than going it alone in terms of sharing of effort and sustainability. The main counter argument is that nutrition concerns may tend to get submerged, and until the procedures are established and no longer need to be innovative, they may flourish better as self-standing, narrower focus projects. This may apply in some specific instances, but in the long run, multifaceted programs have to be supported.

### **Recommendations on Policies and Programs for the Next Ten Years**

The country studies have put forward two complementary types of approach. Both these need support and better calculation of resource needs. Local programs through community organizations must be massively expanded, with input from facility-based resources. Micronutrient deficiency control programs, usually linked to the local programs, must be sustained and new approaches (notably multiple micronutrient fortification and supplementation) researched and adopted. Making the decisions to undertake these actions, and to support the steps leading to their successful planning and implementation, thus constitute the major recommendations here.

### **Massive Increases in Support for Local Programs**

Nutrition programs presently cover a fraction of those in need, thus a huge expansion is a precondition for making significant inroads into the problem. It is known that programs can have this impact under the right conditions. A decision-in-principle to support an expansion of this magnitude, with appropriate intensity of resource application and concern for the most effective program content and organization, is thus an early necessary step. This must take into account the resource implications of finance and personnel and training needs, and the investment will need to be phased in over time.

An order-of-magnitude summary of financial resources required for local programs is given in Table 2. This combines the in-principle calculations discussed earlier with the proposals in the country reports. The country studies had several objectives which differed by country; the involvement of India and PRC was seen primarily as policy studies; the PRC's estimates were primarily for training at sub-national level, hence are not compared with the other figures.

Table 2: Estimates of Resource Needs for National Community-based Programs

Country	Population (m, 1996)	Additional Funds Needed, \$ millions/year		Intensity Proposed in Country Reports, as \$/child/year
		Calculated from population <sup>a</sup>	Proposed in country reports	
Bangladesh	120	\$60 m	\$89 m	\$4
India	945	\$478 m	\$1380 m	\$10
Pakistan	140	\$70 m	\$46 m	\$2
Cambodia	10	\$4 m	\$9 m	\$6
Viet Nam	75	\$25 m	\$5 m	\$0.4
Sri Lanka	18	\$5 m	\$9 m	\$3
Philippines	69	\$20 m	NA	NA
PRC	1232	\$250 m	(\$15 m)	(\$0.5)
Total	2609	\$907 m	\$1553 m	
Bangladesh, Pakistan, Cambodia, Viet Nam, Sri Lanka				
	363	\$164 m	\$158 m	

Notes:

<sup>a</sup> Assumes: unmet needs for 50% of children in Bangladesh, India, Pakistan; 40% in Cambodia, Viet Nam, Sri Lanka; 30% in PRC; funds calculated as \$5/child/year for those with unmet needs.

Thus for viewing the resource implications, it makes sense to look in most detail at Bangladesh, Cambodia, Pakistan, Sri Lanka, and Viet Nam, as given at the bottom of Table 2. Around US\$160 million per year is the estimated funding required (calculated from population figures) for Bangladesh, Cambodia, Pakistan, Sri Lanka, and Viet Nam. This becomes about US\$180 million per year with micronutrient program needs. Similar estimates emerge from the country report proposals. However, these envisage wider coverage, and the resource needs for significant impact may be underestimated judging by the intensity figures (US\$ per child per year) in the last column. The proposed finances are generally less than needed in principle (based on US\$5 per child per year), except for Cambodia and India—although the proposals do not always distinguish between new and add-on funding for that already in place or expected. Still, the overall picture can be broadly interpreted, which should be enough to lead to more detailed country planning. It should be stressed that this may also be a low estimate, in that US\$5 per child per year is at the lowest end of the likely effective scale.

Sources: UNICEF (1998, table 1); Mason, Jonsson et al. (1999, tables 2.3, 4.3).

Community-based programs require high proportions of local workers (often village volunteers, with minimal remuneration, the mobilizers), and of staff employed by government line agencies, or NGOs, (facilitators) to supervise and support these. The ratios used here (see Table 3) are 1:20 for facilitators:mobilizers, and 1:20 for mobilizers:families. The latter is taken to be 1:100 population (1:120 would be more accurate on average). Based on these ratios, the numbers of people who would need to be trained, motivated, and supported as mobilizers totals 3.6 million for Bangladesh, Cambodia, Pakistan, Sri Lanka, and Viet Nam. Bearing in mind that Thailand trained and recruited 500,000 people in this way, the number (1 percent of the population) has some precedent. Still, it is very substantial and the effort implied would indeed be unprecedented in these countries. For facilitators, the overall numbers are also given in Table 3, and amount to 181,500. A number of these are already working in the countries. An expansion in numbers, (re)training, and support

are indicated. Their salaries constitute the major part of the estimated budgetary requirement.

Micronutrient deficiency control programs would add on to local programs, with some additional central functions. The roughly estimated costs are shown in Table 4, taken as 20 percent of the total budget where necessary. These costs tend to be additional to those for local programs, on which they largely depend, and would be higher in the absence of such programs to build on. Micronutrient deficiency control should be an attractive proposition. Nonetheless, it should be understood that while the nature of micronutrient deficiency control provides for more immediate effects than for general malnutrition, the interventions need to be kept up to maintain the effect—by supplementation for example. This contrasts with general malnutrition, assessed as growth failure, which when prevented in early childhood maintains the benefit throughout the life span.

Table 3: **Estimates of Needs for Facilitators and Mobilizers for National Community-based Programs**

<b>Country</b>	<b>Population (m, 1996)</b>	<b>Number of Facilitators (‘000s)</b>	<b>Number of Mobilizers (‘000s)</b>
Bangladesh	120	60	1,200
India	945	473	9,450
Pakistan	140	70	1,400
Cambodia	10	5	100
Viet Nam	75	37.5	750
Sri Lanka	18	9	180
Philippines	69	34.5	690
PRC	1,232	616	12,320
Total	2,609	1,304.5	26,090
Bangladesh, Pakistan, Cambodia, Viet Nam, Sri Lanka	363	181.5	3,630

Sources: UNICEF (1998, table 1). Calculated from population data (F:M 1:20, M:families 1:20, i.e., M:pop 1:100).

Benefit-cost ratios have not been calculated in any detail in the country reports, largely due to uncertainty in the relation between expenditure on large-scale locally based programs and the expected outcome in terms of reducing malnutrition. The estimates use differing methods, and give results for the projected benefit-cost ranging from 1.3 to more than 6 (Mason, Jonsson et al. 1999, ch. 5). The cost and benefits are not directly comparable between community-based programs aimed at general malnutrition marked by child growth failure, and micronutrient deficiencies. For example, preventing growth failure in early childhood has effects decades later, whereas while much of the effect of preventing micronutrient deficiencies is fairly immediate, the intervention needs to be continued for this benefit to continue.

Table 4: Estimates of Resource Needs for National Micronutrient Deficiency Control Programs.

Country	Population (m, 1996)	From Population Data		From Proposal
		Vit. A (\$m/yr)	Iodine (\$m/yr)	Vit. A, I, Fe (total, \$m/yr)
Bangladesh	120	2.1	3.0	18 (e)
India	945	16.6	23.6	200
Pakistan	140	2.5	3.5	5
Cambodia	10	0.2	0.3	1.8 (e)
Viet Nam	75	1.3	1.9	1.6
Sri Lanka	18	0.3	0.5	1.8 (e)
Philippines	69	1.2	1.7	NA
PRC	1232	21.7	30.8	NA
Total	2609	45.9	65.3	NA
Bangladesh, Pakistan, Cambodia, Viet Nam, Sri Lanka	363	6.4	9.2	28.2

Note: Estimates calculated from population data do not include iron deficiency control, which is in the totals from proposals.

Sources: UNICEF (1998, table 1); Mason, Jonsson et al. (1999, Table 2.3B and Table 5.1, or estimated [e] as 20% of proposed total budget).

A balanced approach should address both micronutrient and general malnutrition interventions, the latter mainly through community-based programs. Micronutrient interventions should form an important part of the investments considered here, as in many cases the knowledge and decisions to proceed are in place, and additional resources can be successfully applied.

### Analyze Capacity to Define Gaps and Needs

The principles are clear, and now need to be applied to specific countries. The objective should be to support and build the capacity of countries to implement these programs, filling resource gaps as appropriate. This involves finding out where the difficulties in meeting needs lie. This can be seen in a human rights or a governance perspective. The questions concern who can, may, and should take action, starting at the household level. UNICEF has put this forward in terms of analyzing capacity. However formulated, the process is to decide who needs to be supported, and how, to bring about the needed changes. The next steps recommended in this process must build on the country reports and on considerations such as put forward here and in the overview paper, to identify the key points of intervention. Support for local programs, and for micronutrient deficiency control measures, have been suggested as the main priorities. Identifying exactly how to do this comes next, and the “capacity analysis” approach is the way to go (UNICEF 1999).

## **Policy Dialogue and Supporting Policies that Affect Context**

Programs can be effective under the right conditions, and these tend to be related to fundamental causes of malnutrition, such as social exclusion and women's status. These conditions may be affected by policy decisions and implementation. In the process of negotiating investment from international financial institutions in nutritional improvement, the basic requirements underpinning programs may prove feasible issues for modification. At the same time, the simple but crucial decisions to actually commit resources and implement the programs themselves must be taken.

Beyond context, the coexistence of key programs must be fostered. Poverty alleviation facilitates nutrition improvements in two ways. First, the programs themselves provide household resources for improving nutrition. Second, poverty alleviation program organization can provide for the structure, outreach, and individual contact that nutrition activities can build on. This is the case in PRC and Sri Lanka where the poverty alleviation organizations provide the best prospect of extending and supporting local programs.

The direct effects of improvements such as in education, particularly for women, and in water and sanitation, have far-reaching effects on nutrition. Usually these factors are strongly associated with child growth, although the precise relations vary and need to be seen in specific circumstances (Mason, Jonsson et al. 1999, ch. 3). Nutrition considerations may help to target these. More contentious is the prospect of redirecting nutrition resources that are currently used wastefully. This refers primarily to the resources used for food subsidies and public food distribution programs. The resources spent on these are nearly enough, in some countries, to finance much of the local programs for nutrition, if they could be reallocated.

Taking and implementing many of these decisions, by governments, international financial institutions, and agencies are prerequisites for reducing malnutrition.

## **Meeting Program Needs**

Implementing programs, when resources are committed, will take a number of practical steps. Gaps in capacity must be filled. The needs will be:

- (i) **Organization:** programs depend on local organization and decentralization of resources and decision-making; including fostering community level organizations, by assigning budgets, legislation, and other means;
- (ii) **Training:** the effort envisaged for training village level workers, and their support, is extensive, and will require multilevel structures for training, materials, incentives, and supervision;

- (iii) Advocacy and social mobilization; information; education; training; and support for service delivery as defined by UNICEF; and
- (iv) Mobilization of resources: direct financial inputs will be required, especially for the large numbers of village workers and their facilitators who will need incentives and remuneration, likely beyond the capacity of communities and governments; for external finance, negotiations as to type and level will be needed, in conjunction with reallocation of governmental resources.

### **Solving Generic Issues for Planning and Program Design**

A number of issues that affect all potential programs remain to be resolved. Most involve research that should be undertaken at an early stage, and represent sensible investment in terms of program effectiveness in the future. Some of the salient issues are outlined here.

Resources should be applied to a problem in such a way that the population can respond and the problem is alleviated. In nutritional terms, this means identifying accurately which population groups can respond to which type of intervention. For example, behavioral change (child feeding practices, for instance) may not be possible by some methods for some groups, and this needs to be better defined or ineffective programs will be designed. A similar issue concerns defining the contextual factors and how these can be changed by policy to improve program success. These issues can be researched and guidance provided for country program design.

More specifically, knowledge of the relative roles and cost-effectiveness of different community-based and facility-based activities is not yet well laid out. This could be improved from compilation and synthesis of current knowledge. Such research, although of general application, would be most useful in advance of detailed program planning. The relative effects of using resources for supplementary feeding, compared with using the same resources for behavioral change, could also be worked out as a generic issue.

Population growth in Asia is in the cities and towns. As a result, the malnourished are increasingly in urban areas. Yet most planning for improving nutrition refers to villages and rural communities. Research is needed on the most effective means of improving nutrition in urban areas, and where these have common features and problems, this research can be generic. We need to focus on nutrition-relevant programs in cities and their evaluations, as well as understand better the parallels with rural programs, especially regarding the appropriate forms of local organization.

The relationship of level of effort (for various activities) to impact needs to be better understood. This is likely to be nonlinear, which is crucial as it means that applying too low a level of resources is very wasteful. It does not mean that the

problem will simply be solved more slowly, it means that it will not be solved at all until the level of effort is sufficient to cause change. This has enormous implications for planning investments, and needs to be researched.

Finally, a number of technical issues need research, of which the clearest concern fortification, most urgently iron fortification of staple foods.

### **Looking Ten Years Ahead**

This review leads to extensive proposals for finance, and even more for recruiting and training millions of people. Better nutrition and development for children is a powerful outcome objective, with implications for society and development overall. But the process proposed is important too. What will change, what will be in place, in ten years' time if these recommendations are adopted, financed, and implemented?

Most communities would have a structure of local workers and supervisors in direct contact with families in villages and urban areas, not only helping them to solve nutrition and health problems and raise healthier children, but also assisting with community development, supporting women, and providing a range of benefits. Programs would be multifaceted at the local level, and although the structure might start with nutrition as a main concern, the benefits would be wider still. In particular, problems of social exclusion, and discrimination by class and gender, would have some counteracting forces.

For individuals, specific nutritional problems would be well on the way to solution. Micronutrient deficiencies would be becoming a thing of the past, with goiter and iodine deficiency vanishing, and vitamin A deficiency no longer visible and subclinically much reduced. Anemia would likely be in retreat, with successful fortification. Pregnant women in particular, others too, would be getting regular multiple micronutrient supplements. Low birth weight and early childhood growth failure, and associated sickness and death, would be much reduced—the next generation would be larger, healthier, benefit more from education, and be more productive.

The intergenerational perpetuation of malnutrition will have been cut into, and a process of steadily improving pregnancies and child survival and development promoted. Human capital, development, and rights will all benefit.

Governments have committed themselves to this scenario already. The Convention on the Rights of the Child enshrines the agreement of governments to vigorously support such a process. Adopting these measures will itself be a significant contribution to meeting governments' obligations to implement the Convention on the Rights of the Child.

## References

- ACC/SCN, 1992. *Second Report on the World Nutrition Situation, Vol. I: Global and Regional Results*. Geneva: ACC/SCN.
- Administrative Staff College of India, 1997. "National Strategy to Reduce Child Malnutrition; Investment Plan; Final Report." Asian Development Bank, Manila. Mimeo.
- Allen, L.H., 1994. "Nutritional Influences on Linear Growth: A General Review." *European Journal of Clinical Nutrition* 48(Suppl 1):S75-89.
- Applied Economics Research Centre, 1998. "Final Report on Pakistan Country Strategy Paper on Programs and Investment Strategies to Reduce the Incidence of Child Malnutrition in Pakistan, Vols. I and II." Asian Development Bank, Manila. Mimeo.
- Asian Development Bank (ADB), 1998. "PRC Study on Strategies for Reducing Child Malnutrition." Draft report for the ADB-UNICEF Regional Technical Assistance Project on Reducing Child Malnutrition in Eight Asian Countries. Asian Development Bank, Manila.
- Barker, D.J.P., 1995. "Fetal Origins of Coronary Heart Disease." *British Medical Journal* 311:171-4.
- Beaton, G., R. Martorell, K. Aronson, B. Edmonston, G. McCabe, A. Ross, and B. Harvey, 1993. Effectiveness of Vitamin A Supplementation in the Control of Young Child Morbidity and Mortality in Developing Countries. ACC/SCN State-of-the-Art Series, Nutrition Policy Discussion Paper No. 13, ACC/SCN, Geneva.
- Bleichrodt, N., R.M. Shrestha, C.E. West, J.G. Hautvast, F.J. van der Vijver, and M.P. Born, 1996. "The Benefits of Adequate Iodine Intake." *Nutrition Review* 54(4, Pt 2):S72-8.
- Bouis, H.E., and J. Hunt, 1999. "Linking Food and Nutrition Security: Past Lessons and Future Opportunities." *Asian Development Review* 17(1,2). This issue.
- Brown, J., and E. Pollit, 1996. "Malnutrition, Poverty and Intellectual Development." *Scientific American* 2:38-43.
- Engle, P., 1999. "The Role of Caring Practices and Resources for Care in Child Survival, Growth, and Development: South and Southeast Asia." *Asian Development Review* 17(1,2). This issue.
- FAO/WHO, 1992. *International Conference on Nutrition Goals. World Declaration and Plan of Action*. FAO, Rome and WHO, Geneva.
- Gillespie, S., J. Mason, and R. Martorell, 1996. "How Nutrition Improves." Paper based on an ACC/SCN Workshop on Nutrition-Relevant Actions in Developing Countries—Recent Lessons, XV IUNS Congress, Adelaide, Australia, 25–27 September.
- Government of Cambodia, 1998. "Cambodian Nutrition Investment Plan." Asian Development Bank, Manila. Mimeo.
- Government of Sri Lanka, 1997. "Vitamin A Deficiency and Selected World Summit Goals for Children in Sri Lanka." MOH/MRI/UNICEF, Colombo. Mimeo.
- Government of Viet Nam, 1998. "Investment for Child Nutrition in Viet Nam." UNICEF, Hanoi. Mimeo.
- Grantham-McGregor, S., 1995. "A Review of Studies on the Effect of Severe Malnutrition on Mental Development." *Journal of Nutrition* 125(85,Supplement):2233-38S.
- Guillermo-Tuazon, A., and R.M. Briones, 1997. "Comprehensive Assessment of Nutrition Interventions." Report prepared for the ADB-UNICEF Regional Technical Assistance Project on Reducing Child Malnutrition in Eight Asian Countries. Regional Training Program on Food and Nutrition, University of the Philippines at Los Banos, Laguna, Philippines.

- Haddad, L., 1999. Women's Status: Levels, Consequences, Determinants, Interventions, and Policy. *Asian Development Review* 17(1,2). This issue.
- Horton, S., 1999. "Opportunities for Investments in Nutrition in Low-income Asia." *Asian Development Review* 17(1,2). This issue.
- INFS, and Department of Economics, University of Dhaka 1998. "Strategies for Bangladesh." Institute of Nutrition and Food Science, Department of Economics, University of Dhaka, and Dhaka Urban Community Health Program. Asian Development Bank, Manila. Mimeo.
- Institute of Medicine, National Academy of Sciences (IOM/NAS), 1998. *Prevention of Micronutrient Deficiencies. Tools for Policymakers and Public Health Workers*. C.P. Howson, E.T. Kennedy, and A. Horwitz, eds. Washington D.C.: National Academy Press.
- Jervell, J., 1995. Poor Nutrition and Chronic Disease. Introduction: Overview and Implications for the Future. SCN News. No.13. Pp 110-14, ACC/SCN, WHO, Geneva.
- Jonsson, U., 1995. "Success Factors in Community-based Nutrition-oriented Programs and Projects." Paper presented at the ICN Follow-up Meeting, New Delhi, November. UNICEF, South Asia.
- , 1996. "Nutrition and the Convention on the Rights of the Child." *Food Policy* 21(1):41-55.
- , 1997. "Nutrition, Complexity Theory and Society Evolution." Paper presented at the Meeting on Public Nutrition, Montreal, July.
- Kachondham, Y., P. Winichagoon, and K. Tontisirin, K., 1992. "Nutrition and Health in Thailand: Trends and Actions." UN ACC/SCN Country Case Study supported by UNICEF. Institute of Nutrition, Mahidol University, Thailand.
- Kauffman, S., 1995. *At Home in the Universe: The Search for the Laws of Self-Organization and Complexity*. Oxford: Oxford University Press.
- Kavishe, F., 1992 "Nutrition-Relevant Actions in Tanzania." UN ACC/SCN Country Case Study supported by UNICEF. Tanzania Food and Nutrition Centre.
- Mason, J., U. Jonsson, and J. Csete, 1995. "Is Malnutrition being Overcome?" Paper presented at the Meeting on Overcoming Hunger in the 1990s, Institute of Nutrition, Mahidol University, Thailand, 7-11 November 1994. In World Hunger Program, *Hunger Report 1995*. Brown University, Rhode Island.
- Mason, J.B., P. Musgrove, J-P. Habicht, and F. Watson F., 1995. "Nutrition as a Risk Factor in the Global Burden of Disease." Background paper for the World Bank/WHO Global Burden of Disease Study. Mimeo.
- Mason, J.B., V. Mannar, and N.B. Mock, 1999. "Controlling Micronutrient Deficiencies in Asia." *Asian Development Review* 17(1,2). This issue.
- Mason, J.B., U. Jonsson, D. Parker, and J. Hunt, 1999. "Reducing Child Malnutrition in Eight Asian Countries (Bangladesh, Cambodia, China, India, Pakistan, Philippines, Sri Lanka, and Viet Nam)." Draft overview paper prepared for the ADB-UNICEF Regional Technical Assistance (RETA 5671). Asian Development Bank, Manila.
- Mason, J.B., K. Sethuraman, A.C. Gilman, K.E. Mason, N.B. Mock, N. Dalmiya, and M. Lotfi, 1999. *Progress in Controlling Micronutrient Deficiencies*. MI/UNICEF. Forthcoming.
- Measham, A.R., and M. Chatterjee, 1999. "Wasting Away: The Crisis of Malnutrition in India." World Bank, Washington, D.C.
- MI/UNICEF/Tulane, 1998. "Progress in Controlling Vitamin A Deficiency." The Micronutrient Initiative, c/o International Development Research Center, Ottawa.

- Mock, N.B., and J.B. Mason, 1999. "Nutrition Information Systems for Implementing Child Nutrition Programs." *Asian Development Review* 17(1,2). This issue.
- Munoz, C., and N.S. Scrimshaw, 1995. "The Nutrition and Health Transition of Democratic Costa Rica." International Nutrition Foundation for Developing Countries (INFCO), Boston.
- Murray, C., and A. Lopez, 1997. "Global Mortality, Disability, and the Contribution of Risk Factors: Global Burden of Diseases Study." *Lancet* 349(9063):1436-42.
- Pelletier, D., et al. 1994. "The Relationship Between Child Anthropometry and Mortality in Developing Countries." *Journal of Nutrition* 124(Supplement,10S).
- Phillips, M., and T.G. Sanghvi, 1996. *The Economic Analysis of Nutrition Projects*. Washington, D.C.: World Bank.
- Savage King, F., and A. Burgess, 1993. *Nutrition for Developing Countries*, 2<sup>nd</sup> ed. Oxford: Oxford University Press.
- Schultink, W., and W. Gross, 1996. "The Influence of Vitamin A on Iron Status and Possible Consequences for Micronutrient Deficiency Alleviation Programs. In *Micronutrient Interactions: Impact on Child Health and Nutrition*. Washington D.C.: ILSI Press.
- Shera, A.S., G. Rafique, I.A. Khwaja, J. Ara, S. Baqai, and H. King, 1995. "Pakistan National Diabetes Survey: Prevalence of Glucose Intolerance and Associated Factors in Shikapur, Sindh Province." *Diabetes Medicine* 12(12):1116-21.
- Stanbury, J., 1998. "Prevention of Iodine Deficiency." In C.P. Howson, E.T. Kennedy, and A. Horwitz, eds., *Prevention of Micronutrient Deficiencies. Tools for Policymakers and Public Health Workers*. Washington D.C.: National Academy Press.
- Tomkins, A.M., and F. Watson, 1989. Malnutrition and Infection: A Review. ACC/SCN State-of-the-Art Series, Nutrition Policy Discussion Paper No. 5, ACC/SCN, Geneva.
- Tontisirin, K., and S. Gillespie, 1999. "Linking Community-based Programs and Service Delivery for Improving Maternal and Child Nutrition." *Asian Development Review* 17(1,2). This issue.
- Tontisirin, K., and P. Winichagoon, 1999. "Community-based Programs: Success Factors for Public Nutrition Derived from Thailand's Experience." *Food & Nutrition Bulletin* 20(3):315-22.
- Underwood, B.A., 1998. "Prevention of Vitamin A Deficiency." In C.P. Howson, E.T. Kennedy, and A. Horwitz, eds., *Prevention of Micronutrient Deficiencies. Tools for Policymakers and Public Health Workers*. Washington D.C.: National Academy Press.
- United Nations (UN), 1990. *World Summit for Children. World Declaration and Plan of Action for Implementing the World Declaration on the Survival, Protection and Development of Children in the 1990s*. New York: United Nations.
- United Nations Childrens Fund (UNICEF), 1990. Strategy for Improved Nutrition of Children and Women in Developing Countries. Policy Review Paper E/ICEF/1990/1.6, UNICEF, New York; JC 27/UNICEF-WHO/89.4. Review, UNICEF, New York.
- , 1998. *State of the World's Children. Focus on Nutrition*. Oxford: Oxford University Press for UNICEF.
- , 1999. "Towards a New Programming Approach for UNICEF in ESAR." UNICEF, Geneva.
- United Nations Development Program (UNDP), 1992. *Human Development Report*. Oxford: Oxford University Press for UNDP.
- , 1996. *Human Development Report*. Oxford: Oxford University Press for UNDP.

- Viteri, F.E., 1998. "Prevention of Iron Deficiency." In C.P. Howson, E.T. Kennedy, and A. Horwitz, eds., *Prevention of Micronutrient Deficiencies. Tools for Policymakers and Public Health Workers*. Washington D.C.: National Academy Press.
- West, K.P. Jr, J. Katz, S.K. Khatri, S.C. LeClerq, E.K. Pradhan, S.R. Shrestha, P.B. Connor, S.M. Dali, P. Christian, R.P. Pokhrel, and A. Sommer, 1999. "Double Blind, Cluster Randomised Trial of Low Dose Supplementation with Vitamin A or Beta Carotene on Mortality Related to Pregnancy in Nepal. The NNIPS-2 Study Group." *British Medical Journal* 27;318(7183):570-5.
- Winichagoon, P., Y. Kachondam, G. Attig, and K. Tontisirin, 1992. *Integrating Food and Nutrition into Development. Thailand's Experiences and Future Visions*. UNICEF/EAPRO and Institute of Nutrition, Mahidol University, Thailand.
- World Health Organization (WHO), 1997. Improving Child Health IMCI: The Integrated Approach. WHO/CHD/97.12 Rev.2, Division of Child Health and Development, WHO, Geneva.