

## **Investment in Human Development: Nutrition, Health and Economic Policies**

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### **Why invest in children?**

Investment in children is compelling for several reasons. First, children lie at the heart of international commitments to social justice. International forums, such as the *International Conference on Population and Development*, *World Summit for Children*, *International Conference on Nutrition*, *Education for All Initiative*, and *Beijing Conference on Women*, have a common theme: support for the economic and social rights for women and children lie at the heart of true development. Second, the International Development Goals are centered on raising the life prospects for poor women and children through nutrition, health, and education as human rights. The IDGs include the virtual elimination of infant, under-five child, and maternal mortality, of gender disparities in primary and secondary education, and fulfillment of universal primary school enrolment. These cannot be achieved without higher levels of investments in maternal nutrition, health and care, and in the comprehensive needs of young children. Cost-effective strategies to meet the IDGs do exist, and lie at the core of social protection programs for the most vulnerable women and children.

Develop a child, develop a nation. But the realities of child deprivation are alarming and ubiquitous in Asia. Addressing these patterns of harm and lost human potential are a global governance concern, because raising the prospects of poor Asian children will make global justice and peace possible. The alarming reality includes these facts:

Six million children under five years of age die each year in low-income Asia, more than half of the 11 million deaths globally. Virtually all deaths would be preventable through improved health and nutrition. Moderate and severely underweight children account for about 54 percent of the under-five deaths; the others die from vaccine-preventable diseases (especially measles), pneumonia and diarrhea. Many children who die were low birth weight babies due to the poor health status of their small mothers. Malnutrition and poverty are mutually reinforcing across generations.

Three-quarters of the world's 150 million underweight and 177 million stunted children are in Asia. High child mortality, poor environmental hygiene, low dietary quality for the poor, and poor economic and health status of women explain why half of South Asian children are underweight and/or stunted, by far the highest rates in the world. The rest of Asia is doing relatively better, but Asian children are getting a poor start in life compared to other regions. The impacts on mortality, disability and depressed economic growth (at least 3 percent of GDP according to an ADB study) are heavy yet preventable.

Three quarters of the persons suffering from Vitamin A, iodine and iron deficiencies are in Asia, mostly young children and their mothers. Tiny amounts of vitamins and minerals are needed by

the human body for normal growth and development and good health. Their absence costs lives, and causes disabilities and mental impairment.

Collectively, they damage health; cause death; harm reproduction; reduce intelligence, educability and academic achievement; and lower work productivity and occupational choices. Of special concern, micronutrient deficiencies interfere with child growth and development, sometimes permanently.

Of special concern, iron deficiency anemia (IDA) affects 60 percent of Asian women of reproductive age, and 40-50 percent of preschoolers and primary graders. This causes at least one-fifth of the maternal deaths in the developing world and depresses language and reading skills, hence academic achievement, of young students. Little progress has been made in reducing clinical anemia in Asia, with dire consequences.

As if these losses were not devastating enough, there are insidious, rarely quantified costs that result from deficiency-caused disabilities. These include therapeutic health care; remedial education for the blind, retarded and deaf; custodial care for cretins; limited occupational choices for the mentally retarded, blind and deaf, and anemic workers; and care for motherless children.

More than 30 million children between the ages of 6 and 11 years are not enrolled in school -- the majority are girls who will become tomorrow's illiterate women. Poor nutrition exacerbates other risks that precipitate dropouts.

Human capital improvement is an essential goal of economic development. Development partners, including the Asian Development Bank, place strong emphasis on human development policies that share the opportunities for growth and fruits of development with the children of the poor. Well-developed children will be more productive, contributing citizens. The reasons for investing in the human potential of poor children are both compelling and self-evident.

The global community has recognized through the UN Convention on the Rights of the Child, signed by all Asian governments, that governments must work to ensure the development of each child. The Convention establishes a framework of internationally agreed principles that clearly define what must be done. Asian Governments have pledged to provide health and nutrition for all children, and to guarantee essential education as a human right as well as the key to equitable growth and sustainable development. Yet these pledges have been far from realized, because the levels of investment in social services are hardly commensurate to the need, in part because all too often systems are served rather than the child.

There are also strong economic and social arguments supporting increased investment in children. First, enriched human development may reduce poverty more sustainably than any other strategy. Child development is the trigger point of human development theory. The most critical period of brain development is in the first three years of life and proper nutrition is a critical factor in brain development. Many learning disabilities can be prevented by ensuring adequate nutrition during infancy -- and even before birth by providing adequate health and nutrition for the pregnant mother. The elasticity of the human brain and the plasticity of the human personality are unmatched during the first three years of life. Adequate care of the young child promotes the autonomy of the individual and the self-reliance of the family. "Investments

in early childhood can modify inequalities rooted in poverty and social discrimination"(Young, 1997).

Second, investment in children raises the efficiency of public expenditure and reduces the need for public resources to compensate later on. Early investment in the mother and infant reduces mortality of the most vulnerable groups, reduces illness and dropouts from primary schooling, opens the possibility for lifelong learning, and reduces the state's burden to finance public health and education, and the custodial care of the dysfunctional and lawless. The tendency to drop out of school is compounded by lack of adequate preparation for schooling. Many children who were malnourished as infants, or whose mothers were malnourished during pregnancy, suffer from deficient brain development with obvious consequences on their ability to learn -- and eventually on their productivity as adults. A large body of evidence demonstrates that the earlier the learning capacity of the child can be addressed the better. Investments designed to improve sanitation, health, nutrition, and education for children often benefit the whole community, and allow mothers to pursue earning and education goals.

Third, investing in children strengthens the prospects of long-term economic competitiveness and future quality and productivity of the labor force. Resources that support families to meet the health and nutrition needs of infants and toddlers develop the human brain and its capacity for curiosity, reasoning, inquiry, and social conscience. Expanding the capacity for learning and the potential for achievement for each child in school and the workplace raises wages of the worker, increases permanent income of the family, permits investment in the quality of the next generation, and shifts the major fiscal responsibility of raising children from the state to families, communities, and the private sector. Investments in primary education, along with compatible macroeconomic policies and infrastructure development, are demonstrably the triggers to equitable growth.

Fourth, investment can correct or compensate for the historic biases against girl children through special programs in health and nutrition, incentive packages to induce parents to enroll and sustain girls in basic and secondary education, and ensure that social protection programs mainstream gender concerns. This will help to break the vicious cycle of poverty and underachievement because educating women is the key policy variable to linking child development and sustainable development. "Studies from diverse cultures show that girls who participate in early childhood programs are more likely to attend and continue in school"(Young, 1997).

### **The Economic Costs of the Status Quo**

This section reviews in detail the costs of doing very little for children's nutrition: preventable deaths, lost schooling achievement, productivity and economic growth. On the positive side, the cost-effectiveness and high rates of return on health and nutrition investments on survival, growth and development of young children are reviewed.

WHO has provided the best known estimate of nutrition's contribution to the global burden of disease, about 16 percent (Murray & Lopez, 1996). This is certainly an underestimate, because malnutrition's contribution to mortality from communicable diseases is not factored into the

model, and the recently discovered links between fetal malnutrition, low birth weight, and chronic disease risks in mid-life are ignored as well. Mason *et al* (1995) estimate the contribution is about one-fourth. Nutrition's contribution may increase in the next century, even if underweight under-fives decline, according to Murray and Lopez (1996). The projected shift in disease burden towards cardiovascular diseases, diabetes, and cancer, with persisting problems among the infectious, parasitic and respiratory diseases, have an underlying theme: nutrition as a shared risk factor.

Within the region, estimates of the costs to economies, communities, and individuals in Asia are rare and even more rarely considered by the finance and planning ministries that determine investment priorities. There is an age-old bias that nutrition is a welfare function of the household, not a source of productivity for the society. Hence, the pressure on public finance has been weak because the investment argument has not been adequately framed or communicated. So nutrition has been difficult to compare with other alternatives. But there is strong evidence that hidden hunger exacts a hidden cost of major proportions on the productivity of societies and the long-term growth prospects of Asian economies.

### *Mortality*

A re-examination of underweight malnutrition on mortality of children less than five-years old showed that about 54 percent of deaths are associated with moderate and severe malnutrition, with the 'moderates' responsible for most of the deaths (Pellitier *et al.* 1994). While malnutrition is associated with being underweight and mortality risk is linked to the severity of that state, recent evidence shows that micronutrient deficiencies play a major role in mortality risk as well, especially for pregnant mothers and young children, through influence on height, size, and proper functioning of the immune system. Child deaths from infectious disease are strongly influenced by micronutrient status. VAD in both the clinical and subclinical forms is a major risk factor for children dying from measles, pneumonia,<sup>1</sup> and diarrhea. Studies have shown that improving the vitamin A status of children less than five-years old and their mothers during pregnancy and lactation will reduce mortality by about one fourth, possibly more.

A recent study ADB-UNICEF in 1999 concluded that in nine low-income Asian countries<sup>1</sup>, moderate and severe malnutrition is responsible for 2.8 million preventable child deaths annually. In addition, there are 65,000 deaths annually from anemia (Table 1).

There are also substantial deaths of mothers and preschoolers from subclinical VAD. It was recently estimated that the lives of some 714,000 children less than five years old have been saved annually in 12 low to middle-income Asian and Pacific countries from steady improvement of vitamin A status, with an additional 211,000 instances of child blindness avoided (Table 2). The human tragedy that these figures represent dwarfs the economic consequences, but the lost potential of these lives is a very high price to pay for inaction.

While nutritionists tend to classify nutritional deficiencies as 'macro' when they relate to inadequate energy and protein, and 'micro' when referring to essential vitamin and mineral deficiencies, this is a confusing and false distinction. Both 'macro' and 'micro' deficiencies

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<sup>1</sup> Bangladesh, Cambodia, People's Republic of China, India, Lao PDR, Nepal, Pakistan, Sri Lanka and Viet Nam

**Table 1.** Estimates of excess mortality attributable to malnutrition

<i>Country</i>	<i>Child Deaths Per Year ('000)</i>	<i>No. Due to Mod/Severe</i>	<i>Maternal Deaths Per Year ('000)</i>	<i>No. Due to Anemia</i>
Bangladesh	327	215	24.3	5.6
Cambodia	63	39	33.0	7.6
PRC	970	287	19.6	4.5
India	2,810	1,730	139.3	32.0
Lao PDR	30	17	1.5	0.3
Nepal	95	51	12.5	2.9
Pakistan	687	367	17.1	3.9
Sri Lanka	6	3	4.0	0.9
Viet Nam	92	53	33.0	7.6
Total	5,080	2,762	284.3	65.3

*Source:* Horton (1999)

Author's calculations, using data in Table 1, Appendix Table 1, and information on relative risks in Pelletier *et al.*, (1994).

**Table 2:** Improving vitamin a status in Asia: saving lives, eyesight, and health care costs

<i>Country</i>	<i>Children's Lives Saved per year ( '000)</i>	<i>Childhood blindness averted per year ( '000)</i>	<i>Savings in health care costs per year</i>	
			<i>High US\$</i>	<i>Low ( '000)</i>
Bangladesh	114.2	9.4	9,005	6,670
Cambodia	6.4	1.1	736	545
PRC	69.9	71.0	20,058	14,857
India	381.8	77.9	70,549	52,259
Indonesia	47.0	15.3	2,898	2,147
Nepal	12.1	2.5	1,978	1,465
Pakistan	66.1	15.9	10,139	7,511
Papua New Guinea	1.5	0.4	263	195
Philippines	5.0	6.7	3,408	2,525
Sri Lanka	0.4	1.1	741	549
Thailand	2.7	3.4	1,552	1,150
Viet Nam	7.3	6.7	5,119	3,792
Total	714.4	211.4	126,473	93,665

*Source:* OMNI/USAID Economic Analysis of Micronutrient Interventions-August 1998

influence height, size, immunity, and brain development. And dietary deficiencies are responsible for both kinds of problems. The successful model for Asia will be two-fold: to direct integrated services to poor mothers and children, while building public-private partnerships to raise the quality of diet for all Asians. This amounts to a 'dietary quality' revolution as profound as the green revolution of the 1960s. The issue is no longer simply food security based on per capita calorie availability. Rather, it is comprehensive nutrition security based on an affordable diet of high nutritional quality whose outcome is better judged by mental acuity and economic productivity than by mere physical survival and the capacity to do hard physical labor.

### *Productivity*

The direct productivity effects of malnutrition are on the capacity to perform physical work and on earning ability. Protein-energy malnutrition (PEM), stunting, and iron-deficiency anemia (IDA) reduce both. Improvements in PEM improve wages through increases in weight-for-height, while improvements in iron increase the capacity to perform moderate to hard labor with related increases in wages. These effects have been demonstrated in India, Indonesia, Philippines, and other countries (Haddard & Bouis, 1991; Basta *et al.*, 1979; Deolalikar, 1998; Spurr *et al.* 1977; Behrman 1992)

The indirect productivity effects are on cognitive ability and achievement, through impact on psychomotor skills, development quotients (DQs) for infants, and intelligence quotients for both pre-school and school-age children. IDD, PEM, and IDA have substantial negative impact on developmental capacities of children, probably in that order of significance. In high-risk populations with a large incidence of goiter, IDD depresses average intelligence by 13 IQ points (Bleichart & Born, 1991). Salt iodization programs throughout Asia are rapidly eliminating this problem, but much work remains to be done in terms of program coverage and product quality. IDA depresses psychomotor skills and intelligence, but the effects are reversible if the intervention is early enough (Bleichart & Pollitt, 1996; UN, 1998). PEM depresses DQs and Bayley scores in 12-month-old children in a controlled study have shown that psychomotor and mental development indices correlate with birth weight groups. On the other hand, appropriate complementary feeding for under-twos has a remarkable effect on stunted children of impoverished background, especially when combined with early cognitive stimulation (Grantham – McGregor, 1995).

Recent analysis by Horton and Ross (2001) shows that IDA has substantial impacts on both physical and cognitive ability, but the cognitive effects on earning and national economic growth are dominant, and these impacts increase proportionately to average wage and per capita income in developing countries.

Further evidence suggests that thin children are usually the issue of thin mothers, and both are caught up in an intergenerational cycle of poverty and malnutrition. Underweight or very thin children, suffering from macro and micro deficiencies, are much more susceptible to chronic diseases in midlife, including cardiovascular diseases, hypertension, and diabetes, which combined with poor adult diets predispose for adult obesity (Barker, 1996). Thus, poor children risk a ‘double burden of disease’ through fetal risks. Proper nutrition for the mother and young infant will avert a substantial disease burden across the life cycle of the next generation.

### *Macroeconomic impact: depression of growth*

A recent effort to impress governments on the urgency of taking action has yielded estimates of the growth-reducing impact of malnutrition in a number of low-income Asian nations. ADB and UNICEF worked with seven countries<sup>2</sup> to develop 10-year investment programs that would achieve the International Conference Nutrition (ICN) and World Summit for Children (WSC) goals somewhat belatedly. The general conclusion was that malnutrition, with its insidious

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<sup>2</sup> Bangladesh, Cambodia, People’s Republic of China, India, Pakistan, Sri Lanka, and Viet Nam

effects over the life span of the child, will cost the economy at least 3 percent of gross domestic product, based on conservative assumptions (a ‘low scenario’ built into the model). India, for example, loses growth from two directions: adult productivity (3 percent) from PEM, iodine deficiency, and iron deficiency; and from IDA-induced cognitive impairment (about 1 percent) (Table 3). The study estimated that productivity losses for manual laborers are up to 9 percent for severely stunted workers; losses from IDA are 17 percent for workers engaged in heavy physical labor and 5 percent for moderate workers. Losses due to cognitive deficits for malnourished children were 10 percent for stunted individuals, 4 percent for IDA, and 10 percent for IDD (from Horton, 1998). This translates into a staggering sequence of losses in growth and human potential for the region as a whole.

**Table 3:** Estimates of productivity costs of malnutrition in selected countries as percentage of GDP

<i>Losses of adult productivity</i>			
<i>Country</i>	<i>PEM</i>	<i>Iodine Deficiency</i>	<i>Iron Deficiency</i>
India	1.4	0.3	1.25
Pakistan	0.15	3.3	0.6
Viet Nam	0.3	1.0	1.1
<i>Losses including childhood cognitive impairment associated with iron deficiency</i>			
<i>Country</i>	<i>Cognitive Only</i>	<i>Cognitive Plus Loss in Manual Work</i>	
Bangladesh	1.1	1.9	
India	0.8	0.9	
Pakistan	1.1	1.3	

*Sources:* Calculations for adult productivity from Administrative Staff College (1977), AERC (1997), and Horton (1999), including impairments from Ross and Horton (1998). The data for India from Administrative Staff College are the ‘low scenario’ and are about half the size of the ‘moderate scenario’ losses, and only one-third the size of the ‘high scenario’ losses.

Recent estimates on the costs of IDA by Horton and Ross (2001) drawn from a ten country sample in all developing regions, demonstrate the huge losses to personal income and national economic growth imposed by poor cognitive development in early childhood with lifelong consequences. Among the ten countries, average annual productivity losses are estimated at 0.57 % of GDP, but when cognitive losses are added, the total is 4.05 percent. Losses in absolute terms rise with level of per capita income by country; for example, the annual losses to anemic South Asians is \$ 2.04- \$ 4.53, or \$5 billion for the sub-region; for richer Latin America, the range is \$ 4.03 - \$8.53. Investments in women and early childhood development (see below) should stress reductions in anemia with greater emphasis on cognitive outcomes.

### **Costs and benefits of sustained nutritional improvement**

#### *Cost effectiveness*

Cost-effective nutrition interventions are available and should be used more consistently (Horton, 1998; Del Rosso & Marek, 1996; Institute of Medicine, 1998) (World Development Report,

1993); Expressed in terms of Disability-adjusted Life Years (DALYs)<sup>3</sup>, or healthy years of life saved, the following interventions cost less than \$25/DALY: breastfeeding promotion, salt iodization, staple fortification with vitamin A, semi-annual mass dose of vitamin A, iodine injections for pregnant women, and daily (probably weekly also) oral iron for pregnant women); parallel health interventions at similar cost are the Expanded Program on Immunization Plus (immunizations plus Vitamin A semi-annual doses); school health (particularly integrated iron supplements with deworming medication); and health, nutrition and family planning information and education campaigns. Please note the obvious synergies in promoting joint health and nutrition interventions for mothers and their young children in the form of family-based packages of services.

Other interventions are available for under \$75/DALY: improved weaning practices for children, and food supplements for children and pregnant women. The US Institute of Medicine (1998) summarized evidence on iron and vitamin A interventions, both supplementation and fortification; most interventions cost less than \$25/DALY<sup>4</sup> (Tables 4 and 5), as do some school health and nutrition programs that are competitive with immunization programs (Table 6, from Del Rosso and Marek (1996).

**Table 4.** Cost and benefit/cost ratios of iron supplementation schemes and general iron fortification programs

<i>Intervention</i>	<i>Benefit/Cost Intervention</i>	<i>No. DALYs<sup>a</sup> Achieved</i>	<i>Cost Per DALY (US\$)</i>
Short-term (daily, weekly) benefits and costs of iron-supplementation programs			
Prenatal supplementation only	511	100	51
Widespread supplementation to all iron deficient and anemic subjects and at risk groups	4,665	88	24
Universal fortification	5,038	16	11
plus residual prenatal supplement <sup>b</sup>	5,394	39	16
Long-term benefits and costs of iron supplementation programs			
Preventive supplementation	2,679	37	17
Fortification	3,332	9	

DALY = disability - adjusted life year

<sup>a</sup> Per 100,000 population, considering global birth rates, fixed and other operational costs, and current individual expenditures in purchasing iron-containing preparations (based on information from Guatemala).

<sup>b</sup> Considering that in spite of iron fortification and adequate prepregnancy iron reserves, prophylactic iron supplementation will still be recommended during pregnancy.

Source: Institute of Medicine (1998)

<sup>3</sup> DALY is a composite index of health linked to a productive life usually referred to as a “year of healthy life saved”. DALY is a weighted index that takes into account loss of life, morbidity, and disability and their collective impact on productivity.

<sup>4</sup> Prenatal iron supplementation and vitamin A-enriched food supplements are higher but within the USD75/DALY group.

**Table 5.** Cost-effectiveness of some vitamin A interventions

<i>Intervention</i>	<i>Target groups</i>	<i>Approximate Cost (US\$)</i>	
		<i>Per death averted</i>	<i>Per DALY saved</i>
Supplementation	Children < 5 years	50	1
Fortification	Entire population	154	4
Food supplement	Children < 5 years	1,942	63
Food supplement	Pregnant women	733	24

DALY = Disability Adjusted Life Year

*Source:* Adapted from World Bank (1993, p. 82).

**Table 6:** The Cost-effectiveness of school-based nutrition and health services

<i>Health intervention</i>	<i>Cost per DALY gained (1990 USD\$)</i>
EPI Plus	12-30
School nutrition and health programs	20-34
Family planning services	20-150
Integrated management of the sick child	30-100
Prenatal and delivery care	30-100
Tobacco and alcohol prevention programs	35-55

DALY = disability-adjusted life year; EPI = Expanded Program on Immunization.

*Source:* Del Rosso and Marek (1996)

*Returns on nutrition investments.*

The World Bank (1994) summarized the benefits of micronutrients in terms of cost per life saved and productivity gained per program (Table 7). For saving lives at least cost, targeted supplementation to at-risk groups (pregnant mothers for iron, under-fives for vitamin A) is more cost effective than fortification, although the latter is a more sustainable solution in the long run as incomes rise and households gain access to higher-quality primary health care. Nevertheless, properly targeted supplementation is justified while fortification programs are in the early stage and expanding coverage, as long as the targeting principles reflect risk assessment and are consistently applied.

From the perspective of enhanced productivity delivered by programs, where productivity is defined as the least-cost method of reducing clinical deficiency in the population, fortification is clearly the public policy choice. Fortification is three times as productive as supplementation with vitamin A for under-fives or iron supplementation for pregnant women, and is four times as productive as general iodine supplementation and twice as productive as targeted supplementation for reproductive-age women. So the population-wide impact is greatly increased by fortification.

**Table 7:** Returns on nutrition investments

<i>Deficiency/Remedy</i>	<i>Cost per life saved</i>	<i>Discounted value of productivity gained per program</i>	<i>Cost per DALY gained</i>
	(USD)	(USD)	(USD)
Iron deficiency			
Supplementation of pregnant women only	800	25	13
Fortification	2,000	84	4
Iodine deficiency			
Supplementation (repro-aged women only)	1,250	14	19
Supplementation (all people under 60)	4,650	6	37
Fortification	1,000	28	8
Vitamin A deficiency			
Supplementation (under 5 only)	325	22	9
Fortification	1,000	7	29
Nutrition Education <sup>a</sup>	238		
Nutrition education and maternal literacy	252		

DALY = disability-adjusted life year.

Source: World Bank (1994)

<sup>a</sup> Tilden *et al.* (1994).

Based on the ADB-UNICEF seven-country study, the calculated costs per beneficiary per year (Table 8) were in the following order: all micronutrient supplementation and fortification programs, less than \$1—except iron for pregnancy, less than \$2; nutrition education (e.g. breastfeeding) under \$5; and community-based programs (growth monitoring, home gardening), less than \$10. The outlier is feeding programs, which range from \$70 to \$100 per 1,000 calories delivered, suggesting that the long-standing practice of untargeted or inappropriately targeted food subsidies in large parts of Asia has been expensive and inefficient by international standards. Reallocation of those resources to more cost-effective nutrition outcomes should be the priority of governments before they seek external assistance.

The argument presented in the paper is that two directions for investment surpass all others. First, the fortification of essential foods is a pro-poor investment that will solve the micronutrient deficiencies and increase child height and weight through a "dietary revolution" sustained through market-based solutions. The second pathway is through integrated programs targeting the essential biological and cognitive development of young children. Both approaches have proven and low cost solutions available if there is political will to make them happen. The next sections demonstrate this argument, and the paper concludes.

*An investment bargain: fortifying essential foods consumed by poor mothers and children*

Investment per head in fortifying staple and weaning foods is an order of magnitude lower than highly cost-effective supplementation programs. For example, iodine supplementation per capita for at-risk groups costs \$0.50 per year, while fortification costs only \$0.05 per capita per year. The cost of adding fortificants for essential vitamins and minerals is about \$0.50 per person

**Table 8:** Approximate unit costs of interventions with effects on nutrition

<i>Intervention</i>	<i>Cost per beneficiary per year (USD\$)</i>
Education (e.g. breastfeeding)	5.00
Micronutrient supplementation	0.50
Iodine	
Iron (per pregnancy)	1.70
Vitamin A	0.20
Micronutrient fortification	
Iodine	0.05
Iron	0.09
Vitamin A	0.05-0.15
Feeding programs (for '000 cal/day)	70.00-100.00
Community-based programs (home gardening, growth monitoring)	5.00-10.00

*Source:* Horton (1999)

annually<sup>5</sup>, about the cost of a packet of cigarettes in Asia. Put another way, the additive costs of fortificants are no more than 3 percent of the \$12 per person that WHO recommends countries spend on primary health care. Since micronutrient enrichment is as effective in preventing illness, disability, and death as is primary health care, there will be no sensible argument against fortification as long as the public is aware of the benefits.

Both food industry producers and consumers need to be fully informed about the minimal change in production or purchasing decisions required to shift preferences and demand to fortified foods. The technical costs of production are not prohibitive.

The public sector has a major role to ensure quality assurance and a level playing field for all producers, and to assist the shift to fortified staples with aggressive social marketing to the less affluent. This is a proper use of public resources because it has a preventive health thrust and will allow people's needs to be both felt and informed. The result will be informed choices by all groups of society.

A major regional effort to shift public resources toward public-private partnership to promote fortification of staples and complementary foods for infants is needed, and this deserves extensive discussion. One task is to disseminate to policymakers information about what the status quo costs in lives, disabilities, and lost resources, and how beneficial fortification approaches could be applied. The donor and professional communities should then provide concerted support.

<sup>5</sup> This assumes total iodine and iron requirement and about one third of the Recommended Daily Allowances (RDA) for vitamins A, D, E, and the B group.

**Table 9.** Early childhood development project-Philippines annual earnings and savings from improvement in nutrition (estimates for 1999)

	<i>Pesos (Millions)</i>	<i>USD (Millions)</i>
Current earnings from increased agricultural productivity because of a 50 percent reduction in anemia	1,340	48
Future wages gained because of a 50 percent reduction in iodine deficiency, mortality and stunting	8,400 - 19,600	300-700
Savings in government health expenditures because of a 50 percent reduction of malnutrition-related diarrhea, blindness, and acute respiratory infections	168-672	6-16
Other Benefits (6 years) 144,000 lives saved		
Higher IQs 400,000 infants (+13 pts.)		

*Source:* Heaver & Hunt (1995)

*Summary: economic benefits of fortification programs*

As adapted from Popkin (1978), in Task 10, the economic benefits of fortification are reduced morbidity, improved work capacity, and improved cognitive effects.

Reduced morbidity will reduce health care costs and days lost in school or at work; improve school attendance, concentration, and performance; and strengthen both production and consumption benefits. Reduced public health and public education expenditure, and reduced school dropout and retention rates will increase efficiency of public investment for essential social services and free resources for better uses.

Economic value of fortification is expressed in improved work output due to increased work capacity and improved marginal productivity of labor.

Lastly, improved cognitive ability will allow realization of the benefits of education expenditure; raise the number of years of schooling and academic performance; and, in a growing economy, will also raise wages and household income invested in the quality of the next generation of children.

*International agricultural research: plantbreeding for micronutrient enrichment of cereals*

An extensive research project by the Consultative Group for International Agricultural Research on enriching five staple foods has been ongoing since the mid-1990s, and a major consortium effort on rice is underway with the International Rice Research Institute and the International Food Policy Research Institute, under ADB leadership. By 2003, the prospect of reducing anemia, zinc and possibly Vitamin A deficiency through enriched rice germplasm will be judged. Biotechnology offers considerable promise, as reviewed in Bouis (2000).

**Table 10.** Valuation of economic benefits of fortification programs

<i>Outcome</i>	<i>Benefits</i>	<i>Value</i>
Reduced morbidity	Reduction in health care (depending on patterns of care)	Expenditure on health care, associated travel, and drugs
	Reduction in days of work lost by sufferer or career (depending on employment status)	Improved marginal productivity of labor
	Improvement in school attendance, concentration, and performance	Reduction in wasted education expenditure
	Production and consumption benefits	Discounted present value of per capita income over the years of life lost from premature death
Increased Physical work capacity	Increased work output	Improved marginal productivity of labor
Improved cognitive effects	Greater efficiency of school system; increased future productivity	Reduction in wasted education expenditure; reduced school dropout and retention rates
		Relationship with earnings and marginal productivity of labor

### **Benefits of integrated investments in early childhood**

A Global Conference on Investing in Young Children at the Carter Center (Atlanta) concluded in April 1996 that investment in early childhood is sound and linked to improved educability of children and ultimately to improved productivity of the labor force. Through investments in early childhood, human development is enhanced and contributes substantially to sustainable economic growth (Young, 1997) Early childhood development (ECD) programs focus on the preschool years and integrate interventions in child health, nutrition, and early education (addressing both cognitive and psychosocial needs).

The Conference concluded that there are five good reasons for investing in young children.

- (i) Well-developed children will be more productive and contributing citizens.
- (ii) Early childhood investments can reduce costs and improve the efficiency of primary and secondary schooling.
- (iii) Investments in ECD can modify inequalities rooted in poverty and social discrimination, including gender discrimination. Studies from diverse cultures show that girls who participate in early childhood programs are more likely to attend and continue in school.
- (iv) Improvements designed to benefit children in terms of sanitation, health, nutrition, and education often benefit the whole community and allow mothers to pursue earning and education goals.

- (v) Scientific research demonstrates that the early years are critical in the development of intelligence and most of the child's potential is developed by age four. The impact of ECD investments on personality and behavior is long lasting.

*Synergies among nutrition, health and education*

There is compelling evidence, in part drawn from the financial and economic crisis in Asia in the late nineties, that countries risk a 'lost generation' unless they improve nutrition for children less than two-years old, the stage of life when the body and brain experience maximum growth potential. The importance of adequate macronutrients and iron, vitamin A, and iodine during this period, combined with continued breastfeeding beyond the first six months, cannot be overestimated for the child's prospects as a student, as a worker, and as a citizen.

The pivotal issue is how investments can produce better students and more productive citizens. Child nutrition is an essential element in human development, and is best improved in the context of coordinated investments in primary health care, and early and basic education. Increasingly, these goals are best achieved in integrated early childhood development programs that converge interventions in pregnancy through the child's early primary school years. There are synergistic benefits:

- Nutrition has an impact on health through immuno-competence and stronger resistance to life-threatening infection;
- Health has an impact on nutrition in that reduced illness leads to weight and height gain;
- Nutrition and health improve psychosocial development and learning through better psychomotor skills and socialized vitality; and
- Nourished children who attend preschool are better socialized as preschoolers, less likely to drop out of primary school, adjust better to the social and academic environment of school, and perform better, especially in the early grades.

Two longitudinal studies in the INCAP villages in Guatemala (20 years) and Cebu, Philippines (15 years), respectively, provide strong evidence that the consequences of early childhood stunting are lower IQs, achievement scores, school attainments as teenagers, adult literacy, and wages. There are also behavioral effects such as poor attention and school performance, and poor interaction with adults. Conversely, early complementary feeding (with balanced macro- and micronutrients) for undernourished children less than two-years old (for about a year) has long-lasting benefits that reverse the intergenerational cycle of growth failure to a positive outcome and a hopeful future for poor children (Brown & Pollitt, 1996; UNICEF, 1998). The INCAP study showed that better nutrition improves IQs, achievement scores, adolescent intellectual performance, adult literacy, and wage effects.

Early childhood development (ECD) projects employ poverty targeting principles and focus on mothers and children (normally from birth through 8 years) to ensure that children receive adequate health and nutrition as well as mental stimulation and preparation for learning. Research in many countries shows that supporting ECD activities --- nutritional supplementation and education, essential child health services, and psychosocial and cognitive stimulation --- is a cost-effective method of reducing later drop-out from school and improving

learning and achievement. Yet, in the region as a whole, only a small percentage of young children benefit from ECD, and most are from middle- and upper-income groups. Investment in the needs of very young children, especially children of the poor, is an effective strategy for enhancing their capacity to learn and to benefit from schooling. ADB is increasingly supporting ECD approaches because benefits exceed those of traditional sector-specific health and education projects.

Public-private partnerships for child development are critically important to raise productivity of the newborn generation. No initiative by ADB or the private sector could more profoundly reduce poverty than to render the newborn pliant for life-long learning through adequate nutrition and care. The private sector has a major opportunity to influence the future of children here as well as gain generations of grateful customers.

#### *Illustrating ECD program benefits from the Philippines*

In preparing a sector study on early childhood development (ECD) in the Philippines (with the World Bank), (Heaver & Hunt, 1995) malnutrition emerged as one of the critical obstacles to improving early childhood potential. Thus, it was useful to calculate the benefits than an ECD package of interventions could offer to save the nation lost economic opportunities. Assuming a six-year investment program that addressed critical nutrition needs of mothers and under-fives, the annual savings for reducing anemia by 50% were \$48 million (based on credible increases in agricultural wages); future wages gained from a 50 percent reduction in iodine deficiency, child mortality and stunting would be up to \$700 million, and savings in government health expenditures from a 50 percent reduction in malnutrition-related diarrhea, blindness, and acute respiratory infections would be up to \$16 million. Other benefits (over the six years) would include 144,000 lives saved and higher IQs for 400,000 infants. This kind of economic argument did help the technical line agencies in the Government of the Philippines (education, health and social welfare) to make the relevant case for more government effort, and the result has been a national ECD program with support of the line agencies and both development banks, with over 5 million children as targeted beneficiaries.

#### **Setting the stage for new investment: intersectoral planning and consensus**

Our task is to bring the knowledge about what the status quo costs in lives, disabilities and resources, and how beneficial approaches could be applied to the policymakers who are in position to take action, and then provide concerted support from the donor and professional communities.

There is no sense making a broad appeal for increased investment in child nutrition unless there are champions for the cause who practice advocacy as a political art form. There are stakeholders who can influence the policy and institutional environments, and together they must lay claim on public finances on the grounds that investing in children is unquestionably a public good. Four complex environments must be carefully coordinated and actions calibrated to strengthen their collective will to support the needs of children.

*Policy environment.*

Governments are not accustomed to thinking about children as subjects of investment as such, so the environment must be created consciously. The levels of investment needed to meet the demonstrable need require a paradigmatic shift in thinking about child nutrition as both a public and private responsibility. There must be a national apex agency or an empowered Steering Committee at the highest level to consider and protect the regulatory, policy and program environment for fulfilling child rights and meeting child needs. Children are the moral claimants on government and civil society, which are the duty bearers of those claims.

*Inter-agency planning and capacity building*

Nutrition often lacks an institutional home or is relegated to a dusty corner in several power centers whose interests lie elsewhere. Elevating nutrition to a higher level of concern among all the agencies which influence nutrition as an outcome – that’s the challenge and there is no blueprint. One approach, taken in the Bank’s regional project on child nutrition with UNICEF, was to devote serious time and effort in creating national inter-agency steering committees that presided over preparation of ten-year investment programs for reducing child malnutrition in a sustainable manner. This was remarkably effective in a number of countries, because after two years of preparation the investment programs have been generally endorsed by their respective planning commissions. And this leaves open the tantalizing possibility that finance ministries may in time represent investment programs for child nutrition as conduits for consortium financing as a governance issue and as a means to attaining the ICN and WSC goals. The Bank is planning an Investment Roundtable for Asian Children in September 1999 to bring the finance ministries and the donor community together, and see whether the policy dialogue can engender action plans at the country level.

*Financial policy and strategic planning*

It should be possible to lay a productivity argument at the feet of the financial powers that be, but a parallel argument on why public finance rules should favor public investment in child nutrition must also be won. The argument has five pieces: Private claims match public duties when (i) public goods are created in the national interest (e.g., the Expanded Program and Immunization); (ii) markets fail and the public interest must be served even though private benefits are created in the process (e.g. no “free market” for pro-poor programs like primary health care or PEM control); (iii) externalities exceed private gain (e.g. control of communicable diseases); (iv) “mixed” goods require a public catalyst (e.g. creating an enabling environment for the private sector to fortify essential foods such as staples or complementary foods for infants); and (v) merit goods fulfill national obligations (i.e., meeting the WSC goals).

*Decentralization, Local Governance, and Community Empowerment*

The available evidence shows that community-based assessment, analysis and action plans are the key to improving child nutrition and linking nutrition activities to broader assessment of child potential and development. UNICEF’s planning strategy and the Bank’s regional study support this. Urban Jonsson's review of the contextual and programmatic factors that contribute to the

success of community-based programs reminds us that we have a good idea where we are going (Johnson, 1995). The tricky questions are: given that communities are the focus, what are the respective roles of central and local governments to support community demands and be accountable for the fate of children? Will government allow planning and financial disbursement to be coursed through communities without losing accountability? Will local governments and communities act in partnership to tailor their plans to actual needs and collaborate to sustain what they begin? These are the cutting edge questions that few Asian countries, excepting Thailand, have answered convincingly. Our challenge is to assist in the process of answering sooner rather than later.

### **Elements of an investment plan for early childhood nutrition**

There are useful, well-tried steps that can guide the creation of, and consensus regarding, a national investment program for child nutrition. These elements come to mind, but are hardly conclusive. Perhaps we should pool our experiences and expand the list which includes the following approaches.

- *Prepare a public expenditure review* and, possibly, a national nutrition accounts to identify the investment gaps and dubious corners of the budget where rational reallocation of domestic resources to more cost-effective ends can be justified.
- *Present the cost-effectiveness arguments* for each nutrition program or intervention, preferably linked to intersectoral outcomes to build broad ownership among technical and financial/budget agencies (see Tables 5-8).
- *Emphasize public and private savings from investment* (as in the ECD Philippines case). In appraising the child project in the Philippines, the Bank and the World Bank worked closely with the three technical agencies (health, education and social welfare) to ensure that the benefits of investment were broad-based and child-centered. Different methods were used. Project interventions in integrated maternal and child health and nutrition were shown to have much lower costs per DALY saved than competing alternatives such as vector-borne disease control or typically vertical child health or nutrition programs individually considered. The analysis showed that five health and nutrition interventions will each save more than 200,000 years of healthy and productive life, with PEM control at nearly the same level as control of diarrhea and acute respiratory infections, followed by IDD, EPI and Vitamin A deficiency control. Benefit-cost analysis showed the integrated health and nutrition interventions yielded a ratio of about 4, which is more than bankable by any standard. Regarding the early childhood education component, the analysis showed that improved nutrition lessened the risk of late entry into school and dropout in the early grades, increased the transition probability from grade 1 to higher grades, and the social rate of return was well above the minimum threshold established by the government. Day care programs added benefit value of the mother's time – 25 percent of expected earnings – as mothers were free to seek employment with additional benefits to the child. The range of demonstrated benefits was suitable to the political setting, and built a stronger alliance for neglected children among the key players.

- *Reiterate the economic losses and disease burden impact of “doing nothing.”* Positioning the opportunity cost of the status quo in relation to official commitments at the WSC and ICN, among others, may persuade the backbenchers to act. A disease burden analysis at the national level has two benefits: (i) current and future trends (say, across two generations) can be projected in DALY expressions, with nutrition’s contribution recast as the epidemiological transition unfolds, and (ii) the mismatching of current investment patterns and the emerging pattern of life-cycle nutrition-related risks can be vividly portrayed with sharpened debate on corrective budgetary response.
- *Link investment to a life-cycle view of nutrition,* so that the inter-generational impacts of child nutrition are clear and related to life-long health for the population. Improving the health and nutrition status of young children is clearly the top priority today, but those effects may erode over time unless parallel attention is given to addressing the needs of adolescent girls, young mothers, and the working-age population. A strong case can be made that preventing low birth weight and early childhood malnutrition (for under-threes) is the best intergenerational investment in human development that can be imagined, as long as the life cycle benefit stream is described and understood by policymakers.
- *Identify the core components* for priority investment, leaving an R&D budget at all levels of government and community to test pilots and take corrective action. Without local budgetary authority, formalized decentralization will not work.
- *Consider the time frame of the investment plan* (e.g. ten years) and then specify what can be achieved and how the investments will be phased. An essential maternal and child package could be designed and carefully tested for five years, and then expanded into a comprehensive investment program at a national level. This also provides time to build consensus at all levels of the society for child-centered governance.
- *Expand the dialogue to include the private sector and civil society.* There are community-driven and market-based solutions to sustaining nutrition that government should not attempt to emulate. Government’s role is to provide an enabling environment for these primary actors, and ensure regulation and quality control standards are consistently practiced.
- *Slice the investment gap pie into central/local, public/private, national/external portions,* and conduct consensus building workshops on how resources will be mobilized and deployed. External assistance, however large, must be seen as a residual of the government’s investment program, accessed as a last resource and inserted to stimulate change and sustain continuity.
- *Create a structure of accountability for and to the political leadership.* While UNICEF does an admirable job of pinning back the ears of political leaders on achieving the ICN and WSC goals, memory retention tends to be whimsical. Investment in institution building for sustained monitoring and advocacy of child needs and rights, and tracking progress toward commitments, is indispensable. Without this, societal attention will drift.
- *Reach regional consensus on priorities and take concerted national action.* Many issues require consensus at the regional level to discipline local behavior and set professional

standards to which the public and private sectors can aspire. These include nutrition surveillance, quality assurance, licensing and labeling of products, cutting edge technology applications; and statutory, regulatory, customs and trade reform; and convergent approach to the food and seed industries, to protect patents but also intellectual; property rights of the Commons. An example of a multiple approach to regional consensus and concerted action is the ADB's food-based approaches to eliminating anemia in Asia (Box 1)

## **CONCLUSION**

The unavoidable conclusion is that current levels and nature of investment in children are not commensurate with their needs. Both poverty reduction and human development must claim a larger share of national investment and donor assistance if children are not destined to suffer permanent neglect. The paper offers several clear directions to reorient investment planning towards successful outcomes.

Although traditional, narrowly defined project lending can contribute to achieving common goals for children, comprehensive child development programs, supported through national investment plans, appear more effective and efficient than incremental project lending for health, nutrition or preschool education because of their synergistic benefits for children's early development and preparedness for life.

It seems to this observer that the timing is right to bring the technical specialists and financial experts into a common arena, and take concerted action for children. Asia is the Big Show for underweight and micronutrient-deficient children, and it is within our power to retire this unseemly drama permanently within our lifetime. What on earth could we possibly find more meaningful to do? This conference has stimulated a renewed commitment to act.

**BOX 1 - ADB's STRATEGIES TO ELIMINATE IRON DEFICIENCY ANEMIA (IDA)**

Asia's ability to reduce the alarmingly high rates of maternal mortality and cognitive impairment in children depend substantially on major efforts to reduce anemia (IDA). IDA afflicts 60 percent of all pregnant women (88 percent in South Asia), half the women of reproductive age, and 40 percent of preschoolers in Asia. To date, no clear strategy has emerged to reduce IDA among women of reproductive age or young children. Their respective risks are death during pregnancy and impaired physical and cognitive development, expressed as delayed speech and reading skills that adversely affect school achievement. About one fifth of the 500,000 maternal deaths in developing countries are caused by IDA.

ADB is supporting three regional initiatives that focus on the public and private sectors cooperating to solve the problem of IDA. Two regional studies on food fortification and rice plantbreeding are ongoing, with the expectation that, ADB by 2003, will lead major initiatives in the region to raise the iron density of essential staples consumed by the poor at affordable prices. A third sub-regional initiative in the Trans-Caucasus Central Asia (TCCA) will help seven countries fortify flour and salt through integrated attention to production, regulation and trade.

The regional food fortification project cosponsored by International Life Sciences Institute and Dander) focuses on the iron fortification of wheat flour and condiments such as soy sauce and fish sauce, all widely consumed by the poor in the region. People's Republic of China, India, Indonesia, Pakistan, Thailand, and Viet Nam are participating in the project. Iron fortification emerged as a regional priority at a regional strategy meeting hosted by the ADB in February 2000<sup>1</sup>. Prominent government food regulators and captains of Asian food industries pledged to cooperate in reducing micronutrient malnutrition in the region. IDA was identified as the top priority for concerted action. The project will develop a regional investment plan based on country studies, and regional workshops on food technology, regulation and trade.

The second regional strategy is rice plantbreeding through a donor consortium led by ADB. A three-year research study ending in 2003 will test promising rice varieties with high iron and zinc density to ensure that their yield is adequate, that the iron and zinc are bioavailable to consumers, that consumers are willing to eat the varieties, that the production and dissemination of the new varieties is feasible for national agricultural research systems and seed companies, and that the rice will be affordable to the poor.

The third regional activity, supported by the Japan Fund for Poverty Reduction, responds to the breakdown in production of fortified flour and salt in the TCCA sub-region. The project aims to set up production systems and build capacity for improved regulation, quality control and trade of fortified flour and salt, so that poor women and their children will get adequate iron and iodine through daily consumption of these staples.

<sup>1</sup> Manila Forum 2000: *Strategies to Fortify Essential Foods in Asia and the Pacific – Proceedings of a Forum on Food Fortification Policy*. Manila: Asian Development Bank.

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