Review Article

Food-based approaches to combat the double burden among the poor: challenges in the Asian context

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Estimates of FAO indicate that 14% of the population worldwide or 864 million in 2002-2004 were undernourished in not having enough food to meet basic daily energy needs. Asia has the highest number of undernourished people, with 163 million in East Asia and 300 million in South Asia. Meanwhile obesity and diet-related non-communicable diseases continue to escalate in the region. The double burden of malnutrition also affects the poor, which is a serious problem in Asia, as it has the largest number of poor subsisting on less than $1/day. As poverty in the region is predominantly rural, agriculture-based strategies are important for improving household food security and nutritional status. These measures include shifting toward production of high-value products for boosting income, enhancing agricultural biodiversity, increasing consumption of indigenous food plants and biofortified crops. Urban poor faces additional nutritional problems being more sensitive to rising costs of living, lack of space for home and school gardening, and trade-offs between convenience and affordability versus poor diet quality and risk of contamination. Time constraints faced by working couples in food preparation and child care are also important considerations. Combating the double burden among the poor requires a comprehensive approach including adequate public health services, and access to education and employment skills, besides nutrition interventions.

Key Words: double burden of malnutrition, food-based approaches, poverty in Asia

INTRODUCTION

"*Rapid development has brought enormous benefits to people across the region. Asians today are healthier, better educated and far better off than they were a generation ago. But the region still has some very significant development challenges - chief among them, the continuing problem of pervasive poverty. More than 600 million Asian people subsist on an income of $1 per day or less. As many still do not have a safe, reliable supply of drinking water, and nearly 2 billion have inadequate sanitation facilities. More than 4 million children under age 5 die each year, mostly from preventable diseases*".[1]

Poverty in Asia

The above statement puts into sharp focus the vast inequity in economic and public health conditions that prevail in Asia as well as the challenges that lie ahead. Overall, the region has achieved remarkable economic success over the years. In the 1970s, more than half of the population in Asia was classified as extremely poor, based on the international poverty line of $1-a-day of the United Nations and World Bank.[2] Between 1990 and 2001 in the 23 countries with sufficient data, the proportion of people living on less than $1 a day fell from 33% to 20%.[3] Table 1 reflects the improvement in poverty reduction in recent decades, but progress is uneven for example, Bangladesh, India and Cambodia today have more than one-third of their people living in extreme poverty.

As the region includes five of the world's seven most populous countries namely, China, India, Indonesia, Pakistan and Bangladesh, Asia accounts for staggering numbers of deprived people. The Report of ESCAP[3] estimated that the absolute number of poor people as about 700 million in 2001 (living on less than $1 a day), while, the Asian Development Bank estimated 1.9 billion people or 60% of the population in Asia living on less than $2 a day.[4]

Persistence of under-nutrition problem

Closely associated with poverty is food insecurity whereby household members suffer from lack of access to sufficient food leading to hunger, malnutrition and illnesses. Asia with its widespread poverty has alarming proportions of young children who are victims of protein-energy mal-nutrition and micronutrient deficiency.[5]

- Three quarters of the world's underweight and stunted children are in Asia.
- More than half of the six million deaths of children aged below five each year in developing Asia are underweight.

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Table 1. Changes in proportion of population living on less than $1 a day between 1990-1995 and 1996-2005 [6]

	% of population below $1 per day	
	1990..1995	1996..2005
Pakistan	47.8	17.0
India	42.3	36.0
Bangladesh	35.9	36.0
China	33.0	16.6
Turkmenistan	20.7	12.1
Philippines	19.8	15.5
Indonesia	17.4	7.5
Vietnam	14.6	2.2
Mongolia	13.9	27.0
Azerbaijan	10.9	3.7
Lao PDR	7.8	27.0
Sri Lanka	3.8	5.6
Malaysia	2.0	2.0
Cambodia	Not available	34.1
Nepal	Not available	24.1

Table 2. Prevalence of under-nutrition in Asia[6, 7]

	Children under 5 moderately or severely underweight (%)	Undernourished people as percentage of total population
	1996 - 2005	1996 - 2005
Bangladesh	48	30
Nepal	48	17
India	47	20
Timor-Leste	46	8
Cambodia	45	33
Lao PDR	40	21
Pakistan	38	23
Myanmar	32	5
Maldives	30	11
Philippines	28	19
Vietnam	27	17
Korea (DPR)	23	35
Thailand	18	21
Malaysia	11	3
China	8	12

- Three quarters of those suffering from vitamin A, iodine, and iron deficiencies - mostly young children and their mothers are in Asia.

South Asian countries rank among the top ten countries with the highest proportion of underweight among children aged five years and below (Table 2). In 2005, nearly half of this age group in Bangladesh, India and Nepal were either moderately or severely underweight. South-east Asian countries (Timor-Leste, Lao and Cambodia) also have high proportions of malnourished under-five. The proportion of people consuming less than the minimum dietary energy is another nutrition-related indicator of the Millennium Development Goals used to indicate undernourished people in the population. The overall average of this group in Asia in 2005 was 15.1%. Several countries in South Asia (Bangladesh, Pakistan, India) and South-east Asia (Cambodia, Lao, Thailand, the Philippines) have relatively higher levels of their population with undernourished people than the overall average. Among rapidly developing economies in East Asia, the Republic of Korea showed a high level of undernourished population of 35% compared to 12% in China.

Table 3. Prevalence of overweight / obesity for ages 15 years and above in 2002 [10]

	BMI	25 kg/m^2	BMI	30 kg/m^2
	Male	Female	Male	Female
Mongolia	46.0	65.8	5.2	24.6
Kazakhstan	43.9	41.9	7.9	13.1
Uzbekistan	42.0	44.3	7.1	13.5
Timor-Leste	35.9	46.4	6.0	14.2
Bhutan	34.0	44.7	5.3	13.1
Korea (Republic)	32.8	38.2	2.3	13.7
Lao PDR	30.4	43.5	2.3	9.2
Tajikistan	29.2	41.8	2.5	9.2
Thailand	27.7	32.5	2.5	7.0
China	27.5	22.7	1.0	1.5
Japan	25.3	18.6	1.5	1.5
Malaysia	22.5	34.2	1.6	6.8
Philippines	21.7	25.4	1.1	2.8
Pakistan	16.7	23.2	0.8	2.9
India	15.0	13.7	0.9	1.1
Indonesia	9.6	20.3	0.2	2.0
Cambodia	9.6	7.1	0.1	0.1
Nepal	7.7	8.0	0.1	0.2
Bangladesh	5.9	4.3	0.1	0.1
Vietnam	2.7	7.0	0	0.2

Table 4. Countries with the highest numbers of estimated cases of diabetes for 2000 and 2030 [11]

Rank-ing	2000		2030	
	Country	Millions with diabetes	Country	Millions with diabetes
1	India	31.7	India	79.4
2	China	20.8	China	42.3
3	USA	17.7	USA	30.3
4	Indonesia	8.4	Indonesia	21.3
5	Japan	6.8	Pakistan	13.9
6	Pakistan	5.2	Brazil	11.3
7	Russian Federation	4.6	Bangladesh	11.1
8	Brazil	4.6	Japan	8.9
9	Italy	4.3	Philippines	7.8
10	Bangladesh	3.2	Egypt	6.7

Escalating prevalence of cardiovascular risks and mortality

While the burden of under-nutrition among children and chronic energy deficiency (CED) in adults continue to be major nutritional concerns in many parts of Asia, the burden of overweight and obesity is becoming increasingly widespread in the region. Mongolia and Central Asian countries rank highest in the region with about 50% of adults who are overweight (Table 3). Several countries in East Asia (Republic of Korea, China) and South-east Asia (Timor-Leste, Lao, Thailand) have overweight prevalence in adults that exceed 30-40%. In contrast, South Asian countries, which are among the

Table 5. Age standardized death rates per 100,000 for ischemic heart disease and cerebrovascular disease for males and females in 2002 [10]

	Ischemic heart disease		Cerebrovascular disease	
	Male	Female	Male	Female
Kazakhstan	501	305	211	187
Uzbekistan	460	335	177	153
Tajikistan	407	284	100	84
Bhutan	277	202	131	121
India	268	198	126	117
Lao PDR	260	194	166	146
Pakistan	259	198	124	120
Timor Leste	247	167	119	98
Bangladesh	245	194	117	114
Nepal	230	178	111	103
Indonesia	194	144	99	99
Philippines	154	97	77	55
Mongolia	141	58	201	189
Malaysia	123	83	83	78
Thailand	74	56	53	72
China	74	63	178	140
Vietnam	74	56	53	72
Korea	49	28	134	95
Japan	47	21	57	35

poorest in the region, in general have relatively lower proportion of overweight adults.

Besides increasing prevalence of overweight and obesity, other major risk factors of cardiovascular disease, including diabetes and high blood pressure, are also rising fast and affecting millions in Asia. In the year 2000, 6 Asian countries were among the top 10 countries globally with the highest number of cases of diabetes (Table 4). By 2030, the region will account for almost 80% of the total population with diabetes among the top ten countries. In the leading 2 countries namely, India and China, there will be 121.7 million suffering from diabetes.

Underscoring the high prevalence of cardiovascular risk factors in the region, high mortality rates due to cardiovascular disease are evident in several countries. Central Asia (Kazakhstan, Uzbekistan, Tajikistan) has very high mortality rates for both ischemic heart disease and cerebrovascular disease (Table 5). Countries in South Asia (Bhutan, India, Pakistan, Bangladesh, Nepal) also have high mortality rates for both types of cardiovascular disease, but at a relatively lower levels than those of Central Asia. East Asian countries (China, Mongolia, Republic of Korea) on the other hand, have high death rates due to cerebrovascular disease and comparatively lower mortality rates for ischemic heart disease.

Double burden of malnutrition among the poor

Evidence of the dual burden of malnutrition among the poor in Asia is on the rise. In Bangladesh, while rural and urban poor women suffer from CED (38.8% and 29.7% respectively), overweight was also found in 9.1% urban poor and 4.1% rural women in a nationally representative sample.[8] In Yunnan Province, one of the poorest provinces in China, the rural region had 50% higher premature mortality burden compared to the urban and suburban regions.[9] The rural region is additionally burdened by disease of poverty (infections, perinatal mortality) and injuries.

Compounding the problem of the double burden of malnutrition in low income households is its occurrence among members from the same households. Such a manifestation often involves an underweight child of pre-school age and an overweight mother aged 35-45 years, as reported in Malaysia, Philippines, Thailand and China.[12, 13, 14, 15] Whilst common causes for poor growth in childhood include low maternal nutritional status, inadequate quantitative and qualitative complementary feeding, and vulnerability to infections, the contributing factors to mothers from poor households becoming overweight are less clearly elucidated. Dependence on cheaper sources of energy-dense foods such as cereals and root crops, preference for convenient sweet and oily snacks, and increased sedentariness are some associated findings in the region. Additionally, women with closely spaced births may face difficulty shedding off excess body fat accumulated with each pregnancy. The challenge of ameliorating the dual burden of malnutrition in the same household is that health promotion efforts must be sensitive to the contrasting causes and consequences, and "one size fits all" approach would not be appropriate.

Combating the double burden of malnutrition among the poor: opportunities and challenges

Improving income through agricultural productivity and biodiversity. As agriculture forms the backbone of the livelihoods of the rural poor in Asia, it is through improvement in agriculture production that the small-scale farmers may be able to escape the poverty-food insecurity-poor nutritional status trap. In China, agricultural reforms were said to be the starting point for economic liberalization – "in other words, reforms began in the sector where the majority of poor lived, and they were largely the beneficiaries of reform".[16] In India, it was reported that a 10% increase in the level of agricultural productivity was associated with 4% reduction in poverty.[17]

In Vietnam where government efforts since the mid1990s to reduce rural poverty have focused on income diversification, small-scale farmers reported earning more by increasing their yields, while richer households expanded their cultivated area.[18] Farmers have also attributed rising income to growing more profitable crops such as litchi, tea, sugar cane and tobacco.

Farmers have also found it profitable to diversify into horticultural crops, and they usually earn higher farm incomes as compared to cereal producers.[19] Demand for fruits and vegetables is on the rise globally, fueled by increasing awareness for the health benefits of consuming fruits and vegetables.

Resource-limited farmers face considerable challenges in their efforts to diversify and improve farm productivity. Substantial resources are required including seeds, land, labour, affordable machinery, appropriate technology and information, access to credit and markets for the small-scale farmers. Considerable investments in infrastructure, irrigation and other facilities are needed too. There is also demand for safe produce. For example, fruits and vegetables together account for the major share of the

global pesticide market and indiscriminate use of unapproved pesticides for these crops are practiced. Thus, it is imperative for countries to commit pro-poor economic and agricultural policies in helping small-scale farmers to reform production and improve productivity toward increasing farm income.

It is known however that increasing household income may not necessarily lead to improvement in nutritional status, particularly of young children and women. There should be appropriate incentives targeted at small-scale farmers, especially women, to grow and utilize a wide variety of food crops, toward improving household food security and dietary diversity.

Improving nutrition through dietary diversity. The diet of poor households tends to be predominantly based on starchy staples and lacking in variety. Diets that are lacking in diversity are not likely to meet requirements for essential nutrients. Dietary diversity has been associated with improved nutritional status in children, e.g. in examining evidence from 11 countries including Cambodia and Nepal, height-for-age and dietary diversity were significantly related.[20] In adults, the association between dietary diversity and decreased rates of cardiovascular disease, diabetes and cancer has been reported for American men and women.[21] The health benefits attributed to dietary diversity lies not only in improved nutrient content, but also to the presence of important non-nutrients, particularly phytochemicals, which include antioxidants, polyphenols, carotenoids, and phytoestrogens.

Unfortunately, the world is facing erosion of genetic diversity in food crops, resulting in a loss in dietary diversity. Thousands of traditional cultivars have been replaced by a relatively small number of high yielding, pest- and drought resistant varieties. Cultivation of such crops has tended to benefit large-scale farmers who have access to water management and other resources. The trend toward monoculture for a few staple crops (principally rice, wheat and maize) has led to a decline in the consumption of more diverse grains.[22]

Whilst biofortification products that are developed through plant breeding or genetic modification, such as β-carotene enriched rice and sweet potatoes, have a promising role to play in combating micronutrient deficiency, nonetheless, there remain uncertainties with respect to their efficacy, cost-effectiveness, ethics, affordability and cultural appropriateness to those in need.[23] Among the challenges faced in the development of biofortified staple foods is providing evidence that the micronutrients can be increased to nutritionally useful levels, and that the additional micronutrients are bioavailable.[24] Hence, contributions of biofortified food crops will remain secondary to other food-based strategies, including the promotion of dietary diversity.

Increasing utilization of indigenous food plants. Globally, indigenous people use diverse ways to procure food, which involve not only hunting and gathering, fishing and herding but also subsistence farming and trading. Diversity in the indigenous food supply system enhances nutritional security while maintaining environment integrity.[25] Studies have shown the close connection between consumption of a wide variety of foods and improved nutritional status. In the uplands of the Philippines, nutritional adequacy was related to the variety in the traditional diet, which comprises 51 different rice landraces, 13 species of vegetables, 20 species of fruit, and a rich assortment of root crops, oil plants, spices, and livestock both domesticated and wild.[26]

The traditional knowledge, tools and practice of the indigenous groups deserve support to ensure their continued use of agricultural diversity in a sustained manner. The maintenance of a knowledge database for the nutrient and non-nutrient contents of indigenous foods, as well as of neglected and under-utilized species deserves international support.[27] Plant foods often have several varieties of cultivars, as in Nepal where at least 20 cultivars of taro are consumed. Normally, food composition tables may provide values for only one cultivar or the average of several. Such a knowledge base would expedite health promotion of local traditional foods toward enhanced food and nutritional security.

Improving food security of urban poor. By 2020 more than half of the population in Asia will live in urban areas. The double burden of malnutrition is evident among the urban poor. On the one hand, under-nutrition and related illnesses prevail among young children, owing to a large extent on the poor physical environment they live in (e.g. lacking in access to basic infrastructure and health care services, pollution), while overweight increases among adults due to reliance on cheap energy-dense foods and lacking in physical activity. Underpinning urban poverty and food insecurity are predominantly structural problems that require major investments of the public sector.

In trying to achieve food security, the urban poor face different challenges, compared to the rural poor. Access to land for cultivation or keeping poultry/small animal for food is limited or non-existent. Living in urban areas, the poor are dependent on the monetized economy. As such, their food intake and nutrition are more sensitive to changes in income and the price of food. They usually buy food in small quantities and thus having to pay higher per-unit prices. In order to enhance employment and income generation opportunities among the urban poor, they need greater access to skills training programs, small business promotion and micro-credit schemes.[28]

Often both spouses have to work and young children may be cared for by older siblings and grandparents, who may not have the knowledge or resources to provide adequate nutrition to the children. Also, owing to time constraints, households with working couples frequently eat out or buy home ready-to-eat foods, which are affordable and convenient. However, street foods and processed foods including instant noodles tend to comprise carbohydrate primarily and high in fats and oils. For the poor, convenience and affordability may be traded for risk of contamination and food safety.

In times of emergency such as a natural calamity or an economic downturn, the urban poor can be seriously affected owing to an almost total reliance on the market economy. Thus, nutrition safety net programs are needed. These may include community and clinic-based

interventions to provide food for young children, pregnant women, chronically ill and the elderly.

CONCLUSION

As health statistics continue to show the rise of diet-related non-communicable diseases in developing countries, the numbers take on huge proportions in the case of Asia. This is translated into enormous medical and health-care costs. Health promotion efforts to combat the burden of malnutrition are thus imperative. Nonetheless, challenges abound in a region that is characterized by large segments of poverty, in both rural and urban areas.

The public sector needs to work in partnership with the private sector and others in order to provide appropriate resources, technologies, market incentives and other supportive measures to improve food and nutrition security of the poor.

> "*Malnutrition is both a cause and a consequence of poverty. Overcoming malnutrition is integral to liberating Asia's poor from a shortened life replete with illness, disability, and diminished capacity to learn and earn. Indeed human development, social equity, and poverty reduction in Asia and the Pacific cannot be achieved without improving nutrition*".[5]

AUTHOR DISCLOSURES

Geok Lin Khor, no conflicts of interest.

REFERENCES

1. Kuroda H. Sustainable Development: The Challenges of Energy Security and Health Conference of Montreal Luncheon, 19 June 2007, Montreal, Canada.
2. Asian Development Bank. Fighting Poverty in Asia and the Pacific: The Poverty Reduction Strategy. ADB, Manila, Philippines, 2005
3. ESCAP. Achieving the Millennium Development Goals in the Asian and Pacific Region. Achieving the Millennium Development Goals in the ESCAP Region: Regional Road Map to 2015. Sixth-third Session, Kazakhstan, May 2007.
4. Asian Development Bank. Measuring Policy Effectiveness in Health and Education. In. Key Indicators of Developing Asia and Pacific Countries, 2006. http://www.adb.org/ statistics accessed on 3 July 2007
5. Gillespie S, Haddad L. Attacking the double burden of malnutrition in Asia and the Pacific. Asian Development Bank, Manila and IFPRI, Washington DC. USA, 2001.
6. ESCAP/UNDP/ADB. The Millennium Development Goals: Progress in Asia and the Pacific, ADB, Manila, 2006.
7. UNICEF. The State of the World's Children 2007: The Dividend of Gender Equality. UNICEF, New York, 2006
8. Shafique S, Akhter N, Stallkamp G, de Pee S, Panagides D, Bloem MW. Trends of under- and overweight among rural and urban poor women indicate the double burden of malnutrition in Bangladesh. Int J Epidemiol. 2007;36:449-57.
9. Cai L, Chongsuvivatwong V. Rural-urban differentials of premature mortality burden in south-west China. Int J Equity Health. 2006;5:13-21.
10. World Health Organization. WHO Global InfoBase On-line. http://www.who.int/ncd_surveillance/infobase acc- essed on 3 July 2007.
11. Wild S, Roglic, G, Green A, Sicree, R, King, H. Global prevalence of diabetes. Estimates for the year 2000 and projections for 2030. Diabetes Care. 2004;27:1047-53.
12. Khor GL, Zalilah MS. Dual forms of malnutrition in the same households in Malaysia - a case study among Malay rural households. Asia Pac J Clin Nutr. 2003;12:427-38.
13. Angeles-Agdeppa I, Lana RD, Barba CVC. A case study on dual forms of malnutrition among selected households in District 1, Tondo, Manila. Asia Pac J Clin Nutr. 2003;12:438-46.
14. Kosulwat V, Chittchang U, Wimonpeerapattana W, Suthutvoravut U. Factors associated with dual form of malnutrition in school children in Nakhon Pathom and Bangkok. J Med Assoc Thai. 2006;89:1012-22.
15. Doak C, Adair L, Monteiro C, Popkin BM. Overweight and underweight co-exists in Brazil, China and Russia. J Nutr. 2000;130:2965-80.
16. von Braun J, Gulati A, Fan, S. Lessons learned from the Dragon (China) and the Elephant (India). IFPRI 2004-2005 Annual report. Washington DC, USA, 2005.
17. von Braun J, Swaminathan MS, Rosegrant MW. Agriculture, food security, nutrition and the Millennium Development Goals. IFPRI 2003-2004 Annual Report. Washington DC, USA, 2004.
18. Minot N, Epprecht M, Tram ATT, Trung LQ. Income diversification and poverty in the Northern Uplands of Vietnam. IFPRI Research Report 145. Washington DC, USA, 2006.
19. Weinberger K, Lumpkin TA. Horticulture for Poverty Alleviation. The Unfunded Revolution. AVRDC Working Paper No. 15. AVRDC – The World Vegetable Center, 2005, Tainan, Taiwan.
20. Arimond M, Ruel MT. Dietary diversity is associated with child nutritional status: evidence from 11 Demographic and Health Surveys. J Nutr. 2004;134:2579-85.
21. Kant AK, Schatzkin A, Ziegler RG. Dietary diversity and subsequent cause-specific mortality in the NHANES I epidemiologic follow-up study. J Am Coll Nutr. 1995;14: 233-8.
22. Johns T. Agrobiodiversity, diet and human health. In: Managing Biodiversity in Agricultural Ecosystems (eds: Jarvis DI, Padoch C, Cooper HD). SIDA/IDRC/UNU/ CBD.New York University Press, New York. 2007. p382-406.
23. Johns T Eyzaguire PB. Biofortification, biodiversity and diet: a search of complementary applications against poverty and malnutrition. Food Policy. 2007;32:1-24.
24. Zimmermann MB, Hurrell RF. Improving iron, zinc and vitamin A nutrition through plant biotechnology. Curr Opin Biotechnol. 2002;13:142-5.
25. Wahlqvist M. Diversification in indigenous and ethnic food culture. In Diet Diversification and Health Promotion. Forum Nutrition Basel, Karger, 2005;57:52-61.
26. Frei M, Becker K. Agro-biodiversity in subsistence-oriented farming systems in a Philippine upland region: nutritionalconsiderations. Biodivers Conserv. 2004;13:1591-1610.
27. Frison EA, Cherfas J, Eyzaguirre PB, Johns T. Biodiversity, nutrition and health: making a difference to hunger and conservation in the developing world. Keynote address 7th Meeting Conference of the Parties to the Convention on Biological Diversity (COP 7) 9-20 Feb 2004, Kuala Lumpur.
28. InWEnt. Achieving Food and Nutrition Security (ed. Klennet K). InWEnt, Bonn, 2005.