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Micronutrient deficiency in urban Indonesia

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SUMMARY. Micronutrient deficiency in urban Indonesia. The economic situation of Indonesia is characterized by a large increase in the gross national product which has been on average 7% annually during the last ten years. This was accompanied by rapid urbanization. With the economic improvement, "First World" and "Third World" health and nutrition problems are coexisting in Indonesia. In 1992, the most common of death cause was cardiovascular disease whereas tuberculosis was the second ranking. About 40% of the preschool children are stunted. The main stable food and energy source is rice, although the urban population has a more diverse food pattern than the rural population. In Jakarta, many children receive too late colostrum feeding and mothers are not aware about the importance of correct breastfeeding practices after delivery. Three studies had shown that about one fifth of preschool children and one fourth of elderly take micronutrient supplements. Nevertheless, micronutrient deficiencies are prevalent in Jakarta. About one third of women suffer from moderate vitamin A deficiency (plasma retinol <0.70 mmol/L) and 50% of pregnant women are anemic. More information is necessary on other micronutrient deficiencies. For example, a small study revealed that nearly two thirds of non-institutionalized elderly living in Jakarta experience thiamine deficiency. Appropriate interventions to reduce micronutrient deficiencies should sensitize the urban population to the fact that the government should restrict itself to use its resources to assist only the poorest individuals and groups, whereas it must be expected from the middle class to spend more time and money to solve their own problems.

INTRODUCTION

During the last decades, Southeast Asia has become a region with an impressive economic growth. Nevertheless, within the region there is still a wide difference in the economic situation among the people. Countries such as Myanmar or Cambodia battle to successfully begin economic growth, whereas Singapore is among the richest nations in the world.

POPULATION AND SOCIOECONOMIC DEVELOPMENT IN INDONESIA

During the last ten years Indonesia has undergone remarkable economic growth. The gross national product (GNP) per capita increased from US$ 440 to an estimated US$ 1100 in 1996. As a result, hunger and severe symptoms of undernutrition had been successfully eradicated. For several years, Indonesia has produced enough rice to meet its own demand. The economic growth has been accompanied by increased urbanization. About 40% of its 200 million inhabitants live in urban areas. It is estimated that in about 10 years more than half of Indonesians will live in towns or cities. Life expectancy has increased to 62 years for men and to 66 years for women. Furthermore, within countries such as Indonesia, the Philippines, or Thailand, the economic situation differs between the urban and rural populations.

NUTRITIONAL STATUS AND DISEASES

Table 1 shows the changes in the ranking of causes of death during the last 20 years in Indonesia according to the Ministry of Health. In 1972 the first three causes of death - diarrheal diseases, tuberculosis and respiratory diseases - reflected the health situation of a developing country, whereas in 1992 the most common cause of death was cardiovascular diseases, which are characteristic of high income countries, and tuberculosis a symptom of poverty, was the second ranking cause of death.

This diversity is also expressed by the wide range of the prevalence of stunting in children less than six years of age in different population groups in Indonesia, according to data collected during several nutrition baseline surveys, conducted during the last ten years in Indonesia by the SEAMEO-TROPMED Regional Center for Community Nutrition at the University of Indonesia, Jakarta. The prevalence of stunting does not reflect the situation of entire provinces, they are rather representative for smaller sub-populations at district or sub-district levels. According to these data, prevalence of stunting ranges from 23 to 69%. The lowest prevalence was found in the capital city of Jakarta, on Java, whereas the highest was observed in villages on outer islands of East Kalimantan. The nutrition status of different age groups within urban Jakarta also reflects a remarkable diversity of under- and overnutrition as can be observed on Table 2 (1-9). As a result, despite the significant increase in the GNP, the disease pattern and nutrition situation of Indonesia still shows a wide divergence within its population.

FOOD INTAKE

Assessment of the energy intake of the Indonesian population during the last two decades by the Household Surveys (10) and by the Food Balance Sheets (11), showed a consistent increase of energy consumption in Indonesia. This increase relies mainly on an increased grain consumption, with 90% contribution from rice. As a result, for the broad Indonesian population, the increased income has not yet diversified the energy supply and the main staple food continues to be rice.

Comparison of the food frequency surveyed in West Kalimantan with that in Jakarta, presenting, respectively, the highest and the lowest prevalence of stunting, showed that selected food stuffs (egg, chicken, fish, tofu, peanuts, vegetables, jackfruit and tubers) were more frequently consumed in the urban households of Jakarta than in the rural households of West Kalimatan. Remarkably, the families in Jakarta did not consume less frequently traditional food stuffs such as cassava or other tubers, compared to the rural population of West Kalimantan.

TABLE 1
Changes in causes of death in Indonesia over 20 years

Ranking	1972	1980	1988	1992
1	Diarrheal diseases	Respiratory diseases	Diarrheal diseases	Cardiovascular diseases
2	Respiratory infections	Diarrheal diseases	Tuberculosis	Tuberculosis
3	Tuberculosis	Circulatory diseases	Diphtheria	Respiratory diseases
4	Circulatory diseases	Tuberculosis	Tetanus	Diarrheal diseases
5	Tetanus	Tetanus	Malaria	Other infectious diseases

(Ministry of Health 1993)

Traditional prelactal feeding practices of infants have been widespread in the rural population of Indonesia (12) and also in urban teaching hospitals (13). In urban areas, the delayed initiation of breast-feeding occurs and other types of inadequate colostrum feeding practices are still widespread (14). Independent of the type of maternity ward (public hospitals, private hospitals, health centers or midwife's birth wards), a considerable proportion of mothers does not think that prelactal (colostrum) feeding is needed. Furthermore, particularly in public hospitals and midwife's wards, many infants receive the colostrum more than 12 hours after birth.

Changed food practices and behavior in the urban area are also reflected in the observation that a considerable proportion of the urban population provides their micronutrient intake by supplements. Twenty percent of the preschool children (15), 23% of adolescents (4) and 25% of elderly (5) were taking a multi micronutrient supplement at the time of the interview.

TABLE 2
Under and overweight in different population groups of Jakarta

Population groups	n	Age range (years)	Under† nutrition (%)	Over‡ nutrition (%)
Underfives				
High-income, both sexes[3]	168	4-5	1	16
Middle-low income	628	0-5	23	2
Schoolchildren				
Low/middle-income, both sexes[7]	91	6-10	5	9
Adolescents				
Middle-income, males[4]	118	14-16	43	9
Middle-income, females[4]	805	14-17	10	33
Middle-aged				
Female industrial workers[1]	92	16-36	23	2
Middle income breastfeeding females[8]	92	18-40	9	17
Elderly				
Free living, low-income, males[2]	69	60-69	32	21
Free living, low-income, females[2]	69	60-69	31	31
Free living, middle-income, males[5]	93	60-75	17	10
Free living, middle-income, females[5]	111	60-75	25	15
Free living, low-income, males[6]	48	60-75	29	9
Free living, low-income, females[6]	51	60-75	35	19
Institutionalized males and females[9]	42	53-88	33	26

† Below 11 years: Weight-for-age < -2 Z-score NCHS reference population
From 11 years: BMI < 18.5 kg/m²
‡ Below 11 years: Weight-for-age < +2 Z-score NCHS reference population
From 11 years: BMI < 25.0 kg/m²

From references 1-9.

MICRONUTRIENT STATUS

Based on several small studies conducted by the SEAMEO-TROPMED, anemia is still widespread in Indonesia but occurs at different rates in different age groups. A high prevalence occurs in preschool children, and of particular risk are children between 6 and 18 months of age. Due to the slowing down of the growth spurt, the rate of anemia decreases steadily after the age of 2 years and shows lower rates in primary schoolchildren. After the beginning of menarche, the prevalence in adolescent girls increases again, reaches its peak in pregnant women, and declines after the menopause. Besides of biological factors such as growth spurt, menarche and pregnancy, specific contributing factors to anemia in Indonesia are low iron intake, with reduced bioavailability particularly due to high rice consumption, and iron losses caused by parasitic infections.

Indonesia has remarkably minimized the prevalence of xerophthalmia with an effective vitamin A capsule distribution program (16). However, subclinical vitamin A deficiencies still seem to persist even in Jakarta, where food consumption is more balanced than in rural areas. Prevalence of serum retinol levels lower than 0.7 mmol/l was 81% in anemic underfives (15), 30% in adolescents (4) and 33% in lactating women (8).

During the last three to four years in collaboration with UNICEF, the government of Indonesia has put much emphasis in the iodization of salt. Results from a spot survey of the performance of the program, conducted in 1996, showed that most of the salt, sampled either in households or in markets, was iodized, although about half of the salt samples in urban sites had an insufficient amount of iodine (17). The quality of the rural samples was even worse, with about 80 % of samples considered inadequate. Furthermore, it seemed that due to inadequate storage, the salt obtained from the households showed less iodine than the samples bought in the market.

With decreased fertility and mortality, the proportion of elderly is increasing over-proportionally, particularly in the urban area of Indonesia. Table 3 shows the biochemical indicators of selected micronutrients in a male and female subgroup of elderly in Jakarta. In addition to the commonly known micronutrient deficiencies discussed above, thiamin deficiency expressed as stimulation of erythrocyte transketolase appears to be an additional nutrient-related obstacle in later life. This example shows that there is a further need for identification of micronutrient deficiencies in different urban population groups beyond that of vitamin A, iron and iodine.

MICRONUTRIENT STRATEGIES FOR THE URBAN POPULATION

One of the major differences between the rural and urban populations is that most of the latter does not produce their own food and rely therefore fully on their purchasing power, access to food sources and decision making abilities. Although the availability of food is far greater and purchasing power is higher in the urban than in the rural area, the access to and intake of adequate food of the urban population is limited by lack of time and appropriate information. As a result, strategies need to be developed that take into consideration these two main constraints. In particular, lessons can be learned from private enterprises which often have successfully adapted their marketing strategies to the specific needs of their clients, reaching even low-income groups, where as public programs, despite subsidization, often fail to reach effectively the risk groups.

Dietary intervention, fortification, and supplementation are the three strategies to overcome micronutrient deficiencies in the urban area. In fast growing economies it must be expected from the emerging urban middle class to commit themselves to securing their own food and nutrition needs and choose for themselves the right option, which requires money and time for information, food and nutrient purchase, food preparation and feeding practices. As a result, governments should restrict themselves to define and supervise appropriate legislation securing the highest possible quality of food production and distribution and assist directly only the poorest segment of their society.

TABLE 3
Biochemical indicators of selected micronutrients in male and female subgroups of elderly in Jakarta

Biochemical indicators	All (n=204)	Male (n=93)		Female (n=111)	
	Mean±SD	Mean±SD	(%)/	Mean ±SD	(%)/
Hemoglobin (g/L)	136±24	145±23***	25	129 ± 22	33
Plasma retinol (µmol/L)	1.30±0.35	1.37±0.37*	4.3	1.26±0.33	6.3
RBC Folic acid (nmol/L)	653±232 (621)	600±196 (573)***‡	5.4	697±251 (664)	0.9
Plasma vitamin B_{12} (pmol/L)	371±207 (435)	371±200 (441)	3.2	372±213 (431)	12
Stimulation of the ETK (%)†	21.3±17.7 (17.5)	24.0±19.8 (19. 7)	58	19.0±15.3 (15.7)	70

n=92 in men for retinol and ETK; n=110 in women for ETK
Untransformed values; geometric means in brackets
† ETK - Erythrocyte Transketolase
*** Significance difference between gender at P<0.001 (t-test)
* Significance difference between gender at P<0.05 (t-test)
‡ Data $\log_{10}$ transformed before t-test
/ Low status: Hb men <130 g/L, Hb women <120 g/L; retinol < 0.70 µmol/L; folate< 368 nmol/L; B12<148 pmol/L; ETK > 14%
Calculation factor for RBC folate 160 ng/L = 368 nmol/L

REFERENCES

1. Scholz, B; Gross, R; Schultink, W & Sastroamidjojo, S. Anaemia is associated with reduced productivity of women workers even in less physically strenuous tasks. Brit J Nutr, 77: 47-57, 1997.
2. Rabe, B; Thamrin, MH; Gross, R; Solomons, NW & Schultink, W. Body mass index of the elderly derived from height and from armspan. Asia Pacific J Clin Nutr, 5: 79-83, 1996.
3. Droomers, M; Gross, R; Schultink, W. & Sastroamidjojo, S. High socioeconomic class preschool children from Jakarta, Indonesia are taller and heavier than NCHS reference population. Europ J Clin Nutr, 49: 740-744, 1995.
4. Angeles-Agdeppa, I. Daily versus weekly supplementation with iron, vitamin A, folic acid and vitamin C to improve iron and vitamin C status of female adolescents. PhD Thesis. SEAMEO-TROPMED Regional Center for Community Nutrition. University of Indonesia. Jakarta, Indonesia, 1997.
5. Juguan, JA. Micronutrient status of a selected group of elderly in an urban sub-district: Jakarta Pusat. MSc Thesis. SEAMEO-TROPMED Regional Center for Community Nutrition. University of Indonesia. Jakarta, Indonesia, 1996.
6. Kvalbein, A. Nutritional status and diet of Indonesian elderly, West Java. MSc Thesis. Nordic School of Nutrition, University of Oslo, Norway, 1996.
7. Heinze, I. Lead poisoning in school children in Jakarta. Thesis. Faculty of Agriculture. University of Bonn. Bonn, Germany, 1997.
8. Hänsel, H. Zinc and vitamin A in breast milk and blood of lactating women in a low-income area in East-Jakarta, Indonesia. Thesis. Faculty of Agriculture. University of Giessen, Germany, 1995.
9. Van Hal, L & Kleinjan, E. Comparison of three dietary intake assessment methods among institutionalized elderly. SEAMEO-TROPMED Regional Center. Jakarta, Indonesia, 1996.
10. Central Bureau of Statistics National socio-economic survey 1995. Biro Pusat Statistik. Jakarta, Indonesia, 1995.
11. FAO Food balance sheets 1992-1994. Food and Agriculture Organization of the United Nations. Rome, Italy, 1996.
12. Laudner LJ & Habicht JP. Concept about infants' health, growth and weaning: a comparison between nutritional scientists and Madurese mothers. Soc Sci Med., 29: 13-22, 1989.
13. Hull, V et al. Breast-feeding in the modern health sector in Indonesia: the mother's perspective. Soc Sci Med, 30:625-633, 1990.
14. Martini, E. Magnitude of colostrum feeding practices among mothers at selected maternity wards in east and south Jakarta. MSc Thesis. SEAMEO-TROPMED Regional Center for Community Nutrition. University of Indonesia. Jakarta, Indonesia, 1996.
15. Merzenich, M. Effect of iron supplementation alone and in combination with zinc on hematopoietic parameters and on plasma levels of zinc: vitamin A and vitamin E in anemic Indonesian children. Thesis. Faculty of Agriculture. University of Kiel. Germany, 1997.
16. Muhilal; Tarwotjo, I; Kodyat, B; Herman, S; Permaesih, D; Karyadi, D; Wilbur, S & Tielsch, J.M. Changing prevalence of xerophthalmia in Indonesia, 1977-1992. Europ J Clin Nutr, 48: 708-714, 1994.
17. Krupp, S. Assessment of salt iodization activities in Indonesia: Background and current situation at the household and retail levels, with spot-checks in selected cases. Thesis. Faculty of Agriculture. University of Bonn. Bonn, Germany, 1996.