

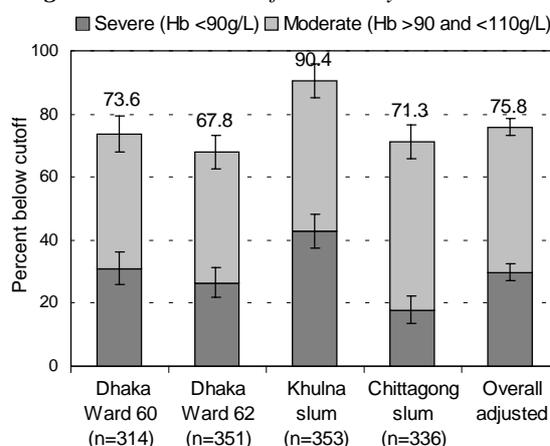
High anemia prevalence among Bangladeshi children in urban slums: An ethical and economic rationale for multi- micronutrient supplementation?

Recent findings from a survey of selected slums in Dhaka, Chittagong and Khulna suggest that anemia is a serious problem among preschool children. A special study from the urban slum sites of the GOB/HKI Nutrition Surveillance Project (NSP) shows that 75.8% of children aged 6-59 months suffered from anemia (hemoglobin < 110 g/L). The prevalence of anemia was highest among children aged 6-11 months (92.3%) and children aged 12-23 months (87.4%). Given the serious and long-lasting consequences of iron deficiency anemia, the nutrition community should be mobilized immediately to try to improve iron status of women and children through iron and multi-micronutrient supplementation and fortification of infant foods.

Iron deficiency during childhood can have severe and long-lasting consequences for physical growth and cognitive development. There is significant evidence that anemic children have lower mental and motor test scores that persist later into life than non-anemic children, particularly among children aged 0-23 months.^{1,2} In addition, children with IDA are more likely to have lower resistance to infections and severe anemia is associated with increased mortality.³ Iron deficiency anemia also increases the risk to lead poisoning among young children and there is evidence that children in urban areas of Bangladesh are exposed to very high environmental lead levels from vehicle emissions.⁴ The vitamin A/anemia survey conducted by GOB/MOH/IPHN and HKI in late 1997 showed that childhood anemia was a major problem in rural Bangladesh.⁵ However, until now, little information has been available on the prevalence of anemia in the rapidly growing urban areas, particularly in the urban slums. In the October 1999 round, HKI added a special module to the urban slum sample of the Nutrition Surveillance Project (NSP) to

ascertain the prevalence and risk factors of anemia in women and children in the NSP urban slums in Dhaka, Chittagong and Khulna cities. Figure 1 presents the prevalence of anemia (Hb<110 g/L) by slum. To highlight the degree of the problem, we have categorized anemia into two groups in this report: 'severe' is defined as <90 g/L, and 'moderate' is defined as 90-110 g/L. The overall age-adjusted prevalence of anemia in the four slum sample was 75.8 percent. Interestingly the

Figure 1. Prevalence of anemia by slum^{i,ii}



ⁱ Bars indicate 95% Confidence Intervals (CI)

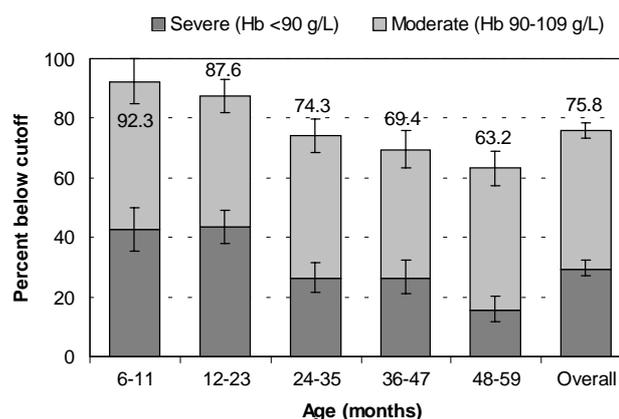
ⁱⁱ 110 g/L is equivalent to 11 g/dL

Methods

The Nutrition Surveillance Project (NSP) works with NGOs to routinely collect nutrition, health and socioeconomic data from households in four urban slums, one each in Chittagong and Khulna, and two in Dhaka (Wards 60 and 62). Households were randomly selected during each round of data collection, and health and nutrition data were collected from up to two under-five children per household. The NGOs that collect this data also provide education and health services to the people in the surveyed slums.

During the October 1999, survey a special module was added to ascertain the prevalence and risk factors for anemia in children and women living in the four urban slums. Capillary blood samples were collected using a finger-prick method from one child and the mother in each household. Hemoglobin concentrations were measured immediately using a portable, battery operated hemoglobinometer (HemoCue, AB, Angelholm, Sweden). Blood samples were collected from a total of 1354 children 6-59 months of age.

Figure 2. Prevalence of anemia by age in monthsⁱ



ⁱ Bars indicate 95% Confidence Intervals (CI)

prevalence of anemia was significantly higher in Khulna slum than each of the other slums, including an extremely high prevalence of severe anemia (42.8%). The prevalence of anemia in the other three slums was similar, ranging from 67.8 percent in Ward 62 to 73.6 percent in Ward 60.

Anemia by age

The prevalence of anemia by age is presented in Figure 2. Alarmingly, more than 90 percent of children aged 6-11 months were anemic—this proportion decreased to 63.2% in the 48-59 month age group, still a very high prevalence. The proportion of severe

Urban slums in the NSP

The rate of urbanization in Bangladesh is estimated at more than nine percent per year. This rate includes a significant number of poor and landless households moving to city slums from rural areas each year in search of better opportunities. Although poverty, a high population density, and food insecurity are common to all four urban slums sampled by the NSPⁱ, the socioeconomic characteristics of these four slums show interesting variations (Table 1). Although Khulna slum is in a more rural setting than the other slums, households in this slum appear to be poorer than households in the Dhaka and Chittagong slums, perhaps because there are fewer formal or casual opportunities for employment in Khulna City.

Table 1. A snapshot of socioeconomic and living conditions of households in the slums (n=1366)

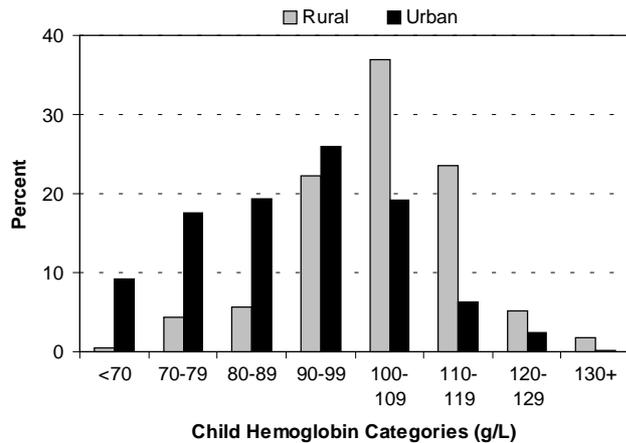
	Ward-60	Ward-62	Khulna	Chittagong	Overall
Households classified as vulnerable (%)	25.1	21.0	56.8	72.7	44.1
Mothers have > 1 y education (%)	36.8	43.9	44.9	6.8	33.4
Household population density**	5.2	4.7	5.4	7.2	5.6
Median household expenditure/month (Tk.)	3200	3250	1575	2192	2520
Percent expenditure on food	60.0	55.4	62.4	64.5	60.5
Ratio of grain /non grain food expenditure	45%/55%	46%/54%	57%/43%	46%/54%	48%/52%

* Vulnerable households are those in which the main earner is a casual or short-term labourer

**Mean number of people per 100 square feet

ⁱ HKI/IPHN (1998). *Urban slums in Bangladesh: A snapshot of NSP working areas*. HKI, Dhaka, Bangladesh

Figure 3. Young child (6-23 months) hemoglobin distribution, urban slum vs. rural national sample



anemia (Hb<90 g/L) was significantly higher in the 6-23 month age group (approximately 43 percent) compared to the older age groups.

Urban vs. Rural

Figure 3 compares the distribution of hemoglobin values for children aged 6-23 months in this urban slum population with the population of rural Bangladesh studied in the 1997 National Vitamin A Survey. Compared with the rural population, the distribution of hemoglobin values for young children from the urban slums is much wider, and is shifted towards lower concentrations. Not only is there a higher prevalence of anemia in the urban areas, there is also a larger proportion of children with severe anemia (Hb<90 g/L). Although these data suggests that anemia is a bigger problem in the urban slums than in rural Bangladesh, the prevalence of anemia among children in rural Bangladesh is still among the highest documented globally.

Discussion

Iron deficiency is the most common nutritional deficiency in the world and an estimated 2 billion people are affected by iron deficiency anemia, a severe form of iron deficiency.⁶ The consequences of iron-deficiency on the health and economies of developing countries in particular are staggering. The economic losses due to iron deficiency in South Asia alone have been estimated at US\$5 billion annually.⁷

The high prevalence of anemia among young children in this population suggests that virtually all children living in these four urban slums are iron deficient. Although the causes of anemia have not been explored here, other studies have demonstrated that consumption of iron- rich foods in the urban slums of

What is iron deficiency anemia?

The body needs iron to produce hemoglobin, the protein that is responsible for carrying oxygen from the lungs to the brain, heart, and other organs in the body. Iron is also important for the production of other proteins that are important for respiration, energy metabolism and immunity. During iron deficiency the production of hemoglobin and other proteins is reduced.

In children aged 6-59 months, anemia is present when hemoglobin concentration in the blood is below 110 g/dL.ⁱ This threshold is based on the distribution of hemoglobin concentrations in healthy populations of similar age and sex. Mild anemia is often not visible, however, some of the main signs and symptoms include paleness of the fingernails, tongue and eyelids, tiredness and breathlessness.

Although there are many causes of anemia, an inadequate dietary intake of iron is the leading cause in developing countries. In particular, consumption of animal products, which contain easily absorbable ‘heme’ iron is particularly low in Bangladesh and other South Asian countries. Absorption of non-heme iron present in leafy vegetables, pulses, and rice is much lower as it is poorly absorbed due to different substances such as phytates, which are found in rice, and tannins, which are found in tea.

ⁱ World Health Organization, UNICEF, & United Nations University (1998). *Iron Deficiency: Indicators for Assessment and Strategies for Prevention*. WHO, Geneva, Switzerland.

South Asia is very low. Slum residents are also subject to repeated infections due to crowding and poor water and sanitation conditions. Combined, these factors are likely to be the main contributors to the high prevalence of anemia among these young children. Clearly, interventions need to be developed and implemented as soon as possible to address this important public health problem.

The prevalence of anemia was highest in children less than two years of age. This is likely to be a reflection of low iron intake during the period when complementary foods rich in micronutrients should be a growing part of the child’s diet. Yet in the slums, such foods are expensive and often even unavailable. The high prevalence of anemia among mothers of

these children (forthcoming) indicates that the women's iron stores, as well as the stores of their children at birth, will be low and that any potential interventions should reach both mothers and their children. Because their diets are deficient in available iron, they are probably also lacking in other micronutrients, given evidence that micronutrient deficiencies overlap. While children 12-59 months are the target of a semi-annual vitamin A capsule supplementation program, there is growing evidence that zinc and other micronutrients have important roles in immune function. Thus, interventions with multi-micronutrient supplementation, rather than iron supplementation by itself, may be justified.

What can be done?

Non-governmental organizations (NGOs) provide many health and family planning services to people in the urban slums of Bangladesh. The potential to introduce iron and multiple micronutrient supplementation programs for both children and women of reproductive age through existing services should be explored. Because of the high prevalence of anemia and other micronutrient deficiencies in this population, a mass preventive supplementation should be promoted rather than treatment of cases of anemia. Other options, such as fortification or micronutrient mixes (e.g. fortified infant foods, micronutrient sprinkles, fortified drinks) should also be explored and promoted to reach the urban population.

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