Nutritional Surveillance Project
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The Burden of Anemia in Rural Bangladesh
The Need for Urgent Action

Many surveys in the past have shown that anemia is a severe problem in Bangladesh among most age, population and geographic groups[1-3]. Findings from a survey conducted by the Nutritional Surveillance Project (NSP) of Helen Keller International (HKI) in collaboration with the Institute of Public Health Nutrition (IPHN) in 2004 show that 68% of children under five years of age are anemic, with the highest prevalence among those 6-11 months old (92%). Approximately 40% of adolescent girls and 31% of adolescent boys suffer from anemia as well as 46% of non-pregnant and 39% of pregnant women. The prevalence of anemia increased in comparison to a similar survey conducted in 2001. This bulletin calls for urgent need for action to reduce anemia, especially in view of the high risks for maternal health and mortality, the devastating impact on cognitive and motor development of an entire generation of children and the vast economic losses at present as well as in the future.

Globally, 40 to 60% of young children are suffering from iron deficiency anemia. The World Health Organization has categorized it as one of the top ten most serious health problems and the United Nations have called for a reduction of at least 30% in the global prevalence of iron deficiency anemia (IDA) by the year 2010[4]. The control of IDA is an underlying factor for the achievement of several Millennium Development Goals (MDGs). It plays a role in combating "hidden hunger" (micronutrient deficiencies) within the first MDG and contributes to reducing maternal mortality (fifth MDG). Anemia impairs ante- and postnatal growth and development, especially of the brain, thus its control affects the achievement of universal primary education (second MDG).

In Bangladesh, the MDGs are reflected in the Poverty Reduction Strategy Paper (PRSP) of the Government of Bangladesh (GOB). Under the umbrella of the PRSP, a Health, Nutrition, Population Sector Programme (HNPSP) is being designed to address malnutrition and offers opportunity for the control of anemia among women. Also, the GOB is currently developing an Anemia Control Strategy that focuses on vulnerable groups, including young children and women of reproductive age.

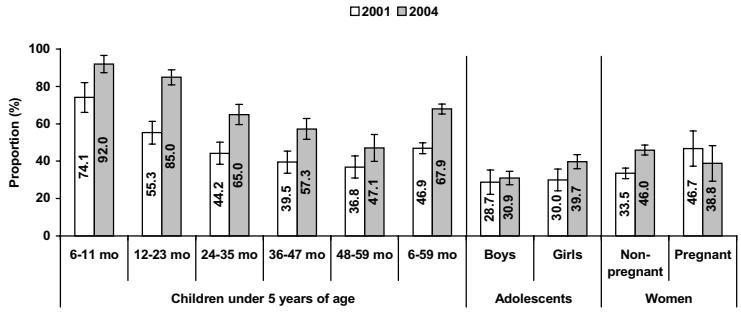

***Figure 1**. Anemia prevalence among children, adolescents and women in rural Bangladesh in 2001 and 2004. (Children:* n=*1148 (2001),* n=*1227 (2004); adolescent boys:* n=*186,* n=*648; girls:* n=*237,* n=*661; non-pregnant women* n=*1091,* n=*1388; pregnant women:* n=*108,* n=*102. Error bars indicate 95% confidence intervals.)*

Helen Keller INTERNATIONAL

NSP NUTRITIONAL SURVEILLANCE PROJECT

IPHN

Survey methods

HKI and IPHN conducted a national anemia survey in rural Bangladesh in Feb-Mar 2004. Data were collected by the Nutritional Surveillance Project (NSP), using a multistage cluster sampling design in 24 rural sub-districts, four from each of the six Divisions. From each sub-district, five *mauza* were randomly selected and one village per *mauza*. Per village, 10-11 children, 11-13 mothers and 10-12 adolescents (equal number of girls and boys), largely from the same households, were sampled systematically for hemoglobin measurements and background information was collected through a structured questionnaire. Hemoglobin concentration (Hb) was measured from capillary blood using a portable photometer (HemoCue). Anemia was defined as Hb <110 g/L (children 6-59m old, pregnant women), <120 g/L (girls 13-19y, boys 13-14y, non-pregnant women) and <130 g/L (boys 15-19y). Severe anemia was defined as Hb <70 g/L and subjects in this category were referred to health centers. Data were analyzed from 1227 children (6-59 m), 661 female and 648 male adolescents and 1490 women of whom 102 were pregnant. The current results were compared to the previous survey in 2001.[2]

Causes and consequences of iron deficiency anemia (IDA)[5-7]

Anemia is often used as a proxy indicator for the prevalence and severity of iron deficiency within a population. Causes of anemia include:

- Low iron intake (poor dietary quality, low meat/fish intake)
- Increased iron demand (growth, infections, blood loss, pregnancy)
- Inadequate absorption in presence of too many inhibitors (tannins, phytates) and too few enhancers (vitamin C)
- Parasitic infections, malaria

Consequences of anemia include:

- Fatigue, reduced concentration and work productivity
- Low birth weight and impaired growth and brain development leading to psychomotor, behavioral and cognitive impairment
- Decreased resistance to infections
- An estimated loss in economic productivity attributable to anemia of 7.9% of the country's GDP.

Anemia in rural Bangladesh

The prevalence of anemia among almost all population groups in rural Bangladesh included in the survey significantly increased from 2001 to 2004. Overall, 68% of children aged 6-59m were anemic in 2004. The prevalence was 92% among children 6-11m old and 85% among 12-23m old children. Of 6-23m old children, 87% were anemic and of 24-59m, 58% were anemic. While the prevalence among non-pregnant women increased in comparison to 2001 (34% to 46%), it decreased among pregnant women (47% to 39%, not significant). The results are shown in **Figure 1**, page 1. Children 6-59m old had a mean hemoglobin concentration of 102.4 g/L (±15.7 SD). The prevalence of severe anemia was 3% among 6-59m old children, the highest prevalence was found in 12-23m old children (5.7%), followed by those 6-11m old (3.9%). Results stratified by children's age groups and gender are presented in **Figure 2**. In older children, the anemia prevalence seems to be higher among girls than boys.

The prevalence of anemia was lower in dewormed children. **Figure 3** shows the deworming coverage in the last 6 months and the prevalence of anemia among those children dewormed and those not. The source of deworming drugs depends on the age of the child. Provision of anthelminthic drugs among 24-59m old children has been integrated into the National Vitamin A Plus Campaign since October 2003. Younger children (12-23m) may obtain it from a different source, e.g. caregivers buy it at a pharmacy. Due to the 6 months recall period, children were grouped according to their current age to retrospectively best reflect their eligibility for deworming from different sources 6 months before the survey. The anemia prevalence was also lower among children who had consumed animal source foods on at least one day during the last week (66.5%) than in those who had not consumed them (87.7%).

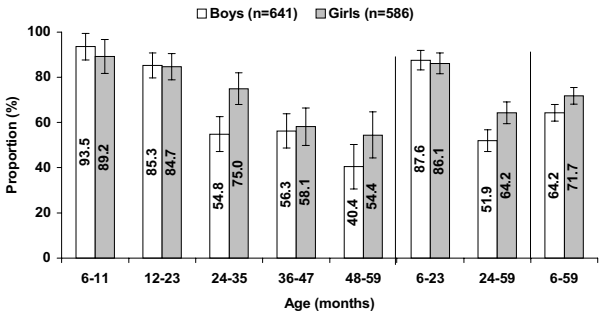

***Figure 2**. Anemia prevalence by age group and gender of the child in rural Bangladesh in 2004.*

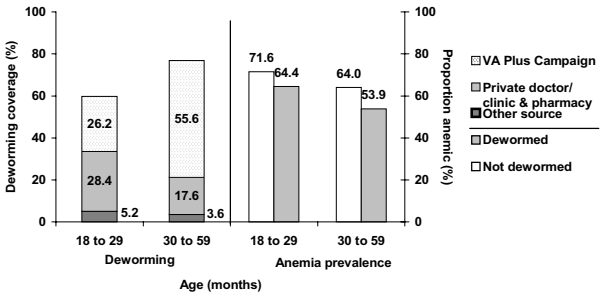

***Figure 3**. Coverage of deworming in the last 6 months by source and prevalence of anemia in relation to deworming status among children aged 18-29m (n=277) and 30-59m (n=589) in rural Bangladesh in 2004. For age group selection please see text.*

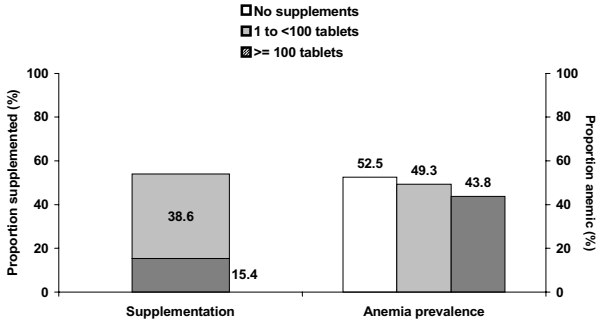

***Figure 5**. Coverage of iron/ folic acid supplements during the most recent pregnancy and prevalence of maternal anemia by supplementation status (n=937) in rural Bangladesh in 2004.*

Figure 4 shows the anemia prevalence in women, stratified by their pregnancy and lactational status. Lactating women had a greater anemia prevalence. Due to the small sample size for pregnant women, these results should be interpreted with caution. Half of all women who were pregnant within three years before the interview received some iron/folic acid (IFA) tablets (**Figure 5**). The anemia prevalence was lower among those women who received IFA tablets.

Implications and discussion

Infants are born with iron stores and breast milk is sufficient to provide iron during the first 6 months of life, given that the mother has sufficient iron stores. After that age, good quality complementary foods are necessary because breast milk alone does not meet the child's nutritional requirements any longer. Consumption of complementary foods low in micronutrients and recurrent infections, may soon lead to nutritional deficiencies, including IDA. These young children therefore are extremely vulnerable, and as the data demonstrate the worst affected among all age groups in rural Bangladesh.

Strategies to control anemia include IFA supplementation, dietary diversification, food fortification with iron and the control of worm infestation or malaria. In-home fortification, such as the use of "Sprinkles", has fueled great hope to efficaciously tackle the problem of IDA among young children. It is a flexible method to provide a sufficient amount (1 RDA) of iron and other micronutrients to vulnerable population groups. Sprinkles can be used with complementary foods without altering the food's color or taste. The relative low costs of Sprinkles could easily outbalance the country's long-term economic loss due to IDA. A national workshop in 2004[8] recommended to focus on interventions scaled-up to the whole country as early as possible. Promising results of studies conducted by BRAC in Bangladesh, including effectiveness, high acceptance and compliance by mothers when using Sprinkles for their children, have been reported.[9,10]

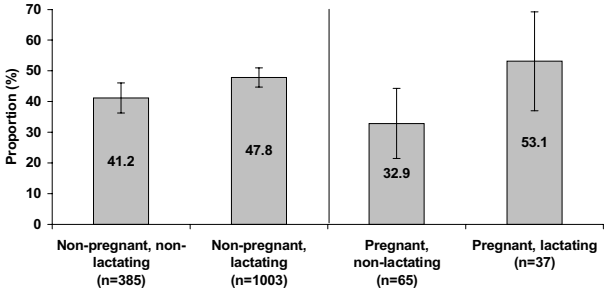

***Figure 4**. Anemia prevalence by pregnancy and lactational status of the mother in rural Bangladesh in 2004.*

The high prevalence of anemia among lactating and pregnant mothers is predominantly due to depletion of iron stores during pregnancy and/or lactation. This highlights the need for improved supplementation among both pregnant and lactating women to ensure adequate iron stores. Sprinkles designed for maternal requirements may prove a feasible option. The anemia prevalence may also be reduced by placing greater emphasis on sufficient birth-spacing (>2 years)[11]. Both the mother and her offspring will benefit from reduced maternal IDA.

In 2001, the IPHN issued national guidelines[12] for the prevention and treatment of IDA, realizing that the "severity of anaemia increases unless iron deficiency is adequately addressed". The recommendations include daily IFA supplements (in nutritionally adequate doses) for all children from 6 months until adolescence to treat and prevent IDA. Weekly IFA supplements are recommended for non-pregnant adolescent girls/ women of reproductive age and daily IFA supplementation for pregnant/ lactating women until 3 months postpartum. Furthermore, the guidelines emphasize the importance of dietary

diversification, helminthes control and food fortification. Dietary diversification may be facilitated through homestead food production, a proven approach to increase the consumption of animal source foods and to reduce the maternal anemia prevalence.[13]

Recommendations

- An effective, low-cost, country-wide intervention across all at-risk groups is needed to reduce the prevalence of anemia. This could be incorporated in the National Anemia Control Strategy for Bangladesh and be addressed through subsequent programs to control anemia.
- In-home fortification, such as Sprinkles, as a feasible strategy to reduce anemia among young children and pregnant/ lactating mothers should be made available nationally.
- Within the HNPSP framework, a sustainable system for the control of anemia must be set up, emphasizing on greater demand creation and improved service delivery.
- The implementation of the IPHN national guidelines for prevention and treatment of IDA should be reinforced.
- Regular monitoring of the prevalence of anemia among all vulnerable groups at national level is needed to monitor progress.

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