Reducing Iron-Deficiency Anemia and Changing Dietary Behaviors among Adolescent Girls in Maharashtra, India

The Issue: India has the highest prevalence of iron deficiency anemia among women in the world, including adolescents: 60-70 percent of Indian adolescent girls are anemic (Haemoglobin (Hb) < 12 g/dl). Anemia among women can result in adverse pregnancy outcomes and severe anemia can lead to maternal deaths; reduced work productivity and impaired physical capabilities are other adverse outcomes. Adolescence, as a period of growth and development, is considered the best time to intervene, to assist in physical and mental development, and to prevent later maternal anemia. Despite the magnitude of the problem, no strategies exist in Indian public health programs to tackle iron deficiency anemia in adolescent girls. To address this gap, the Institute of Health Management-Pachod (IHMP), in collaboration with ICRW, is conducting an intervention study in Maharashtra to improve dietary behaviors and reduce iron-deficiency anemia among unmarried adolescent girls.

The Adolescent Girls Anemia Prevention Program at a Glance (2000 – 2003)

Objectives:

1. To increase number of daily meals adolescent girls eat from 2 meals to 3-4 meals
2. To encourage girls to consume iron rich foods on a daily basis
3. To encourage girls to consume vitamin C-rich foods in combination with iron rich foods daily
4. To reduce the prevalence of anemia especially in the severe (Hb < =7 gm/dl) and moderate (Hb<7.1-9.9 gm/dl) categories

Study Design & Target Group: A 3-year community intervention trial with unmarried adolescent girls ages 10-19 years in 16 slums of Pune city. 10 intervention slums (1000 girls) and 6 control slums (752 girls). Baseline and endline with two cross-sectional samples.

Program Activities: Weekly iron and folic acid tablets given in first 3 months; ongoing nutrition education through home visits and meetings by community health workers, participatory activities such as food fairs; community project through IHMP's life skills program; audiovisual materials such as flash cards and posters developed by the adolescent participants.

Current program status: Now ongoing in 27 slums and 72 villages in Maharashtra. A similar programme has been initiated for married adolescent girls.

Data and Methodology: A census of 1142 adolescent girls in 16 slums in Pune was conducted. Of these, 811 were surveyed for information on dietary and morbidity history, anthropometric measures, menstrual history, frequency of meals in a day, whether lemon is consumed with meals (to increase iron absorption), consumption of locally available iron-rich foods, and workload within and outside the house. Blood samples were taken from 803 girls and haemoglobin was measured using the cyanmethaemoglobin method. Logistic regression was used to determine the predictors of anemia, with haemoglobin status (Hb < 12 g/dl) as the dependent variable. Independent variables included economic status, consumption of iron rich foods, meals eaten in a day, use of lemon with meals, morbidity in the past year, hours worked in a day, and whether menses had started.

Select Baseline Characteristics (N=811)

Average Age (Completed Yrs): 14 yrs
Percent currently in school: 76%
Percent working outside the home: 5%
Percent working 2+ hours in the home: 69%
Percent achieved menarche: 50%

Anemia and dietary behavior

Percent anemic (Hb<12gm/dL): 58%
Percent severely anemic (Hb<7gm/dL): 1.3%
Percent eating 2 or fewer meals daily: 40%

Impact of Anemia Prevention Program on Anemia Levels and Dietary Behavior

Predictors of anemia: Logistic regression of baseline data showed that anemia is significantly more likely among girls who eat two or fewer meals in a day, have been sick in the past year, and consume few iron-rich foods. Thus the intervention focused on changing dietary behavior.

Changes in dietary behavior: Endline comparisons of the intervention and control sites show that the intervention has influenced dietary behavior, with a significant increase in the intervention site compared to the control site in the percent of girls who eat more than 3 meals a day and eat lemon with their meals, as well as in the frequency of eating fruits.

Changes in Dietary Behavior at Endline (Percent)

Diet Behavior	Control	Interv.	Chi^2
> 3 meals daily	3.8	28.4	93.27***
Fruit > 3 times a week	22.6	31.1	8.28**
Lemon eaten with meal	57.5	65.5	5.95*

**p<0.05, **p<0.005, ***p<0.000; Control N=393; Interv. N=549*

Effect on anemia: Between baseline and endline, blood testing showed that mean Hb levels increased from 5.8 to 9.5 gm/dl for severely anemic girls, and from 8.9 to 11.2 gm/dl for moderately anemic girls.

Study Limitations:

- Information on dietary behavior was self-reported and may be biased to that extent
- The study comprised two cross-sectional samples, whereas haemoglobin change is best measured on the same individuals pre- and post-intervention

Policy Implications:

- The government's anemia prevention and control programme should focus on adolescents
- Participatory nutrition education can influence adolescent girls' anemia and dietary behavior
- Iron supplementation programs need to include nutrition education programs to be effective
- Key dietary behavior messages for girls include: eating more than 3 meals a day, eating with family so as to eat enough, eating green vegetables daily, and eating lemon or amla with meals.
- More effective methods need to be devised for community-based Hb testing.

The project:

Since 1999, the International Center for Research on Women (ICRW) is collaborating with partners in India on multi-site intervention studies on adolescent reproductive health in India. The partners are Christian Medical College (CMC), the Institute for Health Management (IHMP), Swaasthya, KEM Hospital Research Centre, and the Foundation for Research in Health Systems (FRHS). The project is supported by the Rockefeller Foundation.

IHMP is based in Pachod, rural Maharashtra, with an office in Pune city. The 3-year anemia prevention program started in Pune city slums but has now been expanded to rural Maharashtra as well, and included in IHMP's life skills program. This work is funded by the Ford and Rockefeller Foundations.

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