J HEALTH POPUL NUTR 2001 Sep;19(3):158-159
ISSN 1606-0997 $ 5.00+0.20

EDITORIAL

Breaking the Cycles of Malnutrition: Are Pregnancy Nutrition Interventions Effective?

The fourth report on the world nutrition situation, published by the UN Sub-Committee on Nutrition in 2000, underlined the importance of a life-cycle approach to the global nutrition challenges (1). Foetal under-nutrition results in a wide range of consequences in perinatal life, in infancy, and there is growing evidence of causal links to chronic diseases much later in life (2,3). Pregnancy is one of the logical target periods for nutrition interventions, potentially providing combined opportunities to treat or prevent maternal depletion and under-nutrition of the foetus. The literature review by David Rush probably conveys a pessimistic view on the effectiveness of nutrition interventions in pregnancy (4). However, the knowledge base is so far weak, with seemingly contradictory results. Many of the basic questions still remain: who will benefit (mother and/or foetus), from what intervention, performed when, and when will what effect be shown?

The magnitude of the immediate consequences as well as the generational and inter-generational effects of foetal growth retardation are enormous in South Asia, and especially in Bangladesh, where reportedly 45% of infants are born with a weight below 2,500 g. Half of the world's malnourished children live in three countries on the subcontinent: Bangladesh, India, and Pakistan. This forms the background to launch ambitious nutrition programmes in the region, where large investments have been made to break the cycle of malnutrition through food and micronutrient supplementation (and related activities) to pregnant women and infants. The research community has up to now neither provided much assistance in explaining the Asian enigma, nor in evaluating and advising appropriate nutrition interventions (5). Most studies on maternal nutrition interventions, weight gain, and birth-weight have been performed in the Western world, where mothers generally are well-nourished and low birth-weight is relatively uncommon, and only a few in South Asia, where these problems are overwhelming.

The literature may provide the impression that maternal weight and weight gain are resistant to nutrition interventions in pregnancy. However, the effects of nutrition interventions should preferably be assessed over an entire reproductive cycle with its possible depletion and repletion phases, and seen in relation to the pre-pregnancy nutrition status (6). A re-analysis of Guatemalan data along these lines showed that malnourished women gained weight during the reproductive cycle, but their subsequent infant tended to have a lower birth-weight than the previous one. Marginally-nourished women, on the other hand, lost weight during the reproductive cycle and their second (study) infant tended to weigh more than the previous one (7). This gives a possible explanation to the contradictory findings on maternal depletion and effects of supplementation in women of different pre-pregnancy nutrition status.

Periods of famine result in substantially lower birth-weights. Some countries have strong annual variation in food security, morbidity, and workload on mothers, resulting in marked seasonal variation in birth-weight (8,9). In Bangladesh, every second woman becoming pregnant has a body mass index consistent with chronic energy deficiency. Will her foetus benefit from her participation in the Bangladesh Integrated Nutrition Project and the 600-kcal daily food supplement or will she herself benefit by maintaining her weight during pregnancy or lactation, or will the entire mother and child dyad benefit? A major determinant for the distribution of the effect seems to be the mother's pre-pregnancy weight. Other important factors for the size of the effect are her basic dietary intake during this period, the energy and nutrient composition of the supplement, the timing and total duration of supplementation, the replacement level of the supplement, her level of physical activity, and her general health, especially the presence of infectious diseases. Chronic psychological stress may probably also contribute significantly to the problem of pre-term delivery and low birth-weight or modify the effect of nutrition interventions (10). The practical and ethical constraints to implementing a strong trial design when the intervention is food are challenging. The complexity of the task increases by the need of evaluating multiple outcomes, thereby measuring most of the

potential benefits. Further, as pointed out in the review by David Rush (4): associations are not easily interpreted, and a higher weight of the mother is not necessarily linked to a reduced perinatal mortality. Biological associations are more frequently U-shaped or S-shaped than linear.

The current large-scale nutrition-supplementation programmes for pregnant women and young children provide good opportunities for the research community to answer some of the unsolved issues. A large community-based randomized trial with combinations of food and micronutrient supplements to pregnant women is currently underway in Matlab, Bangladesh, where pre-pregnancy weight measurements, careful monitoring and assessment over the entire pregnancy cycle are enabled by the running Health and Demographic Surveillance System. Hopefully, that trial and other future studies can improve the knowledge base for nutrition interventions in pregnancy.

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