Global Burden and Significance of Multiple Micronutrient Deficiencies in Pregnancy

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Maternal mortality, low-birthweight infants and childhood stunting continue to be major global public health problems, part of a recurring cycle of disadvantage. Maternal undernutrition in particular is one of the most neglected aspects of nutrition in public health [1]. One possible low-cost public health intervention that might help address these problems is the antenatal provision of multiple micronutrient supplements. If the evidence base could be established, cost-effectiveness found to be acceptable and safety ensured, supplementation could ameliorate the impact of poor nutrition and diets, high disease burdens and the sociocultural factors contributing to these problems.

Concurrent deficiencies of micronutrients are well documented among pregnant women (and young children), especially in low- and moderate-income countries. Micronutrients likely to be important for maternal, infant and child outcomes include iron, vitamin B<sub>12</sub>, folate, vitamin D and selenium and zinc (along with appropriate dietary energy intakes) [2]. Deficiencies in maternal micronutrient status are a result of poor-quality diets, high fertility rates, repeated pregnancies and short inter-pregnancy intervals, increased physiological needs, as well as poverty, sociocultural factors such as early marriage and adolescent pregnancies, and some traditional dietary practices [2, 3].

The WHO health statistics and health information systems do not directly calculate the global burden of micronutrient deficiencies in women of reproductive age. A true measure would reflect not only women’s mortality, morbidity and reproductive health outcomes, but also intergenerational effects that affect both the mother and her neonate’s immediate burden along with the longer-term impact on impaired intellectual and physical development and the later incidence of noncommunicable diseases. In total, micronutrient deficiencies were estimated in the 2002 World Health Report to cause about 6%
of global disability-adjusted life years (DALYs). Estimates attribute iron deficiency anemia to causing a fifth of early neonatal mortality and a tenth of maternal mortality [4]. The impact on women of poor micronutrient status is double that of males, and is far greater in low-income countries, so that the burden (as measured by DALYs) of iron deficiency anemia in low-income countries is 12.5 times that of high-income countries. The significance of this likely relatively large burden (in numbers if not percentages of total) due to multiple micronutrient deficiencies is that it is heavily weighted against women and especially those in low-income countries.

There have been good studies in over a dozen countries addressing the results of multiple micronutrient supplements over and above iron-folic acid supplementation but with conflicting results. Consequently, at least four meta-analyses have been undertaken to establish significant findings that could help guide policies and programs. The conclusions were that multimicronutrient supplementation improves birthweight and likely reduces the number of birthweight infants born [1, 3, 5]. Supplementation with iron-folic acid or multimicronutrients also appears to have positive longer-term impacts on the health and development of the offspring. While there remain concerns about possible increased infant mortality in some populations [1, 3], given the results of the meta-analyses, cautious scaling-up of country effectiveness trials appears justified with careful monitoring and evaluation. In addition to multimicronutrient supplementation, optimal interventions should be part of a larger improvement in antenatal care programs that improve maternal health and nutrition by addressing household food insecurity, improved antenatal and adolescent nutrition, reducing the burden of maternal infections such as HIV and malaria, deworming, strengthening health systems and capacity with increased antenatal and perinatal contact through access to improved clinic care and delivery, and by actively addressing gender and social disadvantage [1, 3]. Taking all the studies together, and with experience in countries such as Indonesia, Mexico, Vietnam and elsewhere, it is likely that effective distribution and promotion systems can be developed for different target groups and settings.

References
1  Bhutta ZA, Haider BA: Prenatal micronutrient supplementation: are we there yet? CMAJ 2009;180:1188–1189.
