

## **The benefits of Multiple Micronutrient Supplementation during Pregnancy**

### **The importance of micronutrients during pregnancy**

Good nutrition is fundamental to good health throughout the life-cycle. It supports physical and cognitive development, and helps to prevent a number of diseases

During pregnancy, good nutrition is particularly important to support good health outcomes for both mother and infant. Evidence also shows that proper maternal nutrition can benefit her child later in life: it can improve cognitive development and reduce the risks of diabetes, obesity, and high blood pressure, among other conditions.

Many vitamins and minerals (collectively referred to as micronutrients) are critical during pregnancy, especially vitamins A, B6, B9 (folic acid), B12, C, D, E, and the minerals iron, zinc, iodine, copper, and selenium. During pregnancy the requirements for many of these micronutrients increase by as much as 50%. These requirements must be met for a healthy pregnancy and fetal development.

### **Maternal micronutrient status in low- and middle-income countries (LMIC)**

The prevalence of micronutrient deficiencies during pregnancy remains widespread, particularly in LMIC. If women are malnourished before pregnancy, this puts them at a disadvantage when they become pregnant and have increased nutritional demands. Micronutrient deficiencies during pregnancy can have serious consequences, including pregnancy loss, low birthweight babies, and birth defects.

### **What was already known about multiple micronutrient supplements during pregnancy?**

To determine the best approach to improve maternal nutrition, studies have compared the impacts of iron and folic acid supplements (IFA) (a common intervention) and multiple micronutrient supplements (MMS) during pregnancy. In 2015, a systematic review summarized the results of these studies. It found newborns of mothers who received MMS were significantly less likely to be born either underweight or small for gestational age (SGA).

The World Health Organization (WHO) considered this review when developing its guidelines on antenatal care, published in 2016, but found that further evidence was needed on the benefits, risks, and costs of MMS to recommend these supplements over IFA. Subsequently, the WHO reaffirmed its recommendation of IFA for routine use in pregnancy, with the caveat that countries with a high prevalence of nutritional deficiencies may want to consider MMS over IFA.

### **What is new about multiple micronutrient supplements during pregnancy?**

To address questions posed by the WHO, help countries interpret the WHO guidelines, and deepen the evidence-base, a Task Force was convened by the New York Academy of Sciences to evaluate new evidence that was not available at the time of the development of the WHO guidelines in 2016.

The findings of the Task Force's collaborative work are summarized in the four papers of this special issue of the *Annals of the New York Academy of Sciences*. These publications show that:

1. **There is a need.** There is a high prevalence of deficiencies of multiple essential micronutrients among women of reproductive age in LMIC, putting women and infants at an avoidably high risk of death and poor health.
2. **There are clear benefits of MMS over IFA.** The new study published in 2017, after the WHO antenatal care guidelines, confirmed the positive findings of the previous systematic review and found the following additional benefits of MMS, compared to IFA:
  - Reduced risk of stillbirth
    - By 8 percent in the overall population of pregnant women
    - By 21 percent among anemic pregnant women
  - Reduced risk of infant 6-month mortality
    - By 29 percent in the group of anemic pregnant women
    - By 15 percent in female infants, but no effect in males
  - Reduced risk of low birth weight (<2500g)
    - By 12 percent in the overall population of pregnant women
    - By 19 percent among anemic pregnant women
  - Reduced risk of preterm (<37 weeks)
    - By 8 percent in the overall population of pregnant women
    - By 16 percent among underweight women
  - Reduced risk of being born small-for-gestational age
    - By 3 percent in the overall population of pregnant women
    - By 8 percent among anemic pregnant women
3. **The risk of excess intake of micronutrients is small.** The Task Force considered the potential risks of women consuming too much of each of the vitamins and minerals in MMS. Findings show that MMS is very unlikely to cause an excess of micronutrients in pregnant women, even in the presence of a nutritionally adequate diet.
4. **MMS is very cost-effective.** In the guidelines, WHO cited MMS as 300% more expensive than IFA. However, more recent cost estimates put the added cost much lower, at 35% or less, and as demand of MMS increases, the cost is projected to further decrease.
  - The Task Force assessed the cost-effectiveness of replacing IFA with MMS in Bangladesh and Burkina Faso. Despite the higher cost of MMS, the added benefits over IFA make the switch highly cost-effective.
  - Results in Bangladesh, in particular, were very promising: replacing IFA with MMS would cost approximately \$39 per case of low birth weight averted, it would save approximately 15,000 young lives (stillbirths and infant mortality) and avert approximately 30,000 cases of preterm birth in a single year.

### **What are some considerations for making the switch to MMS in antenatal care programs?**

WHO stated countries with a high prevalence of nutritional deficiencies may want to consider MMS over IFA. Thus, countries contemplating the switch from IFA to MMS programs should determine if nutritional deficiencies are common. If there is a high burden of nutritional deficiencies, countries can implement MMS in alignment with the WHO guidelines.

To assess if MMS may be beneficial to a given country, the following data can be helpful:

- **Dietary intake data**, collected through multiple-pass 24-hour recalls and food frequency questionnaires, dietary diversity measures, and household consumption and expenditure surveys. This information can help to illustrate nutrition patterns, identify nutrients that are consumed in low quantities and indicate if MMS would be a logical intervention.
- **Biomarker data** can be used to determine a population's prevalence of deficiencies in several micronutrients through nutritional biomarkers (e.g. found in blood and urine samples).
- **Birth outcomes data**, such as pre-term births, low infant birth weight, and SGA. MMS has shown to reduce incidence of each more so than IFA, meaning populations with poor birth outcomes may want to consider implementing MMS.
- **Anemia prevalence**. Given that MMS has greater benefits than IFA for anemic women, assessment of anemia can be an indicator of micronutrient deficiency and can help judge if MMS would be particularly appropriate to implement.
- **Underweight prevalence**. Among women of reproductive age and/or pregnant women, MMS, when compared to IFA, provides a greater benefit to the infants of underweight women.

Successful MMS programs will ensure high coverage and high adherence. Countries with existing, supplementation programs have the opportunity to build upon and strengthen these programs when switching to MMS. To ensure good adherence, countries should consider structuring an educational component that targets pregnant women to communicate the benefits of taking the supplement daily, early on in pregnancy and throughout pregnancy to maximize benefits.