Abstract

Deficiencies in some vital nutrients during pregnancy are very common in women in low-income countries and can lead to birth complications such as preterm births, low birth weight, and infant mortality. This is why governments provide pregnant women with two important micronutrients — iron and folic acid. But there are other vital micronutrients as well. If pregnant women consume not only iron and folic acid but also other micronutrients in a supplement, it would improve women’s health and birth outcomes. But these tablets cost more, so are they worth it?

Introduction

Did you know that worldwide more than 15% of babies are born with low birth weight and more than 10% are born too early? One of the reasons for that is the lack of some vital micronutrients during pregnancy. These types of birth complications can increase infant mortality and lead to life-long disabilities. This is why the World Health Organization (WHO) has recommended that governments provide two very important micronutrients to all pregnant women: iron and folic acid. If pregnant women don’t have enough of these micronutrients, the risk of pregnancy complications is considerable, as iron is very important for the blood system and folic acid for brain development.

What about other micronutrients though? Many studies show that deficiencies in other micronutrients, such as zinc, iodine, and vitamin A, also have negative impacts on the baby’s development. Moreover, studies have shown that when pregnant women take multiple micronutrient supplements (not just iron and folic acid), it reduces the risk of birth complications. WHO still doesn’t recommend multiple micronutrient supplements (MMS), even though deficiencies in these micronutrients are very common in low- and middle-income countries.

We wanted to investigate what would happen if governments started providing MMS tablets instead of iron and folic acid (IFA) only. Would it be effective? MMS tablets contain more ingredients and therefore will likely cost more - would the additional cost be worth it?

Methods

To estimate the effects, costs, and cost-effectiveness of replacing IFA with MMS, we created a mathematical model. For that, we needed several different types of information.

We used demographic data for two countries — Bangladesh and Burkina Faso (Fig. 1) - from an online tool. It provided us with information regarding the population in each country.
It also gave us the rate of infant mortality and of birth complications such as stillbirths, preterm births, and low birth weight.

To estimate the effects of switching from IFA to MMS tablets on these birth problems we used a recent study. It analyzed 17 different independent studies, which compared the effects of the two types of tablets. This study found that MMS has greater health benefits compared to IFA.

To evaluate the benefits of such a switch, we used a statistical measure called DALYs (disability-adjusted life years). This measures the (healthy) years lost due to illnesses, disabilities, or early death.

We calculated the cost of replacing IFA tablets with MMS tablets, which allowed us to estimate the cost-effectiveness (the cost for every avoided child death or year of disability).

For both countries we made two types of calculations:

1. the effect with 100% coverage (assuming that all pregnant women receive the recommended number of tablets)
2. the effect using the country’s current coverage for IFA tablets (50% of women in Bangladesh and 10% of women in Burkina Faso currently receive the recommended number of IFA tablets).

So what would happen if Burkina Faso and Bangladesh governments switched from IFA tablets to MMS tablets for one year? Switching iron and folic acid tablets with multiple micronutrient tablets would reduce infant deaths and birth complications in both Bangladesh and Burkina Faso. The benefits would be very substantial if 100% of women received the recommended number of tablets (Table 1).

Cost and cost-effectiveness differed between the two countries (Table 2). In Burkina Faso, the population is smaller, and currently only 10% of pregnant women receive the recommended number of tablets. This low level of coverage makes the total cost of switching much lower for Burkina Faso than for Bangladesh. Also, the cost-effectiveness of the tablet switch was better in Burkina Faso (i.e. a lower cost of saving one life).
Discussion

Are the more expensive multiple micronutrient tablets worth it? Our results strongly suggest so! The expected benefits are substantial – if this switch was made with current coverage in Bangladesh, it could save more than 7,000 lives each year. It could also reduce the number of preterm births by 16,000 cases per year. Even though the results in Burkina Faso are not as impressive because coverage is low, switching to multiple micronutrient tablets could still save close to 500 lives there each year.

Costs for such a transition from IFA tablets to MMS tablets would be significant. Nevertheless, we believe that making the switch would be cost-effective. Costs of the tablets can be negotiated, and when compared to other methods countries use to reduce infant mortality such as training birth attendants or conducting home visits, switching to MMS tablets would be more cost-effective. This is why we think governments in low- and middle-income countries should consider such an approach.
**Conclusion**

It may seem unethical to attach a dollar amount to human life, but governments have limited budgets. They must weigh the costs and benefits of current and proposed programs and choose ones that produce the greatest benefit per dollar spent for the people. The more information policymakers have, the more well-informed these difficult decisions can be.

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**Glossary of Key Terms**

- **Cost-effectiveness analysis** – an economic analysis that compares the costs and outcomes of different courses of action (in this case – the comparison between IFA and MMS tablets).
- **DALYs (disability-adjusted life years)** – a statistical measure of the impact of a disease that shows the years lost due to illness or early death.
- **Folic acid** – one of the B vitamins (B9), which is important for the growth of the baby’s brain and spinal cord.
- **Infant mortality** – the death of children under the age of 1 year.
- **Iron** – an essential mineral. One of its functions in our body is to transport oxygen in the blood. Deficiency in iron during pregnancy can lead to many complications in the baby.
- **Micronutrients** – vitamins and minerals that are needed by the body in small amounts and are important for growth, energy production, the immune system, and neural development.
- **Preterm birth** – babies born 3 or more weeks before their due date. They often have health complications.
- **Stillbirth** – delivery of a baby who has died more than 20 weeks into a pregnancy. The baby is born without any life signs.

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