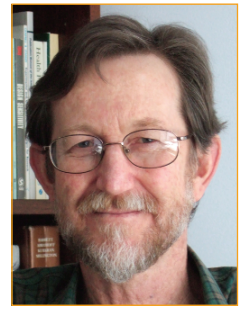


Improving women's nutrition: a requirement for achieving the Millennium Development Goals



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The impact of women's nutrition on the health of populations and to development overall has been recognised only recently. Increasingly it is apparent that the Millennium Development Goals (MDGs) cannot be achieved without substantial improvements in women's nutrition. These improvements will decrease maternal and neonatal mortality, improve the nutritional status and cognitive development of children, improve the economic productivity of women, and decrease adult-onset of non-communicable diseases resulting from nutritional insults to the foetus. Reducing maternal anaemia is particularly important to achieving the MDGs – and proven, cost-effective programmes addressing anaemia are available. The first step in realising the potential for improving women's nutrition is creating the political commitment to move forward.

The full significance of improving women's nutrition as a requirement for achieving the Millennium Development Goals of improving child survival (MDG 4) and maternal health (MDG 5) has been recognised only recently. The World Bank considered improving women's nutrition a critical starting point in improving nutrition in infants in its 2006 strategy report, *Repositioning Nutrition*. The Bank urged governments to invest more in nutrition programmes because of the high economic returns in terms of growth and poverty reduction, the adverse impact of malnutrition on both poor and rich countries, and the failure of markets to address the issue. UNICEF also recognised the vital role of improving women's nutrition before, during, and after pregnancy, in their 2003 nutrition strategy document.

The consequences and causes of poor nutrition of women

The three major adverse consequences of poor nutrition of women highlighted in this review are:

- Increased numbers of low birth weight babies
- Increased maternal and neonatal mortality, specifically from anaemia and vitamin A deficiency, and
- Economic and social costs.

A crucial underlying *cause* of undernutrition in women, outside the reach of direct nutrition interventions, is the poor social and economic status of women. This results in inadequate access to services and information, education opportunities, lack of choices and resources.

Low birth weight

Globally about 16 per cent of babies were deprived of proper nutrition during gestation and are born weighing less than 2,500 grams, i.e. at low birth weight (LBW). India, Bangladesh, and Pakistan have among the highest rates of LBW babies in the world, at 28 per cent combined. The adverse consequences of gestational malnutrition are now well established, but their full significance to the development of a nation has not yet been recognised adequately by policymakers.

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Low birth weight babies are more likely to die than heavier babies. They account for the majority of neonatal deaths contributing substantially to child mortality. The fourth Millennium Development Goal will not be reached without a reduction in neonatal mortality. Strong evidence links weakened immune and cognitive functions to malnutrition in utero. Additionally, the retarded growth of LBW babies is rarely caught up, resulting in another generation of mothers with short stature, predisposed to give birth to small, low birth weight babies. Improving women's nutrition is an essential step in ending this inter-generational cycle.

That poor nutrition during gestation and low birth weight result in obesity and increased vulnerability to non-communicable diseases in adult life (Barker's hypothesis) is now widely accepted. Increasingly, in poorer Commonwealth countries, overweight adults and underweight children are found in the same communities, often in the same households. Women's nutrition plays a central role in these very disturbing trends, and is a critical factor, but not the only factor, in addressing LBW and subsequent adult obesity.

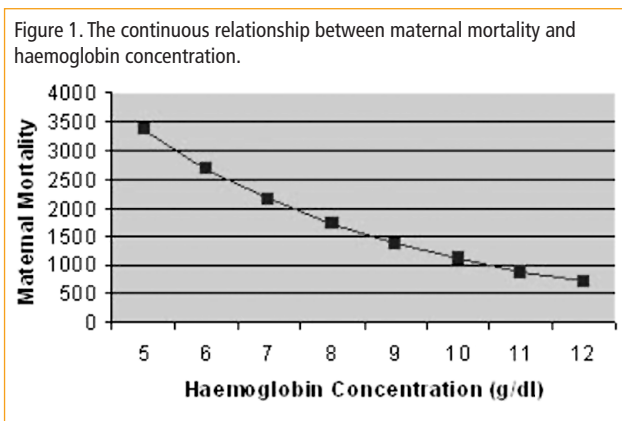
Underpinning the relationship between haemoglobin concentration and mortality risk is the fact that death from cardiovascular causes is a function of blood volume, blood loss, cardiac fitness, and haemoglobin concentration.

The major causes of LBW vary among regions, but usually include: low maternal energy intake (quantity) and poor diversity of diet (quality in terms of vitamins and minerals); excessive energy expenditure through heavy physical activity; infections (e.g., sexually transmitted infections and malaria); becoming pregnant at a young age before the mother's own growth is completed; substance abuse; exposure of the mother to secondary smoke inhalation and indoor air pollution; and domestic violence.

Maternal mortality and anaemia

There is stark inequity in the rates at which women die as a result of pregnancy or childbirth between poor and rich countries. In the poorest countries, women face a life-time risk of one in six compared with one in 30,000 for women in Northern Europe. Women's nutrition, particularly anaemia, plays a major, though often under-recognised, role in this inequity.

As an underlying risk factor for maternal and perinatal mortality and morbidity, iron deficiency anaemia is estimated to cause 115,000 of the 510,000 annual maternal deaths (22 per cent) and 591,000 of the 2,464,000 perinatal deaths (24 per cent) occurring annually around the world. The bulk of this impact was in the mild and moderate grades of anaemia, rather than being limited to severe anaemia (Stoltzfus et al., 2005).



The analysis shown here illustrates that correcting anaemia of any severity reduces the risk of death – The risk of maternal mortality decreases by about 20 percent for each 1 gram per decilitre (g/dL) increase in haemoglobin (Hb) (Figure 1). This decreased risk is continuous over the range of Hb between 5 and 12 g/dL but it is not linear – the decrease in risk is greater at the lower Hb concentrations. This is a new finding and differs from the earlier view that only severe anaemia causes mortality. It has two important policy and programme implications:

- More women are affected by increased mortality risk. Previously only women with severe anaemia were considered to be at increased risk of anaemia. Since the majority of anaemic women have haemoglobin concentrations between 7 and 12 g/dL, this analysis shows that anaemia puts many more pregnant women at risk.
- Address all levels of anaemia. Mild and moderate anaemia (Hb > 7 g/dL) is important to women's health and programmes should focus on these conditions in addition to severe anaemia.

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Mortality can also be affected by vitamin A deficiency. Recent evidence from Nepal links vitamin A deficiency very strongly to maternal mortality. Weekly supplementation with vitamin A resulted in a 40 per cent reduction in maternal mortality with the strongest effect in women with severe deficiency (nightblindness). A replicate study is currently under way in Bangladesh. Vitamin A plays a role in fundamental biological processes including the immune response, and anaemia is a common consequence of vitamin A deficiency.

In addition to increased mortality, caring practices are adversely affected by poor maternal nutrition, and especially by anaemia. Well-nourished mothers often have more energy, time, and motivation to nurture their babies and provide a healthy and stimulating environment that is critical to cognitive development and subsequent success at school.

Economic and social consequences

The adverse impacts of malnutrition on disability-adjusted life years were well documented by the World Health Organization (WHO) in the *World Health Report* in 2002. Among the 25 major risk factors of the global burden of disease, underweight ranked first overall, iron deficiency ninth, zinc deficiency eleventh, and vitamin A deficiency thirteenth. Iron deficiency is widespread and impacts national productivity with losses of up to 2 per cent of the gross domestic product in the most affected countries.

The World Bank estimates that interventions to address micronutrient deficiencies such as iron might cost only 0.3 percent of the GNP. The cost-effectiveness of these interventions is strongly supported by the 'Copenhagen Consensus'. In this initiative, a group of leading

economists prioritised investments for meeting ten major global challenges to development. They determined that providing micronutrients through a combination of public health and private sector programmes was ranked second, after control of HIV/AIDS. They found that providing vitamins and minerals offered better cost/benefit ratios than trade liberalisation, reducing migration barriers, new agricultural technologies, climate change, and other possible investment targets (www.copenhagenconsensus.com).

Programmes to enhance women’s nutrition

Effective programmes that address the preventable causes of women’s undernutrition directly will have their greatest impact in populations with the greatest nutritional deficits. Three basic approaches to nutrition programming include: improving overall diets, fortifying foods with micronutrients, either staples or condiments, and, supplementation. All approaches have advantages and disadvantages that vary for different populations.

Nutrient needs for pregnancy and lactation

Healthy pregnant women need extra energy (285kcal per day) if their pre-pregnancy activity level is maintained. This translates into approximately one additional serving of a staple food each day. Optimal weight gain during pregnancy depends upon a women’s pre-pregnancy body mass index (BMI). The recommendation for women with low BMI (less than 18.5) at the beginning of pregnancy is to gain 18kg before delivering. This will probably require most women to reduce their physical workload. The recommended weight gain decreases with increasing initial BMI and for women in an initial BMI of 30 or more, the ideal weight gain is 7kg (www.linkagesproject.org).

Pregnancy also increases substantially the requirements for many vitamins and minerals. Only supplementation can provide the amounts of nutrients needed during pregnancy and universal iron/folic acid supplementation is standard policy in most countries. Studies have shown that multiple micronutrient supplements may increase birth weight more than iron/folic acid supplements and UNICEF now recommends multiple micronutrients for pregnant women in emergency situations. Further research is under way to determine whether or not multiple micronutrients should be recommended more broadly for antenatal care.

Nutrient needs before pregnancy

There are two important reasons to extend nutrition programmes to the period before pregnancy. First, pregnancy is too short to make up for long-term deficits in nutritional intakes, and second, adequate nutrition is vital at the earliest stages of pregnancy during periods of most rapid growth and cell division. Fortification is an excellent means of improving all women’s nutrition, particularly in urban areas where refined cereals are becoming increasingly important components of diets and food processing is more centralised. However,

fortification is often not a cost-effective and sustainable option for some rural populations that do not eat centrally processed foods. Other strategies such as weekly supplementation or food powders/supplements (point-of-use fortification) are required. Biofortification holds much promise for the future, but requires further research and development before scalable programmes will emerge.

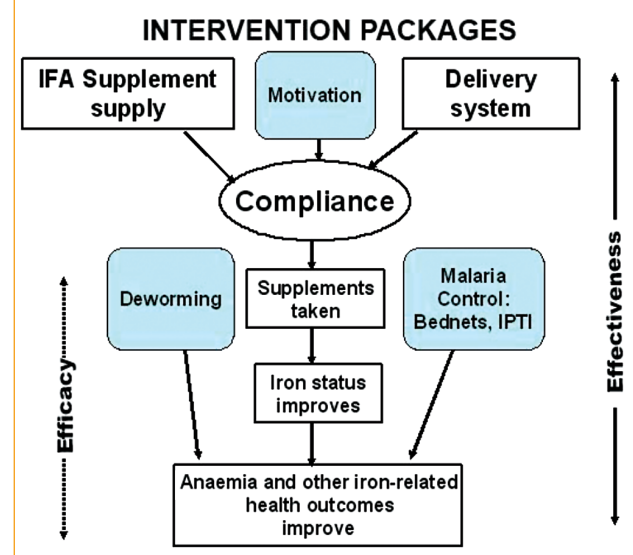
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Reducing anaemia

There is consensus on the *efficacy* (in the controlled research settings) of a number of interventions to reduce anaemia prevalence among pregnant women/women of reproductive age. These include universal supplementation with iron/folic acid tablets either daily, for pregnant, and weekly, for non-pregnant women or adolescents; fortification of commonly consumed food products with micronutrients; and optimal birth spacing. In areas where malaria and/or parasitic worms are prevalent, these may constitute major causes of anaemia. For malaria, intermittent preventive treatment (IPT), long-lasting insecticide treated bed nets (ITN), indoor residual spraying (IRS), and Artemisinin-containing antimalarial combination therapy (ACT) are available. De-worming medications such as albendazole are safe after the first trimester of pregnancy and reduce anaemia.

For an anaemia programme to be effective (in the real world) it must first address the major preventable causes in a coordinated way and, second, be well implemented. Figure 2 distinguishes between concepts of efficacy and effectiveness for anaemia programmes. The barriers to implementing effective iron/folic acid programmes are well

Figure 2. Efficacy of interventions is necessary, but is not sufficient, for effective programmes.



established. Commonly these include ensuring adequate supplies, motivating healthcare staff to provide information and counselling, encouraging family/community support for women to adhere to the recommendations, achieving adequate scale, and lastly, creating a sense of urgency at all levels about reducing anaemia.

There are some who argue that anaemia programmes are not effective and thus should not be a priority where resources are scarce. This is unfortunate because there is now good evidence that anaemia programmes at national scale are successful when the conditions identified above are met. For example, the national prevalence of maternal anaemia in both Thailand and Nicaragua was halved through well-implemented programmes.

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Ghana's integrated anaemia programme

Starting in 2001, Ghana has developed a highly coordinated anaemia programme. Central to the coordination and necessary awareness raising for the commitment needed, an Anaemia Control Coordinating Committee (ACCC) was formed. The ACCC brought together representatives from nutrition, malaria control, reproductive health, health promotion, pharmacy, and other units of the health services, as well as representatives from education, environment and agriculture, to ensure intervention components that addressed the major causes of anaemia and coordinated advocacy and implementation. A major early success of this programme was combining the national rollout of revised guidelines for iron/folic acid supplementation and IPT for malaria, both as components of enhanced antenatal services. Regional health managers embraced the efficiency of this combined anaemia training because front-line health providers were away from their clinics for only a short time. Anaemia advocacy and heightening awareness were achieved through strategic use of the media and engaging the Miss Ghana pageant organisation to adopt anaemia as its focus of community education for a year.

Mainstreaming nutrition interventions

To be sustainable, nutrition interventions must become an intrinsic part of existing preventive and curative services. Several global programmes have components designed to reduce anaemia and women's nutrition interventions should be mainstreamed into them. More information on these programmes can be found in the brochure entitled Maternal Anemia: A Preventable Killer (www.fantaproject.org/publications).

In terms of research needed to support programmes, a balance must be found between further investments in establishing the efficacy and safety of new interventions and operations research to determine how best to strengthen the effectiveness of the interventions of known efficacy, e.g. delivering iron/folic acid to pregnant and pre-pregnant women.

Why little action?

Governments and development partners have been slow to recognise the high economic costs of malnutrition – also that nutrition is the responsibility of several sectors, but the prime responsibility of none. Financing within countries is usually allocated by sector or ministry, so that unless one sector accepts the prime responsibility, no large-scale action will follow.

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Improving maternal nutrition contributes to productivity, economic development, and poverty reduction by improving physical work, cognitive development, school performance and health by reducing disease and mortality. Perhaps most importantly, improving women's nutrition is critical to breaking the cycle of poverty and malnutrition that still traps unacceptably large proportions of many populations in Commonwealth countries.

Dr Philip Harvey (MPH, Sydney; PhD, Cornell) is a public health nutritionist with experience in operational, academic, research, and policy environments. He has over 20 years experience in public health and has lived or worked in Commonwealth countries including Kenya, Uganda, South Africa, Ghana, India, Papua New Guinea, Vanuatu and Australia. He is the author of more than 30 papers published in peer-reviewed journals, and 40 major reports.

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