STRATEGY TO REDUCE MATERNAL AND CHILD UNDERNUTRITION
East Asia & Pacific Regional Office
Health and Nutrition Working Paper

Strategy to Reduce Maternal and Child Undernutrition
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<th>Abbreviation</th>
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<tbody>
<tr>
<td>ANC</td>
<td>antenatal care</td>
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<tr>
<td>EAPR</td>
<td>East Asia and Pacific Region</td>
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<td>EmOC</td>
<td>Emergency Obstetric Care</td>
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<td>EPI</td>
<td>Expanded Programme on Immunization</td>
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<td>HH</td>
<td>household</td>
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<td>HIV</td>
<td>human immunodeficiency virus</td>
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<td>IQ</td>
<td>intelligence quotient</td>
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<tr>
<td>IUGR</td>
<td>intra-uterine growth retardation</td>
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<td>LBW</td>
<td>low birth weight</td>
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<tr>
<td>MMR</td>
<td>maternal mortality ratio</td>
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<tr>
<td>STD</td>
<td>sexually transmitted disease</td>
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<td>TB</td>
<td>tuberculosis</td>
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<td>TBA</td>
<td>traditional birth attendant</td>
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<td>UNICEF</td>
<td>United Nations Children's Fund</td>
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<td>WFFC</td>
<td>World Fit for Children</td>
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<td>WHO</td>
<td>World Health Organization</td>
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STRATEGY TO REDUCE MATERNAL AND CHILD UNDERNUTRITION

Abstract

Undernutrition remains a significant problem among children in the East Asia and Pacific region, despite more than a decade of interventions aimed at improving it. Recent research suggests that a missing factor in correcting undernutrition is periconceptual, maternal and foetal nutrition. This strategy proposes to extend interventions to adolescent girls and pre-pregnant women in order to improve their nutritional status before conception and through all three trimesters of pregnancy. As a result, adequate nutrition will be guaranteed during the vulnerable intrauterine periods of maximum linear growth and weight gain that pre-determine ultimate height and weight. Anaemia during this period becomes a key element as a marker of maternal well-being and status, and a key factor in maternal mortality, and child growth and cognitive function. Consequently maternal anaemia, birth weight and stunting are defined as the key markers of the outcomes of this strategy.

BACKGROUND

Scope of the problem

Malnutrition* is both a distinctive cause and a scarring consequence of poverty. Its sustained prevalence in the East Asia and Pacific Region (EAPR), despite substantial advances in social and economic development, reflects the unevenness of that development and the persistence of pockets of underserved populations. It is a reminder that economic development alone does not automatically lead to improvement in nutrition. Rather, good nutrition is an outcome of many factors – both biological and social – that all need to be in place in order to achieve optimal growth and development.

The poor social and economic status of women even in well-off economies is key in this regard. Persistently high maternal mortality ratios (MMRs), elevated fertility rates and accompanying figures for maternal anaemia are indicators of inequity in women’s social status. This is reflected through poor access to nutrition and health facilities and lack of choices and resources for women.

In addition to the intra-national disparities, the regional prevalence of underweight children, 17 per cent, masks significant disparities between countries as well. If China, with its large population and very low underweight prevalence of 10 per cent is excluded, the regional average goes up to 27 per cent – close to the proportion of underweight children in Sub-Saharan Africa (29 per cent).²

* Malnutrition is taken to reflect both under and over nutrition. In this strategy only undernutrition is being addressed.


² UNICEF EAPRO, Towards a Region Fit for Children: An Atlas for the Sixth Asia and Pacific Ministerial Consultation (Figure 2.3.4), 2003; and UNICEF, State of the World’s Children 2003.
Over the last decade there has been little reduction in undernutrition rates in most countries of the region (figure 1). Experience shows that an improvement of a half percentage point a year can be expected through general socio-economic development, without specific programmes to combat undernutrition. Even this minimal improvement was not achieved in six countries. With intensive efforts, improvements of at least two percentage points per year can be achieved but no country in this region has managed to do that.

The region is not alone in its lack of progress on undernutrition. Between 1990 and 2001, worldwide prevalence of undernutrition fell only 5 per cent from 32 per cent to 27 per cent. As a result, some 165 million children are still undernourished today.

There is little data available on other indicators of undernutrition, for example low birth weight (LBW), stunting, anaemia or vitamin A deficiency. Therefore, it is hard to assess what has been achieved or even the current status of these important conditions.

From the data that is available, stunting emerges as a major problem in the region. It affects 21 per cent of children under five

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**Box 1: Undernutrition in the East Asia and the Pacific Region**

- **27 million children underweight**: 17 per cent of all the undernourished children in the world, almost as many as live in Sub-Saharan Africa.

- **Six EAPR countries in the Global Top Twenty undernourished**: Cambodia is number one (45 per cent underweight), Timor-Leste is second with 43 per cent underweight, and Lao PDR has 40 per cent.

- **The situation is not improving**: Underweight rates stayed the same or increased in Cambodia, Lao PDR and Mongolia. Furthermore, meagre improvement in Myanmar, Papua New Guinea and the Philippines hardly matches socio-economic development.

- **Only one country** - Viet Nam - **comes close to required rates of improvement**: Undernutrition fell by 1.8 percentage points per year over the decade; 2 percentage points per year represents a good achievement.

- **Stunting is highly prevalent**: More than one third of children younger than five are stunted in ten countries in the region.

- **Anaemia rates are high**: For example, 90 per cent of children 10-11 months old are anaemic in Cambodia.

*Analysis excludes the Democratic People's Republic of Korea because of its unique situation

Sources: UNICEF, *State of the World's Children 2003* and East Asia and Pacific Region Office

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7 Hunt, Joseph and Quibria, M. G., op. cit. p. 13.
8 Ibid.
years of age; more than are underweight. In ten countries of the region, more than one third of under-5 children are stunted. Moreover, as with the proportion of underweight children, there appears to have been little improvement (figure 2).

Consequences of undernutrition

Nutrition plays a major role in the survival, growth and development of young children. The effects of poor nutrition, in all its forms, impact upon the social, economic and cultural development of societies and nations. It will be impossible to achieve many of the Millennium Development Goals (MDGs), including the goals on extreme poverty and hunger, primary education, child mortality, and HIV/AIDS, malaria and other diseases, if undernutrition cannot be reduced and prevented. There are several indicators of undernutrition, each reflecting a different aspect of this condition. However, they often occur in the same individuals.

Underweight (low weight for age): It is now well recognised that being underweight is an important underlying cause of young child death. This association exists across the range of growth failure, not just amongst those severely undernourished. The percentage of child deaths (6 to 59 months) that could be attributed to the potentiating effects of undernutrition in infectious disease has been estimated to be 56 per cent. Eighty-three per cent of these were attributable to mild-to-moderate, as opposed to severe, undernutrition. More recent work continues to find that changes in young child mortality over the past several decades have been significantly related to changes in general malnutrition, and that reducing the prevalence of low weight for age could, by 2005, reduce child mortality by approximately 30 per cent and under-5 mortality by 13 per cent. A recently published journal article quotes similar statistics: 53 per cent of all child deaths could be attributed to being underweight. Of these, 35 per cent of all child deaths are due to the effect of underweight status on diarrhoea, pneumonia, measles and malaria.

Underweight status denotes low body mass relative to age. As such it is influenced by both the height and weight of the child and is thus a composite indicator of stunting and wasting. Determining which of these is most significant is, as a result, difficult. Interpretation of the data and, in particular, understanding of causation requires more analysis.

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7 UNICEF EAPRO.
10 Black, R. E., Morris, S. S., and Bryce, J., Where and why are 10 million children dying every year?, Lancet, 361, 2003, pp. 2226-34. (The fraction of disease attributable to being underweight was 61 per cent for diarrhoea, 57 per cent for malaria, 53 per cent for pneumonia, 45 per cent for measles and 53 per cent for other infectious diseases. Foetal malnutrition might contribute in a similar way to neonatal mortality.)
Stunting (reduced length/height for age): Stunted children are shorter than children of the same age in reference populations. Stunting has adverse effects on children’s cognitive and behavioural development, through mechanisms that are still not fully understood.\(^\text{11}\) Analysis of data from the Cebu Longitudinal Health and Nutrition Study in the Philippines re-confirmed these findings: Children stunted between birth and age two years had significantly lower test scores at age eight than non-stunted children at age eight (-0.14 SD, adjusted). This association was found even in children moderately stunted, though it was most evident in severely or persistently stunted children and those who had become stunted early. Being stunted was also found to be associated with less schooling, which was a partial reason for the poor cognition found.\(^\text{12}\)

Therefore, stunting is an indicator of poor nutrition in pregnancy and in the first 2 to 5 years of life. As stunted children demonstrate limited catch up growth, they tend to grow into stunted adults. Final adult height is largely predicted by height at two years of age.

For this reason stunting needs to be prevented in utero and in early childhood. Stunted women (<140) are more likely to give birth to low birth weight babies. As birth weight increases, these stunted women are more prone to obstructed labour.

Wasting (reduced weight for length): Wasting is a measure of thinness. It often reflects a recent and severe process that has produced substantial weight loss, usually as a consequence of acute shortage of food and/or severe disease. For this reason the indicator is used extensively in emergency settings. Wasting significantly increases the risk of mortality and increases the severity of morbidity.

Low Birth Weight (birth weight <2500g): In developing countries the major reason for low birth weight (LBW) is intra-uterine growth retardation (IUGR) as opposed to pre-term delivery, which is more commonly found in developed countries. A baby who has suffered IUGR as a foetus is effectively born malnourished, and has a much higher risk of dying in infancy. Infants who weigh 2,000g to 2,499g at birth have a four-fold higher risk of neonatal death than those who weigh 2,500g to 2,999g, and a ten-fold higher risk than those weighing 3,000g to 3,499g. These risks continue into the first year of life, although at a lower magnitude. In developing countries with a high prevalence of low birth weight, IUGR infants account for the majority of neonatal deaths. LBW infants are more susceptible to hypoglycemia and to birth asphyxia. They are also at greater risk of suffering from diarrhoea and pneumonia in the first months after birth.\(^\text{13}\) This helps to explain why being LBW is such a major risk factor for neonatal death; of the 36 per cent of under-5 deaths that occur in the neonatal period, 22 per cent are attributed to diarrhoea and pneumonia, and 21 per cent to pneumonia;\(^\text{14}\) it is easy to see why preventing LBW can contribute significantly to reductions in neonatal, infant and under-5 mortality.

Birth weight is a strong predictor for size in later life, therefore most IUGR infants do not catch up to normal size during childhood. In countries such as India, Pakistan, the

\(^{11}\) Grantham-McGregor, S., A review of studies of the effect of severe malnutrition on mental development, Journal of Nutrition, 125, 1995, pp. 2233S-2238S.
\(^{15}\) Black, R. E., Morris, S. S. and Bryce, J., op. cit.
Philippines and Sri Lanka, the incidence of LBW predicts the prevalence of underweight status during preschool and subsequent years. Studies indicate that some catch-up growth is possible, especially in the first two years of life. Catch-up growth is particularly pronounced in long but thin IUGR infants, who gain in weight but less so in height. In other words, stunted IUGR babies are less likely to catch up and IUGR is a risk factor for childhood and adult stunting.

Cognitive function across the life cycle is also related to birth weight, as birth weight influences performance in primary, secondary and high school through to university. The optimal birth weight range for cognitive function is between 3.5 to 4.0kg.

Most immune functions have been shown to be impaired in IUGR infants. The greater the foetal growth retardation, the greater the impairment of immune competence. This impairment may be sustained through childhood.

Beyond childhood, there is growing evidence that IUGR increases the risk of acquiring high blood pressure, non-insulin-dependent diabetes, coronary heart disease and cancer in adult life. The “foetal origins of disease” hypothesis posits that poor nutrition during critical periods of gestation and early infancy, followed by relative affluence, increases the risk of chronic disease in adulthood.

Micronutrient Deficiency: Young children and women of reproductive age are frequently affected by multiple micronutrient deficiencies because nutrient needs are particularly high during periods of maximum growth such as during pregnancy, lactation and early childhood. Examples of the consequences of these deficiencies are shown in Box 2.

**Box 2: Micronutrient Deficiencies: Examples of impact of inadequate intake**

- **Vitamin A**: Eye lesions and blindness; substantial increase in mortality from measles and diarrhea, decreased haemoglobin synthesis
- **Iron**: impaired cognitive and motor development; impaired work capacity
- **Zinc**: impaired growth; impaired immunity and increased infections
- **Iodine**: increased still-births; cretinism; decreased motor and impaired mental function
- **B12**: impaired growth and cognitive function
- **Multiple micronutrients**: believed to contribute to childhood stunting

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In 1993, four independent meta-analyses showed that in areas where vitamin A deficiency is prevalent, child mortality can be reduced by 23 to 34 per cent following vitamin A repletion. Weekly, low-dose vitamin A and/or carotene supplementation in pregnancy has also been found to reduce maternal mortality by 40 per cent. The link between vitamin A and mortality is believed to be related to vitamin A’s role in immunity from perinatal and childhood infectious disease and, in pregnant women, through the effect of carotenoids as anti-oxidants on eclampsia, pre-eclampsia and possibly placental abruption.

Iodine deficiency is associated with an average 13.5 point reduction in IQ for a population. Deficiency in school children leads to reduced cognitive function while deficiency during foetal life can have profound and irreversible effects on the child’s brain development and mental capacity, in the form of cretinism. Furthermore, foetal iodine deficiency presents a serious challenge to survival and can lead to miscarriage, still birth and early neonatal death.

Iron deficiency, leading to anaemia, is the most prevalent of all the micronutrient deficiencies and affects in particular young children and women of reproductive age, especially pregnant and lactating women. In pregnant women, anaemia is associated with premature births, intrauterine growth retardation and low birth weight infants. Anaemia affects both infants’ and children’s physical and mental developmental causing learning deficits, eating disorders and poor growth. Full-term infants of anaemic mothers have reduced iron-stores and are at risk of becoming iron deficient and anaemic even if exclusively breastfed for six months. Iron deficiency anaemia, especially in children under two years of age, can result in learning problems even if iron deficiency and the resulting anaemia are corrected. Iron deficiency also affects iodine uptake, increasing the risk of iodine deficiency, which can have devastating effects on foetal brain development and children’s ultimate mental capacity as noted above. Anaemic children of all ages are apathetic, which affects social development and educability.

Anaemia also affects adults. It reduces a woman’s ability to survive bleeding during and after childbirth and so contributes to maternal mortality. Women with severe anaemia have a 2.5 times greater chance of dying during pregnancy or at delivery than women who do not have anaemia. Anaemia-related fatigue also makes the effort of child labour more difficult, thus prolonging delivery. Conservative estimates suggest anaemia is the direct cause of 3 to 7 per cent of maternal deaths worldwide. Other estimates suggest it is the direct or indirect cause of 20 to 40 per cent of maternal deaths. Anaemia related fatigue affects work productivity and earned income accordingly. A literature review from 1973 to 1981 found a 10 per cent increase in haemoglobin levels associated with a

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10 to 20 per cent increase in work output. Adults with anaemia are less likely to engage in social activities and less likely to nurture and care for their infants and children.\textsuperscript{25}

**Zinc deficiency** impairs innate and acquired immunity.\textsuperscript{26} Zinc deficiency also has direct effects on the gastrointestinal tract that lead to an increased clinical severity of acute enteric infections.\textsuperscript{27} As a result, zinc deficiency increases the risk of mortality from diarrhoea, pneumonia and malaria by 13 to 21 per cent.\textsuperscript{28} Zinc deficiency may also negatively affect growth as growth retarded children respond well to zinc supplementation.\textsuperscript{29}

**ANALYSIS OF CAUSES**

**Conceptual framework**

UNICEF’s Nutrition Strategy\textsuperscript{30} is based on a conceptual framework (see figure 3) that illustrates that nutrition is about much more than food. The conceptual framework identifies inadequate dietary intake and disease as the immediate causes of undernutrition. The underlying causes are food security, care of women and children, and health services and environment. The conceptual framework, adopted around the world, continues to form the basis for nutrition programming within UNICEF. Underlying all of this are the economic and political structures that reflect the government’s and society’s will to have healthy, well-nourished children and women. However, while the framework covers all aspects of women and child nutrition, in practice it has been used mainly to guide post-natal interventions to prevent and reduce undernutrition. It does not adequately reflect the additional dimension of inter-generational causality: short, under-nourished women give birth to low birth weight babies, who themselves grow up to be short adolescents and women.

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\textsuperscript{25} Ibid.


On the basis of this conceptual framework, many nutrition programmes throughout the world have focused on addressing the underlying causes of undernutrition in young children through well-known interventions such as home gardening, food subsidies, breastfeeding counselling, health and nutrition education, vitamin A and iron supplementation, access to iodized salt, child immunizations, clean water and improved sanitation, and growth monitoring and promotion. These are interventions that address population-wide causes of child undernutrition and seek to increase resources (food, care, health services, clean water, etc.) that are necessary for optimal growth and nutrition. These now need to be complemented with interventions that address the health and nutrition of women before and during pregnancy, that prevent adolescent pregnancies, and that focus on the reduction of low birth weight and stunting as immediate as well as long-term ways to reduce undernutrition.

Undernutrition throughout the life cycle

As illustrated in the diagram of the life cycle, often undernutrition is ‘inherited’: light-weight, short women tend to give birth to small, low birth weight babies, who, since they do not catch up in growth, become short, light-weight girls and women. Such ‘inherited’ undernutrition cannot be fully addressed by postnatal interventions alone. Hence, measures of maternal nutrition (i.e., low caloric intake or pregnancy weight gain, low pre-pregnancy weight and short stature) have become, along with ethnicity, important established indicators of factors that have a direct impact on IUGR in developing countries.  

Despite genetic influences, which account for 40 per cent of the variances of birth weight, intrauterine environmental factors are more powerful. In Asian immigrants to the USA, low birth weight rates were reduced from 15.5 to 8.5 per cent (a 46 per cent reduction) within a decade of arrival, proving that small Asian women can have usual birth-weight babies if the environment is supportive.

Figure 4: The life Cycle

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The importance of the intrauterine environment is supported by Dobbing’s description of ‘critical periods’ in his studies on brain growth and development two decades ago. A critical period is a period of rapid growth in cell number or in cell size during which cells are especially vulnerable to insult or deprivation. Vulnerability is at its greatest during periods of maximum growth velocity. It is during these maximal periods that the potential for ultimate development is determined. Dobbing applied this concept to cell division and growth in nerve cell numbers in the developing brain and to the later development of cognitive function. The adequacy of circulating levels of iodine at critical periods of brain growth offers a well-known example. The foetus of an iodine-deficient mother can be successfully protected if iodine is given in the first and second trimester of pregnancy. Supplementation in the third trimester or after birth will not prevent the mental deficits. The same principal can be applied to critical periods in other growth as well, including linear and weight growth.

Winnick described three phases of foetal growth – phase 1: cellular hyperplasia (increase in cell number), phase 2: hyperplasia with hypertrophy (increase in cell size), and phase 3: cellular hypertrophy. These phases correlate roughly with the trimesters of pregnancy (phase 3).

Linear growth velocity, defining the critical period of growth in length, reaches its maximum before the 15th week of gestation. After that, it drops to a plateau before birth and never rises to the same velocity in postnatal life, (including the short but not as significant surge during adolescence). On the other hand, peak growth velocity for weight of the foetus occurs in the 32nd to 34th week of pregnancy. This is important for two reasons. It implies two different vulnerable periods, and therefore possibly two different mechanisms of interference in linear and weight growth. It also suggests the need for different interventions to protect those growth spurts. It is of great importance to realize that similarly, in postnatal life, the processes leading to stunting and wasting are independent of each other and the commonly-held concept that stunting is the outcome of chronic undernutrition in childhood must be challenged.

The implication is that nutritional materials needed for the rapid cell division seen in linear growth (i.e. protein and micronutrients) are different from those needed for increases in cell size and weight gain (i.e. calories). It also implies that the nutritional inputs necessary to protect the linear growth spurt must be delivered in or before the 1st trimester and thereafter, while the calories for weight gain are most crucial through mid pregnancy and the last trimester – assuming that hyperplasia has occurred appropriately in the first trimester. While different nutrients and different mechanisms may be in play, the two are still related since a decrease in absolute cell number (resulting from phase 1 disturbance) will leave fewer cells to grow in phase 3.
There is circumstantial evidence to support this hypothesis:

(i) Balanced protein energy supplements given to chronically undernourished women during pregnancy (usually in the last half of pregnancy) lead to only modest improvements of birth weight.
(ii) The greatest deficits in birth weight due to acute starvation are found when mothers are malnourished in the preconception period.
(iii) Intrauterine deficits of non-caloric micronutrients, including zinc, folic acid and vitamin C, correlate with birth weight decrease particularly when absent in the first trimester.
(iv) Iron supplementation in the first weeks of pregnancy of iron replete, non-anaemic women led to significantly improved birth weight and a lower incidence of low birth weight.

Summary of life cycle nutrition
Intrauterine life effectively establishes the potential for ultimate growth and development of the child, which, as in mental development in the presence of iodine deficiency or adult diseases programmed in utero, may not be measurable at birth, but may only become evident in some cases many years after birth. Attention to maternal health and nutrition before and throughout pregnancy is therefore necessary to establish such potential. Thereafter, postnatal interventions aimed at the child: food, care and health – all the elements of the Nutrition Conceptual Framework – are necessary to ensure that the potential is achieved. Preventing growth failure in utero and preventing growth failure in the first two years of life are equally important for adult body size and composition. How this influences strategic approaches will be discussed below.

GOAL AND OBJECTIVES

Overall Goal: Between 1990 and 2015, reduce by half the proportion of people who suffer from hunger. [Millennium Development Goal 1]

Objectives:
1. Reduction of child malnutrition among children under five years of age by at least one third with special attention to children under two years of age, [A World Fit For Children (WFFC) goal] specifically:
   a. Reduce by at least one third the proportion of children under five who are stunted.
   b. Reduce by at least one third the proportion of children who are underweight.

The Millennium Development Goals are recognized as part of the “Road Map” for implementing the Millennium Declaration, which was unanimously adopted by United Nations Member States in September 2000.
A World Fit for Children, which was adopted by the United Nations General Assembly at the twenty-seventh special session, 10 May 2002.
2. Reduce by at least one third the rate of low birth weight. [WFFC goal]
3. Reduce by one third the prevalence of anaemia, including iron deficiency, by 2010. [WFFC supportive goal]
4. Achieve sustainable elimination of iodine deficiency disorders by 2005. [WFFC supportive goal]
5. Achieve sustainable elimination of vitamin A deficiency by 2010. [WFFC supportive goal]
6. Achieve use of appropriate multiple micronutrient interventions for 50 per cent of women of reproductive age. [EAPR goal]
7. Protect, promote and support exclusive breastfeeding of infants for six months and continued breastfeeding with safe, appropriate and adequate complementary feeding up to two years of age or beyond. [WFFC supportive goal]
8. Improve the nutrition of mothers and children, including adolescents, through household food security, access to basic services and adequate caring practices. [WFFC supportive goal]

**STRATEGY**

The focus of the UNICEF EAPRO Nutrition Strategy is to reduce maternal and child undernutrition through a greater emphasis on the nutrition of women. Because of the importance of maternal anaemia as both a marker and an indicator of poor nutritional status in girls and women, the entry point for key aspects of this strategy will be the reduction of anaemia in reproductive age women. Interventions aimed at achieving this objective can be expected to contribute to a reduction in low birth weight and stunting.

The strategy, integrated programmatically with maternal mortality reduction, has four major components (see Box 3).

**Target adolescent girls, pre-pregnant women and pregnant women with interventions to improve maternal and child nutrition**

This component recognises the importance of maternal nutrition and well-being in contributing to the survival, growth and development of young children and to their ultimate adult stature. This calls for greater emphasis on the important population of adolescent girls and pre-pregnant women to ensure that all women enter pregnancy with optimal health and nutrition in order to ensure optimal foetal growth and development and pregnancy outcome.
Adolescent girls and pre-pregnant women are not a customary target group for public health and nutrition interventions. Although many programmes target pregnant women, they often do not reach them until the second or even third trimester. Therefore new and innovative ways to reach this population group will be needed. Adolescent girls can be reached through secondary schools in countries where enrollment is high. Another strategy is to reach young women at the time that they get married. In many cultures there are social, religious or legal systems that identify and offer counseling to young couples when they become engaged or married. For example, in Indonesia, young couples register with the Ministry of Religious Affairs when they want to get married. This ‘contact’ has been used as an opportunity to increase tetanus toxoid vaccination and to encourage the women to take iron folate supplements. Through community-based approaches, there are often less formal ways to identify newly-married or about to-be-married couples, e.g., through a network of community outreach workers, midwives or women’s unions. In some countries, young women may be reached through the factories where they work.

Reaching out to adolescent girls and pre-pregnant women will help convey the message that pregnancy is a special time and that women need to be healthy and prepared for it. It also educates the woman herself, before she has married or had children, that she must look after her own health for the future well-being of her family. Newly married or about-to-be-married women may be particularly receptive to such messages at this critical period of their lives. Most importantly, adolescent girls must be counseled about the importance of not getting pregnant until they have completed their own growth, usually around their 20th birthday.

Increase the nutrition content of preventative and curative health care and improve the access of adolescent girls, pre-pregnant women and pregnant women to these and contraception services

For women to be able to enter and complete pregnancy in optimal health and nutritional status they require access to quality services such as:

- Micronutrient supplements: iron folate or multi micronutrients
- Nutrition counselling and education that emphasizes the importance of protein foods, micronutrient-rich foods, animal foods, etc., especially in pre-pregnancy and during early pregnancy (with greater emphasis on the caloric quantity of foods in later pregnancy)
- Monitoring of pre-pregnancy weight (aim is to achieve at least 40kg) and weight gain during pregnancy (aim is to achieve a total weight gain of at least 6kg during the pregnancy amongst the population to be reached)
- Identification, prevention and treatment of diseases and infections such as anaemia, hookworm infestation, malaria, tuberculosis, HIV and STDs
- Tetanus toxoid vaccination
- Contraception services to enable women to plan their pregnancies, delay the age of first birth, lower fertility, improve birth spacing and prevent unwanted pregnancies.

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• Health education to encourage better caring practices of the pregnant woman such as improved hygiene practices, reduction of workload, ANC visits and access to quality food.

The important difference is that nutrition must become an intrinsic part of existing preventative and curative care services, both in content (information and counselling given to women and families about nutrition) and in services (provision of micronutrient supplements, assessment of anaemia, de-worming, etc).

Such services can be provided through extended basic health or antenatal care services with strong linkages to communities in order to increase access, demand and utilization. The health workers delivering the services need to have the necessary skills, equipment and drugs and to understand the principles behind promoting optimal health and nutrition of young women. Good quality care includes health workers who are polite, responsive, prepared to listen and well-trained. These services can also be expected to contribute to reductions in maternal mortality and should be recognized as key elements of a comprehensive safe motherhood strategy.

Develop community-based processes aimed at empowering adolescent girls, pre-pregnant women and pregnant women

Many countries already operate “community-based” programmes that aim to empower families to facilitate and advance their own development. Examples include water management schemes, growth monitoring to identify faltering children, family and community credit schemes, rice banks and revolving funds to facilitate community economic development. What these have in common is a management/development structure that enables communities to assess and analyse their own problems and identify actions to address them. The structure is based on community dialogue and empowerment and a belief that communities have a responsibility and a role in their own development and empowerment.

Communities need to recognize and appreciate the special needs of adolescent girls and reproductive-age women for optimal health and nutrition and to facilitate behavioural change in order to increase their access to care and to participation in decision making. This is likely to be difficult as women frequently have a lower status than men in Asian society, and young, unmarried women are often particularly ignored. Attempts to improve provision of health and nutrition services to adolescent girls and pre-pregnant women will help to reflect the importance of this age group.

Increase coverage of effective child nutrition interventions

The above strategies, aimed at a new age-group, respond to a recognition of the importance of maternal nutrition. In addition, it is important to continue and to strengthen implementation of key infant and young child nutritional interventions that have proved to be effective. These will help to ensure that the child’s potential for full and normal growth can be realized.

Recent analysis by the Bellagio group¹ has reconfirmed the importance of several key nutrition interventions in reducing child mortality. The authors found conclusive

¹ The Bellagio Child Survival Study Group consists of those who participated in a team residency on “Knowledge into action: improving equity in child health”, sponsored by the Rockefeller Foundation, which was held in Bellagio, Italy in February 2003.
evidence that breastfeeding (exclusive in the first 6 months and continued from 6 to 11 months), appropriate complementary feeding, zinc supplementation and vitamin A supplementation significantly reduce the mortality rate of children under 5 years old. 51

The most ‘valuable’ intervention is breastfeeding, which ranked highest of all the interventions in its potential capacity to reduce child mortality and child malnutrition. More work is needed to protect women and their families (and politicians) from marketing of breastmilk substitutes, to protect the rights of working mothers and to generally create a more favourable environment for breastfeeding. These were all strategies that were agreed upon through the Innocenti Declaration in 1991 and which have been repeated and re-emphasized in the WHO/UNICEF Global Strategy for Infant and Young Child Feeding of 2001. 52

Improved complementary feeding is another relatively neglected child nutrition intervention that could potentially reduce child mortality rates by 6 per cent by improving weight for age. Strategies to improve timely, adequate, safe and properly fed complementary feeding as laid out in the Global Strategy for Infant and Young Child Feeding include providing accurate information and skilled support, counselling on local foods, developing community- or industrially-processed low-cost complementary foods, food fortification and nutrient supplementation.

A review of randomized trials of daily or weekly zinc supplementation conclude that it leads to reduced incidence and severity of diarrhoea, a lower rate of pneumonia and perhaps has a preventative effect on clinical malaria. Significant reduction in mortality and improved growth in small-for-gestational-age children has also been found. 53 A meta analysis has found that zinc supplementation has a positive growth effect on both height and weight, particularly in children already stunted or underweight. 54 Maternal zinc supplementation appears to have a beneficial effect on neonatal immune status, early neonatal morbidity and infant infections. However, evidence is conflicting on its effect on labour and delivery complications, gestational age at birth and promotion of intrauterine growth.

Vitamin A supplementation was recognized as a further highly efficacious strategy and as noted earlier in this paper, has been found to reduce under-5 child mortality by 23 to 34 per cent in vitamin A deficient populations. As such it remains one of the most cost-effective child mortality interventions, comparable to child immunization.

Increased intake of micronutrients can also be achieved through food fortification. This strategy has proven very successful in many countries and is receiving growing attention and support from the donor community and private industry. Salt iodization remains the greatest international achievement in food fortification and currently 68 per cent of households in developing countries and 80 per cent in East Asia and the Pacific, regularly consume adequately iodized salt. 56 Efforts to accelerate progress

52 WHO and UNICEF Global Strategy for Infant and Young Child Feeding, 2003 (endorsed, by consensus, on 18 May 2002 by the Fifty-fifth World Health Assembly, and on 16 September 2002 by the UNICEF Executive Board).
towards the World Fit for Children goal of universal (90 per cent) salt iodization by 2005 need to be made. Meanwhile, more and more countries are starting national fortification programmes of staples such as flour, sugar, oil and condiments such as fish or soya sauce. This is a strategy with significant potential in this region that should be explored and supported as appropriate.

INTEGRATION WITH SAFE MOTHERHOOD PROGRAMMES

This strategy focuses on the same target group as the EAPRO Strategy to Reduce Maternal Deaths. These two strategies see improving maternal nutrition as a requirement for reducing both maternal mortality and child undernutrition. As shown in figure 5, there is a close correlation between low birth weight and maternal mortality suggesting that the same environmental factors favour high rates of low birth weight and high maternal mortality. As such the two strategies should be implemented together for greater efficacy and efficiency.

There is also another reason: evidence exists that as birth weight increases (which is one of the hoped for outcomes of improved maternal nutrition), the relative risk of obstructed labour may also increase, particularly in populations where women are of short stature (due to undernutrition as children, or because of their young age). For these reasons, the two strategies should be implemented in the same geographical areas to ensure the safety of these women through the following strategic interventions:

- Prevention of pregnancy in adolescent girls: This constitutes the right of adolescent girls not to be mothers. The risk associated with pregnancy is much greater for girls under age 18, and far greater for child mothers aged 16 or less. Educational and service measures must be taken to protect these young members of society from pregnancies. Preferably, community mechanisms and other norms should help discourage young girls from marrying before they have finished their own growth. Keeping girls at school by making school acceptable and relevant is the optimal way to delay early marriage. If it is not possible to delay marriage, then young women must at least be able to access appropriate contraception and their husband and their respective families counselled on the dangers of teenage pregnancy. In addition, reduction of unwanted pregnancies in general is first-order prevention from deaths associated with pregnancy and is included in the Strategy to Reduce Maternal Deaths.

Figure 5: Relationship between LBW & MMR in Asian and Latin American countries

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• Access to Emergency Obstetric Care Facilities: An important component of the Strategy to Reduce Maternal Deaths is to increase access of women to existing EmOC facilities through heightened awareness of the early signs of obstructed labour and other complications, improved community transport plans, and improved availability of fully staffed and equipped institutions. Thus, should there be an obstructed labour due to increased birth size or other reasons, the woman is able to access quality emergency obstetric care services for the required Caesarean section. A transient increase in Caesarean deliveries due to cephalo-pelvic disproportion may lead to a reduction in stunted growth and potentially, a significant reduction of obstructed labour in the future.

Improvements in maternal nutrition, as well as leading to improvements in stunting and birth weight, can be expected to reduce maternal mortality, especially from preventable causes such as anaemia. Through interventions described in this paper, it may be possible to reduce maternal mortality by as much as 33 per cent. Finally, as noted, there is accumulating evidence that nutritional interventions involving micronutrient supplementation with vitamin A, C, E and iron reduce maternal mortality through improvement in immunity, haemoglobin levels and prevention of eclampsia. Prevention would thus become a significant approach to reducing maternal deaths.

**MONITORING AND EVALUATION**

The key to the success of this new strategy and its adaptability to all countries in the region will be based on documentation of experience and monitoring and assessment of achievements. Baseline data should be collected for comparison with mid-term and end-term assessments. Because of the novelty of some of the interventions, the scarcity of government data on some of the indicators and the change in strategic focus from previous programmes, it may be necessary to undertake specifically developed surveys for these assessments in order to determine causality assuming changes occur. In addition, an on-going monitoring system of process indicators should be developed for assessing progress of implementation and the various components. Key measurable indicators should be developed to measure progress towards and achievement of specific objectives: e.g., prevalence of anaemia, rate of low birth weight and prevalence of stunting. A suggested monitoring outline is on the following pages.
<table>
<thead>
<tr>
<th>Process Indicators</th>
<th>Question</th>
<th>Indicator</th>
<th>How to Collect?</th>
<th>Frequency</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Are adolescent girls, pre-pregnant women and pregnant women receiving minimum nutrition interventions?</td>
<td>Coverage of target population with iron-folate/multi micronutrient supplements</td>
<td>Percentage of women with complications of pregnancy who use EmOC facility appropriately</td>
<td>Monthly</td>
<td>Coverage should be periodically verified through survey.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coverage of target population with deworming</td>
<td>Health system routine records or by community if distribution is through community mechanism</td>
<td>Monthly</td>
<td>Coverage should be periodically verified through survey.</td>
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<tr>
<td></td>
<td></td>
<td>Proportion of target population undergoing regular community- or hospital-based monitoring of weight gain during pregnancy</td>
<td>Health system routine records or by community if weighing is organized by community alone</td>
<td>Monthly</td>
<td>Coverage should be periodically verified through survey.</td>
</tr>
<tr>
<td></td>
<td>Coverage of target population with deworming</td>
<td>Proportion of target population sleeping under bed nets</td>
<td>HH survey or by reports by community health workers</td>
<td>Every 2-3 years or monthly if monitored by community health workers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proportion of target population with unmet contraceptive needs</td>
<td>Proportion of pregnant women with complications who access EmOC facilities</td>
<td>Health system routine records</td>
<td>Annually</td>
<td>Health system records would need to be supplemented with reports by community midwives or TBAs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Proportion of target population using adequately iodized salt in HH</td>
<td>HH survey</td>
<td>Annually</td>
<td>Assessment can also be done by spot checks.</td>
</tr>
<tr>
<td></td>
<td>Are infants and young children receiving minimum nutrition interventions?</td>
<td>Proportion of newborns weighed at birth</td>
<td>Routine reports of midwives, health facilities and TBAs</td>
<td>Annually</td>
<td>Coverage can be verified if birth weight is noted in child health card.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exclusive breastfeeding rate at 6 months</td>
<td>HH survey</td>
<td>Every 2-3 years</td>
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<tr>
<td>Process Indicators</td>
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<td><strong>Question</strong></td>
<td><strong>Indicator</strong></td>
<td><strong>How to Collect?</strong></td>
<td><strong>Frequency</strong></td>
<td><strong>Notes</strong></td>
<td></td>
</tr>
<tr>
<td>Are infants and young children receiving minimum nutrition interventions?</td>
<td>Proportion of infants between 6-9 months receiving complementary food</td>
<td>HH survey</td>
<td>Every 2-3 years</td>
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<td></td>
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<tr>
<td>Coverage of post-partum women and U5 children with adequate vitamin A supplements</td>
<td>Routine reports of health system</td>
<td>Annually</td>
<td>Coverage should be periodically verified through survey.</td>
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<tr>
<td>Coverage of U5 children with zinc supplements</td>
<td>Routine reports of health system</td>
<td>Annually</td>
<td>Coverage should be periodically verified through survey.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Impact Indicators</th>
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<tbody>
<tr>
<td><strong>Question</strong></td>
<td><strong>Indicator</strong></td>
<td><strong>How to Collect?</strong></td>
<td><strong>Frequency</strong></td>
<td><strong>Notes</strong></td>
</tr>
<tr>
<td>Do adolescent girls, pre-pregnant women and pregnant women have improved nutrition?</td>
<td>Prevalence of anaemia of women at marriage</td>
<td>Health system</td>
<td>Annually reported</td>
<td></td>
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<tr>
<td>Proportion of women with pre-pregnancy/marriage weight of &lt;40kg</td>
<td>Health system or community if weighing is done by community</td>
<td>Annually reported</td>
<td>Monitoring these two indicators also has a social mobilization purpose.</td>
<td></td>
</tr>
<tr>
<td>Proportion of women achieving weight gain during pregnancy of at least 8kg</td>
<td>Health system or community if weighing is done by community</td>
<td>Annually reported</td>
<td></td>
<td></td>
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<tr>
<td>Do infants and young children have improved nutrition?</td>
<td>Prevalence of LBW</td>
<td>Health system</td>
<td>Annually reported</td>
<td>A space should be included in the child health card to record birth weight.</td>
</tr>
<tr>
<td>Prevalence of stunting at 2 years</td>
<td>Survey</td>
<td>Annually reported</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevalence of underweight at 2 years</td>
<td>Survey</td>
<td>Annually reported</td>
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</tbody>
</table>

Note: These are core questions and illustrative indicators. Specific monitoring and evaluation strategies will be developed at the country level.
SCOPE

It is anticipated that this strategy is applicable to all countries in the region, in particular those with high under-5 undernutrition and high levels of maternal undernutrition and/or maternal mortality. In addition, countries that have seen little improvement in child malnutrition with current nutrition programmes might be expected to see improvements with a new strategy. As the strategy requires both a service delivery and community-based approach, there would be benefit in implementing this strategy in geographical areas where community development projects are already on-going and where close supervision and implementation support can be provided. As noted above, the strategy should be integrated with the Strategy to Reduce Maternal Deaths. As this latter strategy should be implemented within a 5-hour radius of existing EmOC facilities, these two factors will largely dictate the most appropriate geographical regions. At initial stages, it is recommended that the strategy be implemented on a smaller scale to facilitate implementation, supervision, monitoring and assessment.