

## Nutritional issues for women in developing countries

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The topic of nutrition of women in developing countries has largely been equivalent to maternal nutrition with emphasis on the effect of the mother's nutritional status on birth weight and lactational performance. Little attention has been paid to the well-being of the mother and the effects of nutrition on her performance in social and economic activities. In the present review I will limit discussion of maternal nutrition to its relationship with the nutritional status of the mother as opposed to the child, and will focus on other aspects of women's nutrition. Issues related to reproduction are the topic of another review in the present symposium (Goldberg, 1997).

Recognition of the importance of nutrition of women in developing countries has increased over the past decade with initiatives by a number of international organizations helping to encourage work in this area. The United Nations Administrative Committee on Coordination/Sub-Committee on Nutrition (ACC/SCN) held a symposium in 1989 on Women and Nutrition (Administrative Committee on Coordination/Sub-Committee on Nutrition, 1990) which considered issues such as women's work loads and time constraints. The International Center for Research on Women together with the US Agency for International Development co-ordinated a research programme, involving twenty projects in developing countries, on Maternal Nutrition and Health Care from 1987–90 (Parker *et al.* 1990). Although this second initiative focused on maternal nutrition, the emphasis was on the mother's nutritional status rather than pregnancy outcomes. The United Nations International Children's Emergency Fund dealt with the topic of women's work and the need for access to child care (Himes *et al.* 1992) and launched the Girl Child Initiative to address issues related to gender discrimination in childhood. These programmes mark a needed broadening of the area of women's nutrition to finally move away from equating it with maternal nutrition.

### DEVELOPING COUNTRIES

Developing countries form a diverse group with varied economic and socio-cultural conditions. They range from the so-called least-developed countries to the rapidly-developing economies in east Asia and encompass market economies through highly-centralized ones. Per capita gross national product (GNP) varies from as little as \$100 in countries in Africa such as Mozambique, Tanzania and Ethiopia to over \$2000 in some Latin American (e.g. Costa Rica, Brazil) and Asian (e.g. Malaysia, Thailand) countries (United Nations International Children's Emergency Fund, 1996). Differences in basic infrastructure and the priority given to expenditure on health, education and welfare result in discrepancies between GNP and the health and nutrition status of the population. The contrasting examples of Sri Lanka and Libya are shown in Table 1. Socio-cultural factors, particularly as they relate to the position of women in society, are also important in determining the nutrition of women.

Some developing countries are experiencing an epidemiological transition, with a change from infectious diseases and undernutrition to chronic diseases such as hypertension and diabetes as the most important cause of morbidity and mortality.

Table 1. *Gross national product (GNP) and health and education indicators in Sri Lanka and Libya* (From United Nations International Children's Emergency Fund, 1996)

	Sri Lanka	Libya
GNP (US\$)	600	5310
Under 5 years mortality rate (deaths/1000 live births)	19	95
Life expectancy at birth (years)	72	63
Female literacy (%)	85	54

Further, within-country variations between rural and urban areas and among social classes will affect the nutritional issues of most relevance to women. The main issues for more-affluent women in these countries or for the majority of women in countries in transition are probably similar to those of women in developed countries. These will be discussed by the other speakers at the present symposium and will not be addressed here.

#### CHILDHOOD UNDERNUTRITION

Protein-energy malnutrition remains prevalent in many developing countries (de Onis *et al.* 1993). The most common form of undernutrition is stunting or low height-for-age. The percentage of children less than 5 years of age who are stunted ( $< -2$  SD of World Health Organization/National Center for Health Statistics reference values; Hamill *et al.* 1977) is illustrated in Fig. 1 for selected developing countries. Childhood undernutrition has important long-term functional consequences for work capacity (Haas *et al.* 1995) and mental development (Gorman, 1995; Grantham-McGregor, 1995). In addition, short stature in women is associated with small pelvises and increased risk of obstructed labour, which is reported to occur in 2–14% of deliveries in developing countries and in Bangladesh is the cause of 10–17% of maternal deaths (Royston & Armstrong, 1989). Risk of obstructed labour rises sharply in women less than 1.45 m tall and is also greater in women 1.5 m tall compared with those 1.6 m or taller. Approximately 16–18% of women in Asia have heights below 1.45 m, 11–15% of women in Latin America, and 3% of women in Africa. Average heights are 1.57–1.58 m in Africa, 1.52–1.54 m in Latin America and 1.50–1.51 m in Asia. For comparison average height in Europe is 1.61 m with almost no women with heights below 1.45 m (Administrative Committee on Coordination/Sub-committee on Nutrition, 1992).

#### *Gender discrimination*

Preference for sons is evident in several developing countries. Expressed preference (mothers who would prefer their next child to be a boy : those preferring a girl) is high in South Asia and the Middle East, while moderate preference for sons is typical in Africa and other Asian countries. In most Latin American countries there is equal preference, while in only two (Venezuela and Jamaica) of the thirty-eight countries reviewed was there a slight preference for girls (Ravindran, 1986). Expressed preference does not necessarily translate into discrimination in health care or nutrition, although there is evidence for this in a number of countries, particularly in South Asia.

Gender discrimination in relation to nutrition can take the form of less food or food of lower quality being given to girls than boys, girls may be breast-fed for shorter periods (Chatterjee & Lambert, 1990) and mothers may become pregnant again sooner after a

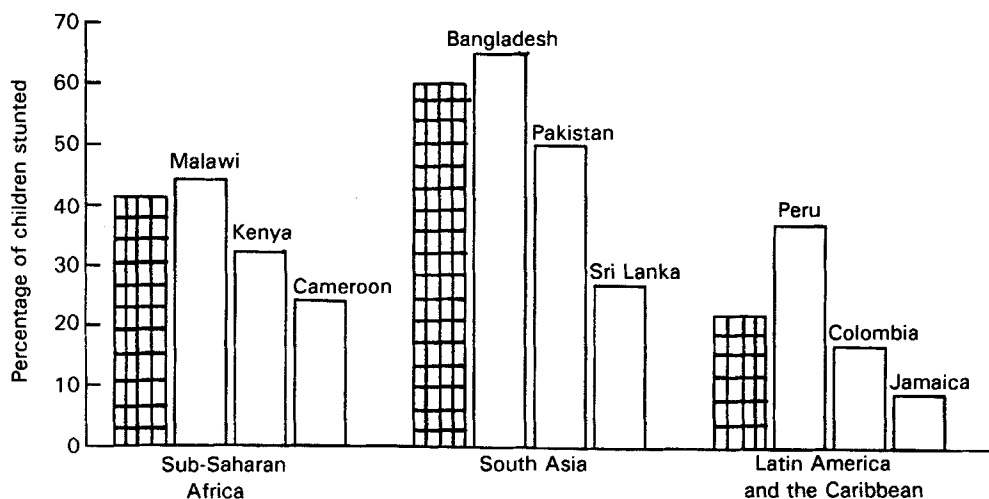


Fig. 1. Percentage of children < 5 years of age who are stunted in selected developing countries and regions. (▨), Regional average. (Data taken from de Onis *et al.* 1993).

daughter and stop breast-feeding when they become pregnant (Khan, cited in Royston & Armstrong, 1989). Patterns of intra-household food distribution are discussed later in relation to women, but there is evidence that in some countries girls receive less food than boys from age 1–4 years (Carloni, 1981; Abdullah & Wheeler, 1985). Several studies in South Asia have shown girls to have poorer nutritional status than boys (Chen *et al.* 1981; Bairagi, 1983; Sabir & Ebrahim, 1984; Bajaj, 1989), although this is not always seen (Martorell *et al.* 1984). The data from Sabir & Ebrahim (1984) is illustrated as an example in Fig. 2. Differences in childhood nutritional status by gender are seen less frequently in Africa. Where differences have been seen (Tripp, 1981; Mbago & Namfua, 1992) they are thought to be due to the cultural practice of boys eating with their fathers and, thereby, having access to more and better food and there was little evidence of active discrimination against girls.

Parents may also be more likely to seek health care, or seek care sooner, for sons than daughters. There is some evidence for this from a study in India where the ratio of malnutrition in girls compared with boys was 4:3 in the community but more boys than girls were brought to hospital (Gopalan & Naidu, 1972). This pattern was also seen in Pakistan where the prevalence of illness was the same in boys and girls but more boys were taken to a doctor (Sabir & Ebrahim, 1984). The combination of poorer nutritional status and less access to health care probably leads to the higher mortality rates from 1 to 4 years of age seen among girls in Pakistan and India and in some countries in Africa (Kholosa, 1980; World Bank, 1994).

#### REPRODUCTIVE HEALTH

The maternal mortality rate shows the greatest difference between developed and developing countries of any public health indicator (Royston & Armstrong, 1989). The rates are highest in sub-Saharan Africa where they range from 230 to 1100 maternal deaths per 100 000 births (United Nations International Children's Emergency Fund, 1996).

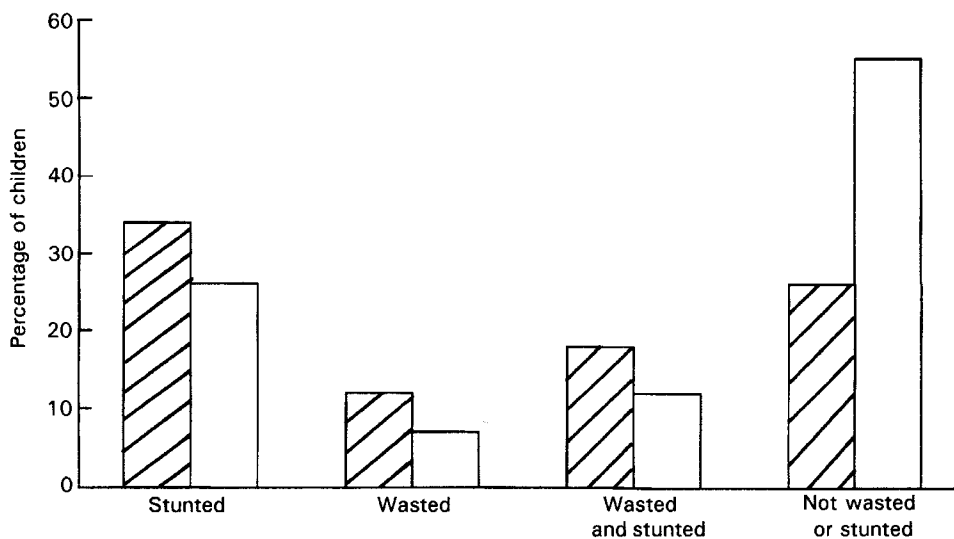


Fig. 2. Percentage of boys (□) and girls (▨) aged < 5 years in Lahore, Pakistan who are stunted, wasted, both stunted and wasted or normal. (Data taken from Sabir & Ebrahim, 1984.)

Maternal mortality rates are also high in most other developing regions, for example South Asia (80–600 deaths/100 000) and in Latin America and the Caribbean (40–600 deaths/100 000). In comparison maternal mortality rates are less than 20/100 000 in Europe. Although much of this difference can be explained by inadequacies in health care, maternal nutritional characteristics such as short stature or anaemia increase a woman's risk of complications at birth and of mortality.

The average number of births to women in developing countries ranges from four to eight. When the amount of time spent breast-feeding is added to this a large proportion of Third World women's reproductive years are spent under the increased nutritional demands of either pregnancy or lactation. McGuire & Popkin (1990) have estimated that from age 15 to 45 years the amount of time women are pregnant or breast-feeding ranges from 23% in Costa Rica to 61% in Bangladesh, with a typical range for Asian and African women of 35–48%.

Frequent reproductive cycles, particularly among women whose nutritional intakes are marginal, are likely to contribute to deterioration in the mother's nutritional status. For example, the weight-for-height of non-pregnant, non-lactating (NPNL) women in Bangladesh was lower in women with higher parity (Huffman *et al.* 1985). Short recuperative intervals between the end of lactation and the next pregnancy and overlap of lactation and pregnancy are particularly stressful and have been shown to lead to depletion of maternal body fat (Merchant *et al.* 1990). Short non-pregnant intervals and breast-feeding continuing into the third trimester are also associated with lower weight gains in pregnancy (Siega-Riz & Adair, 1993). Approximately 50% of women studied in Guatemala and the Philippines experienced overlap of lactation with the subsequent pregnancy (Merchant *et al.* 1990; Siega-Riz & Adair, 1993).

Although weight loss is a normal feature of the post-partum period, in nutritionally-at-risk women even moderate weight loss may have consequences for maternal health. Adair & Popkin (1992) investigated weight loss from 2 to 24 months post-partum in Filipino women, as part of a longitudinal study of the health and nutrition of the women

and their infants. Of the women, 55 % had net weight loss over this interval, and duration of lactation, particularly lactation for more than 12 months, was a significant predictor of weight loss. Weight loss may have the most serious implications for the 14 % of women in the sample who had BMI < 18.5 at 2 months post-partum, and in 88 % of these women BMI did not increase over the duration of the study. In addition, BMI decreased to < 18.5 in 16 % of women with adequate BMI at 2 months post-partum. Weight loss in women with low BMI was comparable with that of women with adequate BMI indicating that nutritionally-vulnerable women may have been further compromised.

Another factor which may contribute to maternal depletion is that there may be little reduction in activity levels by women when they are pregnant or breast-feeding, even in late pregnancy. A cross-cultural study of pre-industrial and traditional societies found that in fifty-one of 112 (45 %) societies women continued full duties until labour and in another twenty-seven reduced activity after the 7th month of pregnancy (Jimenez & Newton, 1979). Women also returned to full activity soon after birth, in ninety-eight of 195 cases within 2 weeks. In an observational study of women's activity in Malawi, Tucker & Lamba (1990) also found little reduction in activity from mid pregnancy through to the post-partum period. However, Lawrence & Whitehead (1988) reported a reduction in physical activity during late pregnancy and the first month of lactation in rural Gambian women.

#### *Teenage pregnancy*

Of births in developing countries 10–50 % are to teenage mothers. Early child-bearing is common where teenage marriage is the norm, such as in several countries in South Asia. However, teenage pregnancy rates are also high in other regions, for example in Latin America and the Caribbean 10–25 % of births are to teenage mothers and 40–66 % of women have given birth by the time they are 20 years old (Pan American Health Organization, 1994).

Pregnancy during adolescence is associated with increased risk of obstetric complications and mortality (Royston & Armstrong, 1989). In addition there may be competition for nutrients between the fetus and the growth needs of the young mother. Growth in stature continues until age 18 years and growth of the pelvis continues for 2–3 years after growth in stature is complete, through late adolescence (Moerman, 1982). Using increase in knee height as a more sensitive measure of growth during pregnancy, Scholl *et al.* (1990) found that 56 % of adolescent girls in the USA grew during pregnancy and in those who were multiparous, maternal growth was associated with lower birth weights. There is little information on the effects of lactation on the nutritional status of adolescents. However, in one small study in India, adolescents lost more weight during the first 3 months of lactation than adult women (Geervani & Jayashree, 1988).

#### WORK AND ENERGY EXPENDITURE

The heavy work load of low-income women in developing countries is well established (Leslie, 1988; McGuire & Popkin, 1990). Time-allocation studies have been conducted in several countries and examples from different regions in the Third World are shown in Table 2. Rural women typically spend 3–4 h in agricultural production, 2–5 h in food processing and preparation and 0.5–3 h collecting fuel and water and a further 1–5 h in other work such as production of crafts and marketing (Leslie, 1988). The amount of time spent in child care may be difficult to determine as this often occurs concurrently with other tasks; however, where this has been recorded the time allocated to child care ranges

Table 2. *Time allocation (h/d) of women in developing countries from three regions*

	Nepal (Berio, 1984)	Burkina Faso (Bleiberg <i>et al.</i> 1980)	Nicaragua (Leslie, 1988)
Agriculture	3.7	4.6	–
Collecting food and water	1.1	0.7	0.5
Food processing and cooking	3.0	2.0	3.5
Child care*	0.7	0.1	1.0
Other work†	2.3	2.1	5.6
Total	10.8	9.5	10.6

\*Often occurs concurrently with other tasks and not recorded separately so may be underestimated.

†Includes household activities, crafts and marketing.

from 20 min to 3 h. The total amount of time spent working is generally between 7 and 12 h. Women work longer hours than men in most countries and have less time for leisure and social activities and this differential is also seen in the work done by girls and boys (Bério, 1984; McGuire & Popkin, 1990).

Although the amount of time spent in various activities is often reported, there is less information on the energy expenditure of women. Variations in the intensity of tasks and rest periods during the activity may limit the accuracy of calculations of energy expenditure using standard values for the energy costs of activities (World Health Organization, 1985). Bleiberg *et al.* (1980) measured the energy costs of women's activities in Burkina Faso and calculated their energy expenditures from the time spent in various activities to be 9.7 MJ (2320 kcal) in the dry season, increasing to 12.1 MJ (2890 kcal) in the rainy season when more time was spent farming. Energy expenditure of Gambian women measured in early pregnancy also varied by season and on average was 10 MJ (2400 kcal; Lawrence & Whitehead, 1988). In contrast, in Ethiopia, total energy expenditure of rural women calculated from measured BMR and energy costs of activities was 7.9 MJ (1899 kcal) (Ferro-Luzzi *et al.* 1990). This relatively low value reflects the lower activity level of the women who performed few agricultural tasks compared with women elsewhere in Africa. The physical activity level of the women in the Gambia and Burkina Faso ranged from moderate (1.68 in the Gambia) to heavy (1.97) in the dry and rainy seasons, while that of the Ethiopian women was light (1.47). Most research on energy expenditure in Third World women has focused on the energy costs of pregnancy and lactation and more information is needed on the energy expenditure of NPWL women in developing countries.

#### *Implications of time constraints for nutrition and health care*

Many primary health care strategies for maternal and child health require substantial time inputs by women. In the context of the limited free time available to many women in developing countries, failure to take their time constraints into account may affect the success of health programmes. Women are responsible for many activities related to health and nutrition, such as food preparation, child care and hygiene, and often make the initial decisions regarding use of health care. Although children are the beneficiaries, most nutrition interventions are targeted at women who are expected to access services and act on new knowledge (Leslie, 1995). McGuire & Popkin (1990) have described the conflicts that poor women in developing countries face in trying to fulfil their economic, biological and social roles, as a zero-sum game in which increased time or energy spent in one area may have negative effects on another. They also point out that the child survival revolution

has to be implemented by women who must, for example, take their children for immunizations and growth monitoring, and prepare and administer oral rehydration solutions. The time costs to women are not trivial (Leslie, 1988) and have been insufficiently recognized in most primary health care systems and by international agencies.

#### DIETARY INTAKES

The energy and protein intakes of women in selected developing countries are shown in Table 3. The samples are not representative and include rural women (Ethiopia, Kenya, Guatemala), migrant workers (Brazil) and wives of mine workers (Papua New Guinea). Energy intakes are often below recommended values and women typically meet a smaller percentage of the requirements than men. Protein intakes are usually more adequate; however, women may consume lower-quality protein than men. For example, in Burkina Faso women were reported to consume only 0.8 g animal protein compared with 10.3 g consumed by men (McGuire & Popkin, 1990). Intakes of micronutrients such as Ca, Fe, riboflavin, niacin and retinol are also often below recommended levels (Desai *et al.* 1980; Ulijaszek *et al.* 1987; Gittelsohn, 1991).

Although there are problems associated with collection of dietary information which may lead to underestimation of intakes, the data in Table 3 suggest, given the moderate to high levels of physical activity described (see p. 350), that many poor women in developing countries are chronically energy deficient. Further evidence for this relating to BMI is discussed later.

#### *Intra-household food distribution*

The unequal distribution of food is an important cause of the inadequate intake of women in poor households. Lower intakes by women as a percentage of requirements have been reported in several settings (Carloni, 1981; Samarasinghe *et al.* 1990), particularly in South Asia. Although women are usually responsible for food preparation, they give priority to the men in the households, feeding their husbands first, then their children (sometimes boys before girls) and then themselves. Rizvi (1983) has described how this self-sacrificing role in intra-household food distribution is acquired by girls who learn to be least demanding and give priority to the male members of the household. In a detailed observational study of intra-household food allocation in Nepal, women had lower energy intakes than men, were served after men and in some age-groups received fewer second helpings (Gittelsohn, 1991). Higher-status foods, especially animal products, were also given preferentially to males.

Table 3. *Energy and protein intakes of non-pregnant women in developing countries*

Country	Reference	Energy		Protein (g)
		MJ	kcal	
Papua New Guinea	Ulijaszek <i>et al.</i> (1987)	6.2–7.3	1491–1763	27.3–35.9
Kenya	Kusin <i>et al.</i> (1984)	7.4	1765	59.0
Ethiopia	Ferro-Luzzi <i>et al.</i> (1990)	8.5	2023	–
Brazil	Desai <i>et al.</i> (1980)	4.5	1068	28
Guatemala	Schutz <i>et al.</i> (1980)	7.9	1876	–

Women's role in decision making in the household may increase where they earn their own income and women's employment may thus benefit household nutrition. Although women's incomes are often lower than men's, if women have control of their income they may allocate more of it to food and health expenditures (Chatterjee & Lambert, 1990; Holmboe-Ottesen *et al.* 1988, 1989). Women's income has been associated with better nutritional status of their children (Tripp, 1981) and, in some cases, higher energy intake by the women (Adair *et al.* 1990). However, labour force participation often reduces the time available for child care and may have a negative impact on their children's nutritional status where adequate alternate care is not available (Popkin, 1980).

#### CHRONIC ENERGY DEFICIENCY

A BMI of  $< 18.5$  has been recommended as an indicator of chronic energy deficiency in adults (James, 1994). In many developing countries substantial percentages of women have BMI below this level, reaching as high as 61% in a sample of Indian women (Ferro-Luzzi *et al.* 1992). However, there is wide variation and in some populations experiencing an epidemiological transition the problem is one of obesity rather than undernutrition (Fig. 3).

The functional implications of a low BMI were reviewed at a recent workshop (James & Ralph, 1994). Women with low BMI were reported to experience greater morbidity and to have reduced activity levels (Garcia & Kennedy, 1994; World Health Organization, 1995). Lower productivity has also been found in female factory workers with low weight and weight-for-height (Satyanarayana *et al.* 1978). The effects of chronic energy deficiency experienced by poor women on their health and their ability to work either in home production of food or to earn incomes probably contribute to a continued cycle of poverty.



Fig. 3. Frequency distribution of BMI ( $\square$ ,  $< 18.5$ ;  $\square$ ,  $18.5-24.9$ ;  $\square$ ,  $25-29.9$ ;  $\blacksquare$ ,  $> 30$ ) of women in India and Zimbabwe (data from Ferro-Luzzi *et al.* 1992), Philippines (data from Garcia & Kennedy, 1994) and Jamaica (T. E. Forrester, personal communication).



## ANAEMIA

The prevalence of anaemia, the majority of which is due to Fe deficiency, is extremely high amongst women in developing countries (Table 4; Administrative Committee on Coordination/Sub-Committee on Nutrition, 1992). Even in countries where energy deficiency is rare, anaemia remains a significant problem. For example, in Jamaica, where less than 5% of women have BMI < 18.5 (T. E. Forrester, personal communication), the prevalence of anaemia in pregnant women is 52% and in lactating women is 42% (University of West Indies/Ministry of Health, Jamaica, 1987).

Anaemia is associated with deficits in cognitive ability (Pollitt, 1993) and work capacity. In a controlled trial of Fe treatment given to Fe-deficient female tea pickers in Sri Lanka, the quantity of tea picked increased significantly after one month of supplementation with the increase being greatest in women who were initially most anaemic (Edgerton *et al.* 1979). Anaemia is of particular concern in pregnancy. When severe, anaemia can be a direct cause of maternal mortality due to heart failure or infections resulting from impaired resistance. More frequently, anaemia increases the risk of death from haemorrhage (Royston & Armstrong, 1989) which is the single largest cause of maternal death in many developing countries.

## OLDER WOMEN

There is little information on the nutrition of women past reproductive age in developing countries. These women may have more status than younger women in some societies, but in others may be vulnerable, especially if widowed and dependent on male relatives. Because of their influence on younger women, older women may be important targets of nutrition intervention and education programmes. Health issues related to chronic diseases are important amongst older women in developing countries as in developed countries. In most countries in Latin America and the Caribbean, cardiovascular disease, cancer and diabetes are among the five most common causes of mortality for women in the age-groups 49–64 years and over 65 years (Sennot-Miller, 1989). However, in some countries in the region, respiratory infections and nutritional deficiencies remain important causes of death. In one community studied in Jamaica, the main health problems of women over age 65 years were hypertension, diabetes, arthritis and anaemia (Mesfin *et al.* 1989).

Osteoporosis is a major health problem in women in developed countries. However, there is little information on the prevalence of osteoporosis amongst women in developing countries. Chronic undernutrition, especially in childhood and adolescence, and repeated

Table 4. Prevalence (%) of anaemia in women aged 15–49 years\* (From Administrative Committee on Coordination/Sub-committee on Nutrition, 1992)

	Pregnant	Non-pregnant
Sub-Saharan Africa	50	40
Near-East and North Africa	44	31
South Asia	64	64
South-East Asia	56	47
Middle America and Caribbean	34	27
South America	31	21

\*Anaemia is defined as haemoglobin < 110 g/l in pregnant women, < 120 g/l in non-pregnant women.

Table 5. *Nutritional issues and underlying socio-economic factors for women in developing countries*

Maternal depletion including anaemia	Lack of ability to limit fertility (access to family planning, cultural pressures)
Chronic energy deficiency: Intra-household food distribution High work loads	Poverty, gender discrimination, lack of basic technology

pregnancies may increase the risk of osteoporosis, whereas other factors such as high physical activity may be protective.

### CONCLUSIONS

The many nutritional problems faced by women in developing countries can be grouped in three main areas: childhood undernutrition leading to short stature; frequent reproductive cycles contributing to deterioration of maternal nutritional status including anaemia; heavy work loads and expenditure which, together with marginal dietary intakes, mean that many poor women in the Third World are chronically energy deficient. The consequences of these nutritional problems can include increased risk of maternal mortality, reduced work capacity and increased morbidity due to reduced resistance to infections. Inadequate nutrition amongst women in developing countries will, therefore, often lead to impairments in the women's health and affect their ability to fulfil their social and occupational roles.

Although the focus of the present review has been on nutritional issues, these may actually be thought of as symptoms of underlying social and economic issues. A few examples of these are given in Table 5. Interventions to improve the nutrition of women are unlikely to be successful in the long term unless these issues are also addressed.

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