Introduction
Chapter-I

INTRODUCTION

Adolescence has been described as a phase of life beginning in biology and ending in society. Indeed adolescence may be defined, as the period within the life span when most of a person's biological, cognitive, psychological, and social characteristics are changing from what is, typically considered child-like to what is considered adult-like. For the adolescent, this period is a dramatic challenge, one requiring adjustment to changes in the self, in the family, and in the peer group. In contemporary society, adolescents experience institutional changes as well. Among young adolescents, there is a change in school setting, typically involving a transition from elementary school to either junior high school or middle school; and in late adolescence there is a transition from high school to the worlds of work, university, or childrearing.

The term adolescence meaning “to emerge”, or “achieve identity” is a relatively new concept especially in development thinking. The origin of the term form the Latin word, ‘adolescere’ meaning, “to grow, to mature” indicate the defining features of adolescence. However, a universally accepted definition of the concept has not been established.

Adolescents aged between 10-19 years account for more than one-fifth of the world’s population. In India, this group forms 21.4 per cent of the total population. Characterised by distinct physical and social changes, the separate health, education, economic and employment needs of adolescents cannot be ignored. Adolescents are also entitled to enjoy all basic human rights – economic, social, political and cultural but their inability to exercise these rights places the ones on policy makers and adults
to implement separate measures to ensure their rights. Moreover, it is necessary to invest in adolescents as the future leaders and guardians of the nation’s development.

A pre-requisite for policy planning and focus is a comprehensive situational analysis of adolescents. Yet, there is a marked absence of reliable data and information on adolescents. There has been an encouraging trend to reverse this in recent years, with a growing awareness of adolescent needs, particularly in the voluntary sector, and an increase in the number of innovative programmes on adolescents.

**Defining the group ‘adolescents’**

Adolescents as an age group usually tend to the subsumed under the categories of either youth or children. The formulation of definitions clearly demarcating the age and characteristics of adolescents is only a recent phenomenon, and yet to be widely recognized across the world.

The actual interpretation of adolescence as a phase of life remains a social construct that differs between cultures. In India, there is a resistance to the concept of ‘adolescence’, if it is understood, as in the west, as an extended period of education and training for adult roles. The experience of such a phase is limited in the Indian context. This may be explained by factors such as a delay in the onset of puberty (due to poor nutritional status) and prevalence of early marriage (signifying adulthood). It may further be argued that in India the generation gap cited in the west does not exist. However, with the changing economic and social profile, generation difference in India is becoming increasingly important. The association of adolescence with sexuality is another factor, which increases resistance to the concept, particularly in regard to female adolescence (Greene, 1997). However, if adolescence is viewed in terms of shift in “dependency to autonomy, social responses to physical maturity, the management of sexuality, the acquisition of skills and changes in peer groupings...
(Greene, 1997)”, then the notion that adolescence is a social stage that occurs only in developed nations must be discarded.

Adolescents are generally perceived as a homogenous group, yet they can be stratified on the basis of gender, caste, class, geographical location (urban/rural) and religion. Adolescents also include a whole gamut of categories school and non-school going, drop-outs, sexually exploited children, working adolescents – both paid and unpaid, unmarried adolescents as also married males and females with experience of motherhood and fatherhood.

It may be persistent to ask are their any common characteristics defining adolescents? The only universal definition of adolescence is to mark it as a period in which a person is no longer a child, and not yet an adult. This is a period of rapid growth and is apparent from the prevalence of new factors – of new capacities, of being faced with new situations, new types of behaviour – which signify opportunities for growth and development, but also risks to health and well being. The period is characterised by a combination of physical changes (puberty), behaviour changes and shifts in social grouping. Broadly these changes are –

**Physical changes**

The onset of puberty is marked by rapid growth and the development of secondary sexual characteristics.

**Psychological changes**

The development of a sense of identity distinct from parents and self-worth, the exploration of new relationships with their peer groups, with the opposite sex, families and the community. It is also a time of exploration and experimentation. At this stage, media and peers exert a powerful influence. Manifested by change, it is also a stage of extreme vulnerability where, for instance, alcohol use could easily slip
into alcohol abuse if there is inadequate access to services and a supportive
environment. The support and understanding of parents during this phase is critical in
enabling them to meet these challenges (WHO, 1997 and 1998).

**Nutrition and health**

Nutrition is usually taken as another significant indicator of the health and
overall status of adolescents. Adequate nutrition is particularly critical for adolescents
as it is a primary determinant of the spurt of growth that characterises adolescence.
Poor nutrition is often cited as a major reason for the delay in the onset of puberty in
Indian adolescents. Also, gender discrimination in India is mentioned as one of the
main causes of female under nutrition.

A positive shift in most nutritional studies has been the move away from the
overwhelming concentration on the nutritional status of children, mothers, or
pregnant women to include adolescents. In addition to the traditional categories of
children and adults, the design of the National Nutrition, Profile 1998 includes
'School age children' and 'adolescents'. Average intake of nutrients was also
classified according to age and sex. However, there are anomalies even within the
same profile. The regional nutrition profiles primarily detail two categories, children
and adults, excluding adolescents.

A major measure of nutritional or health status is the average intake of energy
and protein and also iron against the recommended daily allowance (RDA). The
protein intake of all groups is adequate but the age groups below 15 years fall short in
energy intake. Average intake of iron is deficient in almost all age groups. It is
plausible that the short falls create more vulnerability among adolescent girls due to
greater demand for better nutrition.

Of particular concern to policy makers is the nutritional status of girls as it has
inter-generational effects. Low socio-economic status compounds the problem of
under nutrition, with consequent effects on height and weight. In addition, under nutrition reduces the reproductive, physical and mental capacities of girls and continues to result in low birth weights and foetal loss. If India wishes to achieve the goals of health for all and adequate nutritional for all, it must attend to the problem of under nutrition among adolescent girls.

The RNIS supplement discusses the assessment of under nutrition in adolescents in emergency situations. The World Health Organization (WHO) defines adolescents as persons aged 10-19 years old. Because of the focus on humanitarian emergencies, the discussion will include only an evaluation of acute under nutrition. This paper will not address many other important nutritional problems in adolescents, such as anaemia and other micronutrient deficiencies, poor nutritional habits, eating disorders, and obesity. The (low height for – age). In adolescents, chronic under nutrition also delays normal maturation. Although chronic under nutrition is an important and widespread problem with multiple adverse health outcomes, it is not usually the highest nutritional priority in emergency situations. In such situations, acute under nutrition is often common and, at least in young children, may account for a substantial proportion of overall mortality. Moreover, the distinction between acute and chronic under nutrition among adolescents and adults is not nearly as clear as it is among young children. Since adults and older adolescents no longer increase that height, they cannot become stunted and thinness may result from either a sudden or longstanding food deficit. This discussion emphasizes practical issues of anthropometric assessment of nutritional status rather than general knowledge of adolescent growth and development. Nonetheless, this supplement does include some information on these topics so that the reader can understand the difficulties associated with anthropometric assessment in this age group. This paper also points out some of the deficiencies of the current recommendations regarding the nutritional
assessment of adolescents, including those published by WHO. Examples of assessments that have used the recommended procedures are included. Many of these assessments have produced misleading results, and at least one has resulted in the implementation of potentiality-unneeded interventions. In displaced and emergency affected populations, the most common method of assessing the overall nutritional status in a population is to weight and measure children 6-59 months of age. However, emergencies in Europe, Central Asia, and Africa have highlighted the nutritional vulnerability of other population subgroups, such as elderly adults. Adolescents have not traditionally been considered at disproportionately elevated nutritional risk in emergency situations. Nonetheless, because of rapid growth in stature, muscle mass, and fat mass during the peak of the adolescent growth spurt, the requirements for some nutrients is as high or higher in adolescents than in other age groups. Between 10 and 19 years of age, the requirement for many micronutrients, including vitamin A, thiamine riboflavin, niacin, folic acid, vitamin B12, vitamin C, and iodine, reaches levels required by non-pregnant adults. Moreover, rapid growth produces a higher requirement among adolescents 10—14 years of age for calcium than any other population age group except pregnant women. The 2,420 kcal required per day by adolescents 15-19 years of age are the highest energy requirement of any age group. The recommended general ration of 2100 kcal per person per day for populations wholly dependent on relief food is based on a distribution of age and sex which assumes that 20 per cent of the population are adolescents 10-19 years of age and 56 per cent are adults. In populations with a higher proportion of adolescents or adults, this ration may provide insufficient energy. Adolescence may also present a nutritional opportunity, although little is known about the short and long-term effects of acute under nutrition during adolescence. In many cultures, a large proportion of girls have their first pregnancy during adolescence. Improvement in nutritional status
can improve pregnancy outcomes, including maternal death, foetal death, and pre-term delivery, experienced by pregnant adolescents.

**Nutritional requirements of adolescents**

The period of transition from childhood is called adolescence with accelerated physical, biochemical and emotional development. It is during this period that the final growth spurt occurs. There are many body changes, which result due to the influence of hormones. The growth spurt of boys is slower than that of girls. The growth spurt signals the onset of critical body composition of 10 per cent body fat. However 22 per cent of body fat is required to maintain regular condition. Growth velocity is maximum for boys between 12-15 years and for girls 10-13 years. They attain their adult stature between 18-20 but bone mass continues to increase upto age of 25. With the profound growth of adolescence there is increased demands for energy, protein, minerals and vitamins.

The dimensional changes and changes in maturational timing over the generations are called secular changes, the term secular referring to successive periods of time. Magnitude of secular trend in stature, which may approximate 1 cm/decade, and the inverse secular trend in monarchial timing, which may approximately 0.2 year/decade. Adolescent anorexia may lead to diminution of the secular trend.

**NUTRITIONAL REQUIREMENTS**

**Energy**

Calorie needs increase with the metabolic demands of growth and energy expenditure. Although individual needs vary, girls consume fewer kilocalories than boys. Boys need 2500-2600 kcal a day. Sometimes the large appetite characteristic of
this growth period leads adolescents to satisfy their hunger with snack foods that are high in sugar and fat and low in protein.

The calories for both boys and girls from the age group of 1-3 years to 7-9 years remain the same. From the age of 10 years, there is a marked difference in the calorie needs of boys and girls. As seen from the fig. 6a the needs of boys are higher than those of girls, which continue till the adult stage. Adults, both female and male require less calories compared to 18-19 year old. Growth and physical activity contribute significantly to the total energy requirement.

**Proteins**

For most adolescents, eating to satisfy appetite offers a reasonably sensitive indicator of energy needs. Protein needs represent 12-14 per cent of energy intake. The protein intake usually exceeds 1 g/kg body weight. This meets growth needs and for the pubertal changes in both sexes and for the developing muscle mass in boys.

As is evident from the figure 6 b the protein requirements for both boys and girls are the same up to the age of ten years. But there is a gradual difference in their requirements from the age of 10 years where the boys have a higher requirement compared to girls. The pattern is similar in calorie requirement.

Between 10-12 years the requirement of protein for girls is higher compared to boys. Later boys require more than girls of the same age.

**Minerals**

500-600 mg of calcium is needed during adolescence, much more than an adult. Bone growth demands calcium. About 150 mg of calcium must be retained each day to allow for the increase in bone mass. Adolescents who have less bone mineral density are susceptible for osteoporosis later in their life.
Iron needed for haemoglobin synthesis necessitated by the considerable expansion of blood volume and for myoglobin needed for muscle growth. The girls need to ensure adequate intake of iron as they lose 0.5 mg/day by way of menstruation. The daily menstrual loss of iron is computed from the iron content of blood lost during the menstrual period averaged over a month. If this lost iron is not replaced, it predisposes to iron deficiency anaemia. During adolescence there is an increase in body mass corresponding to about 4.3 kg/year in the male and 4 kg/year in the female. With a further increase in haemoglobin by 2 g/dl in the male and 1 g/dl in the female, the respective requirement for growth alone is 0.7 mg/day in males and 0.45 mg/day in females while the obligatory losses also increase with age.

Frank zinc deficiency is not normally seen in adolescents. Zinc supplements have been shown to increase pubertal growth in adolescents suffering from pubertal delay.

**Vitamins**

The need for thiamin riboflavin and niacin increases directly with increased caloric intake. Folacin and B₁₂ are essential for DNA and RNA synthesis and needed in higher amounts when tissue synthesis is occurring rapidly.

Tissue growth involves amino acid metabolism particularly transamination to synthesis nonessential amino acids. So the requirement for B₆ is increased. Premenstrual tension can be reduced if adolescent girls consume 100 mg/day vitamin B₆. Skeletal growth requires vitamin D. While the structural and functional integrity of newly formed cells depends on the availability of vitamin A, C and E.

**FOOD HABITS**

Physical and psychosocial pressures influence adolescents’ eating habits. The boy fares better than the girl in that his large appetite and sheer volume of food leads
him to consume adequate nutrients. But the adolescent girl is less fortunate because (a) her physiologic sex differences associated with fat deposits during this period and comparative lack of physical activity she may gain weight easily, (b) social pressures and personal tensions concerning figure control will cause her to follow unwise, self imposed crash diets for weight loss, (c) self starvation may result in complex and far reaching eating disorders like anorexia nervosa and bulimia.

Teenagers have the reputation of having the worst eating habits. They have skip a meal. Or they may eat fast foods, which are generally inadequate in calcium and vitamin A but high in calories, saturate fat and sodium.

NUTRITIONAL PROBLEMS

1. Obesity

Studies have shown people who eat out more number of times are susceptible for obesity. Children are exposed to high calorie, high fat foods that are readily available, heavily advertised and delicious. Skipping meals at home and consuming foods that are junk (very salty, high sugar and fat) also contribute to overweight. Fat diets may be tastier than non-fat diets.

An excessive intake of calories is less often the cause than lack of exercise. Concern about personal appearance may make the adolescent more reluctant to participate in activities like dance or sports that control weight. Other causes of obesity may be family habits, emotional stress and hormonal imbalance.

2. Eating disorders

Adolescent girls perceived their diets in the light of appearance and body shape while boys are more concerned by fitness and general well being. There are three recognised eating disorders anorexia nervosa, bulimia nervosa and binge eating disorder.
3. Anorexia nervosa
4. Bulimia nervosa
5. Binge eating disorder
6. Predisposition to osteoporosis
7. Anaemia
8. Under nutrition
9. Premenstrual syndrome

**Malnutrition due to early marriage for adolescent girls**

Often a significant proportion of Indian girls get married soon after menarche and bear a child when she herself is still a child-mother are considered ‘high risk’ as maternal and perinatal death rates and infant mortality rates are higher among them. In India almost 40 per cent of girls are married and have the first child before 18 years of age. Pregnancy is optimal when the mother is biologically mature. A biologically mature female is a young woman who is at least 5-year post menarch and this has greater impact on pregnancy then her chronological age.

Nutritional deficiency signs get aggravated if the adolescent girls conscious immediately after menarch since she has to meet the demands of not only her growth but also that of concepts. This incidence of both preclampsia have been found to be higher and so also the incidence of pregnancy wastage.

In the poorer section of the society, complication is more common in adolescent, which have direct bearing on the outcome of pregnancy.

Studies on age-related infant mortality in various parts of the country have shown that early neonatal deaths are almost double in the adolescent age group. Maternal mortality again is high due to eclampsia haemorrhage. There is close association between the maternal body weight and the incidence of low birth weight.
The lactation failure is also a more common occurrence among the adolescent, resulting in high infant mortality and morbidity due to earlier introduction of supplement. Due to small size of the pelvis, there is increase in the rate of premature deliveries and also high incidence of low birth.

Pregnancy and childbirth are safest not at 15 but between 25 and 30 years.

**Main nutritional issues for adolescents**

Adolescence is the second most critical period of physical growth in the life cycle after the first year. Twenty five per cent of adult height is attained during adolescence. For many adolescents, inadequate quality and quantity of food are the prime determinants of nutrition problems. These conditions may be due to household food insecurity, intrahousehold allocation of food that does not meet their full range of dietary needs, livelihoods insecurity, and lack of nutrition knowledge. Micronutrient malnutrition and chronic energy deficiency resulting in thinness (low body mass index or BMI (1. Body Mass Index (BMI) is a measure of thinness in adolescents and adults; it is equal to a person’s weight in kilograms divided by height in meters $^2$ or (kg/(m$^2$)) and stunting stem primarily from poor diet. Excessive physical activity patterns (e.g., heavy workloads and walking long distances) and infection may also contribute to under nutrition.

**Stunting** (short stature) in both adolescent boys and girls was prevalent in 9 of 11 studies conducted by the International Center for Research on Women in the early 90's, ranging from 27 to 65 per cent. Data on underweight (thinness indicated by low BMI for adolescents and adults) are largely unavailable for adolescents. ICRW reported low BMI ranging from 3 to 53 per cent. Adolescents in India, Nepal and Benin were the most severely affected among the 11 study sites.

**Overweight/obesity** data are not widely reported for adolescents, but there is growing concern about these problems. WHO estimates that 60 per cent of deaths among people aged 15-29 are due to cardiovascular disease. However, there is a growing concern about the increase in obesity among adolescents.
globally are due to non-communicable diseases associated with unhealthy diets and physical inactivity, with 79 per cent of these deaths occurring in developing countries? The same changes in diet and physical activity contribute to the increased prevalence of obesity in youth, often seen side by side in communities with under nutrition. There is also some evidence that low birth weight may predispose individuals to obesity and associated chronic diseases later in life. In Chile, 12 per cent of schoolchildren are obese; 17 per cent of older adolescent girls in South Africa are obese; and in China, one study found that the prevalence of overweight and obesity (BMI > 25), in young adults has moved up from 10 to 15 per cent for urban areas, and from 6 to 8 per cent in rural areas, over a ten year period (1982-1992).

**Iron deficiency** is the most prevalent micronutrient deficiency among adolescents. Iron deficiency and anemia are associated with impaired cognitive functioning, lower school achievement and most likely lower physical work capacity. WHO estimates that 27 per cent of adolescents in developing countries are anemic; the ICRW studies documented high rates in India (55 %), Nepal (42 %), Cameroon (32 %) and Guatemala (48 %). Adolescents (both boys and girls) are at risk of developing iron deficiency and iron deficiency anemia because of the increased iron requirements for growth. Infectious diseases such as malaria, schistosomiasis, and hookworm affect both boys and girls, contributing to anemia by affecting the absorption of or increasing the loss of iron. Following the end of their growth spurt, boys rapidly regain adequate iron status, where girls may continue to be or become more deficient because of the increased requirements for iron due to menstruation, pregnancy, and lactation.

**Folate deficiency**, if not addressed during the pre or periconceptual period, may cause irreversible fetal damage. Addressing folate deficiency beyond the middle of the first trimester of pregnancy will not correct neural tube defects that occur in the
early weeks of pregnancy. The unplanned nature of many adolescent pregnancies underscores the need to take a preventive approach to this specific nutritional issue for youth.

In settings of endemic iodine deficiency, girls are affected disproportionately relative to boys, although all individuals are affected. Detrimental cognitive effects include neural impairment and poor school performance. The fetus of an iodine-deficient mother is at risk of spontaneous abortion as well as a range of neurological and intellectual impairments.

Other micronutrients that may be deficient in adolescents include vitamin A, zinc, and calcium. The latter two are particularly important for achieving maximum growth potential. Calcium intake in adolescence is also important for preventing osteoporosis (birth bones) later in life. Vitamin A deficiency appears to negatively affect growth and possibly sexual maturation. It is critical for healthy immune system functioning and optimal vision.

A related health issue is adolescent pregnancy. It is often associated with nutritional, obstetric, and perinatal health risks for teen mothers and their babies. Incomplete maternal growth heightens the risk of obstructed labour. There is evidence that competition for nutrients will favour the still growing mother, placing offspring at risk for low micronutrient stores and low birth weight. Concurrent pregnancy and growth worsen maternal micronutrient deficiencies – iron and calcium for example. Children of adolescent mothers are also often at greater risk of poor nutritional care and feeding practices.

**The impact of gender inequalities on women health**

The existence of social and economic inequalities means that in many countries women have difficulty in acquiring the basic necessities for a healthy life. Of course, the degree of their deprivation will vary depending on the community in
which they live but the “feminization” of poverty remains a constant theme. “Cultural 
devaluation” is also important, though it is difficult to measure or even to define. 
Because they belong to a group that is seen by society to be less worthwhile, many 
women find it difficult to develop positive mental health. This process begins in 
childhood, with girls in many cultures being less valued than boys, and continues into 
later life, where “caring work” is given lower status and less rewards. These gender 
inequalities are further reinforced by women’s lack of power and the obstacles they 
face in trying to effect social change.

The prevailing tendency is to view as pathological what are normal processes 
in women’s physical and mental health. For example, pregnancy and childbirth are 
normal physiological processes under most circumstances. Unlike diseases affecting 
males, they are not diseases or surgical events. In many societies pregnancy and 
childbirth have been treated as medical processes rather than as healthy processes. 
Gender inequalities that prevent access to high quality health services doubly 
disadvantage women already at risk because of their childbearing role.

The nature of female labour itself may affect women’s health. Household work 
and child care can be exhausting and debilitating, especially if they are done with 
inadequate resources and combined, as they are for many women, with pregnancy and 
subsistence agriculture. They can also damage mental health when they are given 
little recognition and carried out in isolation. The time consumed by caring for others 
leads to neglect by women of their own health. For women, domestic life and labour 
also carry the threat of violence, since the home is the arena in which they are most 
likely to be abused. The emphasis on their domestic roles also means that women 
suffer more severe consequences that men when a family member is a substance 
abuser or if they abuse substances themselves. Even in the context of paid work, 
“female” jobs often pose particular hazards that receive little attention.
Gender based violence is a risk factor for many women. Not only is it a violation of their human rights, but also it has wide ranging consequences for their physical and mental health and the health system. Women are victims of assault as a result of inequalities in society, and are most at risk of abuse from their partners and close relatives.

The sexual subordination of girls and women has increased their vulnerability to sexually transmitted diseases, HIV and AIDS, exacerbating the burden of disease among them and greatly reducing life expectancy and quality of life. In addition, girls and women with HIV and AIDS are exposed to stigma and mistreatment in most circumstances.

**The impact of gender inequalities on men’s health**

Thus far it has been women and their advocates who have paid most attention to the impact of gender divisions on health. However, new questions are now being raised about the possible health hazards of being a man and these may also need to be addressed in the development of gender-sensitive policies.

On the face of it, “maleness” can only be health promoting, since it is likely to give a man greater power, wealth and status than a woman in the equivalent social situation. However, certain disadvantages have also been identified. In the context of paid work, for instance, the idea of the male “breadwinner” has meant that in many societies men have felt compelled to take on the most dangerous jobs. As a result, male rates of industrial accident and disease have felt compelled to take on the most dangerous jobs. As a result, male rates of industrial accident and disease have historically been higher than female rates, and deaths from occupational causes are more common among men than among women.

Men in the majority of societies are also more likely than women to adopt a variety of unhealthy habits, such as using and illicit psychoactive substances and engaging in high risk sexual behavior.
dangerous sports. These activities are linked in most cultures to ideas about masculinity, so that young men in particular may feel pressure to indulge in risk-taking behaviour in order to show that they are “real men”. Similar concepts have been used to explain the high rates of male-on-male violence found in many parts of the world. In the area of mental health, too, some men are now arguing that gender-stereotyping narrows the range of emotions they are allowed to express, making it difficult for them to admit weakness, for example, or other feelings regarded as feminine.

Gender inequality affects men’s behaviour and may affect relationships between women and men. It has impeded men’s appreciation of their responsibility for the health hazards of violence in relationships between women and men.

Gender differentials in nutrition status

The Indian NNMB data reveal a mixed picture of male/female differences in mean calorie and protein intakes. In 1982 girls 13-16 years old consumed much less than boys and only two-thirds of their recommended calorie intakes (in all states surveyed except Karnataka). While girls 16-18 years old fared slightly better than boys, they were still below requirement. Earlier data (1979) showed no significant differences in the caloric adequacy of males and (non pregnant, non lactating) females over 18 years old. While no data were given in this year for pregnant women, lactating women were more calories inadequate than their non-pregnant, non-lactating counterparts.

An examination of percentile values of calorie intakes expressed as percentages of recommended levels among those 13-16, 16-18, and over 18 years old (in pooled 1975-1978 data) reveals no major differences between males and females. Only among pregnant and lactating women were these values lower than for males, as well as lower than for non-pregnant, non-lactating women. On the other hand, the
data from the Pakistani Planning Commission do not reveal any consistent differences in the distribution of adult makes and females in different calorie consumption, nor among pregnant, lactating, and other adult females.

**Micronutrient deficiencies**

**Iron**

Pooled 1974-1978 data on food consumption from the Indian NNMB show that girls between 13 and 18 years of age obtain lower percentages of the recommended levels of iron that do boys of the same ages. With the onset of menarche, young girls are highly susceptible to anaemia in the absence of adequate dietary iron. The prevalence of anaemia among women in India is extremely high, as shown by the study conducted by the Indian Council of Medical Research in four areas of the country.

Anaemia is also common in pregnancy, frequently caused by a combination of low iron intake and poor absorption, exacerbated by malaria and hookworm infections. In some poor communities in India, 80 to 90 per cent of pregnant women may be anaemic, while nationally the figure may be greater than 50 per cent. A national survey in Pakistan in 1976 found more than 54 per cent of pregnant women to be anaemic. Between 40 per cent and 50 per cent maternal deaths may be associated with anaemia or the resultant increased dangers of haemorrhage. In Varanasi 119 pregnant women were treated with 60 mg of iron and 500 mg of folic acid daily for 100 days and improved their haemoglobin levels by 1.6 g per cent (compared with a fall of 0.3 g % in a non-treated group). Birth weights increased significantly in the supplemented group (mean 2.91 kg) over the placebo-treated control group (mean 2.59 kg).
Iodine

An estimated 200 million people in India and Pakistan are at risk of iodine-deficiency disorders. Of all micronutrient deficiencies, a shortage of iodine in pregnancy has the most far-reaching consequences. In some seriously affected areas in the Himalayas, 80 per cent of the population suffers from goitre, and up to 10 per cent of newborns may be cretinous.

Iodine deficiency disorders also have a significant effect on rates of spontaneous abortions, still births, and infant and neonatal death. A single injection of iodized oil given at the start of pregnancy in Zaire had dramatic effects on perinatal and infant mortality, and on the birth weights and development quotients of the children. If administered early in pregnancy or preferably before conception, iodized oil has demonstrable results. Given that cretinism is irreversible and that an iodized oil injection is inexpensive (35 cents) and is effective for five years, Iodization of iodine-deficiency disorders can be high on a list of priorities.

Synergistic effects of gender and poverty on nutrition status

The effects of gender and poverty on nutrition status may be synergistic. An economic analysis of malnutrition among young children in Punjab revealed that, while gender was the most statistically significant determinant, differences between man and women were especially great among the lower socio-economic group or caste. Nutritional status among the higher caste landowners was better on the whole, and the gender differential was also smaller.

In this study, gender had a highly significant effect on calorie intake among the study population as a whole, and on diarrhoeal disease rates among the economically better off, with females having lower intakes and exhibiting higher rates of infection. Although both high and low socio-economic groups discriminated against females in breast-feeding practices, girls in the better-off households consumed as many calories
as and more protein, iron, and supplementary food than boys because food resources were not scarce among these families. Among the poor, however, discrimination against female children, coupled with inadequate purchasing power, meant that young girls had lower calorie intakes and consumed less supplementary food and less solid food than boys. This resulted in considerably higher mortality levels among low caste female infants (196 per 1,000 live births) than among males. The greater vulnerability of girls may be due to differences in the care and upbringing of sons and daughters. “These differences reflect an economic, as well as a cultural premium placed on living sons ........ (while) daughters are considered unproductive and an expensive economic drain, particularly the cost of dowry when they marry”. This socio-cultural attitude considerably influences household nutritional care of girls in their natal homes and is carried on to varying degrees when they marry (daughter-in-law wife, and mother).

Determination in nutrition status as females grow older as a combined result of socio-cultural, economic, and biological processes has been documented (cross-sectionally). Gender differences in adult nutrition status also appear to be exacerbated by poverty, as has been demonstrated in Tamil Nadu.

Regional variations

In addition to the national surveys cited above, smaller studies of household dietary intake in different parts of the subcontinent provide information on different between boys and girls by age, socio-economic status, region, and season. A mapping of these studies shows that nutritional equity is lower in northern India and improves towards the south. While in Rajasthan, a northern state, all children under 12 years old and adult women were deprived of their fair nutritional shares relative to adult males, as well as to the applicable RDAs, the gender differential disappeared among adults in the western state of Gujarat (except for lactating women) and Maharashtra,
and the southern states of Andhra Pradesh and Tamil Nadu. Even in the latter areas, however, preschool girls tended to be worse off than boys, and some gender differences were seasonal. In most instances, adolescent girls appeared to be as well off as or sometimes even better off than their male counterparts.

In the east (including Bangladesh), the situation was similar to that in Rajasthan, but the deprivation of women appears to be economically rather than culturally mediated, as work plays a significant role in female under nutrition. Regional variations also occur in Pakistan, with higher rates of malnutrition among women in Baluchistan and Sind than in Punjab and the North-west Frontier Province. In essence, the social and economic value of women underlies regional variations in their nutrition status and in sex-based differences in nutrition.

**Socio-economic differences**

While not permitting an examination of gender differences within each socio-economic category, the NNMB’s dietary intake surveys document lower food consumption in households without land than in those with land, among those who possessed land but did not grow crops in the reference year than among those who did grow crops, among labourers and “others” (village artisans and petty businessmen) than among cultivators, and among scheduled castes and tribes than among non-scheduled groups. Thus, women in these groups are likely to be at the greatest risk of malnutrition.

**Economic crises**

In times of extreme scarcity, females’ access to food is more circumscribed than that of males. A survey of some flood-torn West Bengal villages in 1978 showed that females of all ages up to 72 years had higher rates of malnutrition than males. The female/male ratio of malnourished children 0-5 years old was 1.07. If only moderately and severely malnourished children were considered, the ratio rose to
1.40, and it was 1.50 among severely malnourished children alone. These data suggest that females were both more at risk of malnutrition and more severely affected by it. The authors also pointed to the synergistic effect of impoverishment and gender bias, which has been documented in Bangladesh as well.

**Consequences of female nutritional deprivation**

**Physical underdevelopment**

A major consequence of girls’ nutritional deprivation in early childhood and adolescence is their failure to achieve full growth potential. A majority of girls from low-income families reach adolescence about 12-15 cm shorter than their well-to-do peers in the same society. The NNMB data on Indian women show that between 12 % and 23 % of those 20-24 years old in the states surveyed were less than 145 cm tall and between 15 % and 29 % weighed less than 38 kg. The percentages were even higher among younger girls 49 per cent were under the references height and 67 per cent under the reference weight among 15-year olds who had not yet completed their adolescent growth spurt, but who might yet marry and bear children at this early age. Girls who bear a child before the close of the adolescent growth spurt may remain physically underdeveloped and hence are at greater risk of obstetric complications, obstructed labour, or maternal death as well as of bearing low-birth-weight infants. During pregnancy, women’s access to food is often restricted through the taboos and rituals observed in traditional India and Pakistani households. Besides low maternal pre-pregnancy weight and inadequate weight gain during pregnancy, low birth weight is also related to low maternal haemoglobin levels, so that the high prevalence of anaemia adds to the negative outcomes of childbearing.

**High maternal mortality**

In developing countries overall, childbirth accounts for some 25 per cent of deaths in women of childbearing age, compared with 1 per cent in the United States.
Worldwide, WHO has estimated that 250 women die every four hours because of problems associated with childbirth. In India, pregnancy and childbirth accounted for around 12.5 per cent of deaths among rural females between 15 and 45 years of age in 1986. While the aggregate national maternal mortality rates are estimated to be around 500 and 600 per 100,000 live births in India and Pakistan respectively, rates of over 1,000 have been recorded in certain parts of these countries. These rates contrast with the range of 1 to 15 maternal deaths per 100,000 live births in developed countries. In comparison with this up to 1,000-fold difference, the difference between the lowest and highest recorded national infant mortality rates in the world is around 25-fold.

High maternal mortality in India and Pakistan is a reflection of women’s under-nutrition, poor health status, and high fertility. Poverty, low rates of female literacy, and poor access to or use of health services are some of the underlying factors. Several common causes of maternal deaths are related to malnutrition, particularly to anaemia, while other serious causes, such as toxaemia and septicaemia, reflect the inadequate health care available to women in the antenatal, intra-natal, and post-natal periods. Some research in India has found that for each maternal death there were 16.5 cases of illness related to pregnancy and childbirth, most of which were not treated.

**Low birth weight and high infant mortality**

In both India and Pakistan an estimated 25 – 30 per cent of babies weigh under 2,500 g at birth, and low birth weight is a significant factor underlying their high mortality. A retrospective study of more than 10,000 perinatal deaths revealed that 75 per cent were associated with weights of less than 2,500 g.

Poverty exacerbates the problem of low birth weight, as poor women have both a nutritional handicap and inadequate access to food during pregnancy. For
example, a 35.5 per cent frequency of low birth weight was found in babies born to poor, short women, compared with 24 per cent among those born to poor women over 145 cm tall and 15 per cent among babies of better-off, taller women. A detailed study of 5,914 live-born infants in Pelotas, Brazil, disclosed that although low birth weight was more common in those of low income mothers, it was a much more important determinant of infant mortality than income per se.

In India and Pakistan, low food intake during pregnancy is a major problem. Numerous studies have found that women consume little or no extra food during pregnancy, and may even consciously limit their intake in the fear of developing large foetuses, which would make labour more difficult, given their small pelvic sizes. Food taboos often deprive women of protein and iron sources, as well as reducing calorie availability. Foetal growth in India is similar to that among Caucasians until the last five to six weeks of pregnancy, when foetal weight gain slows dramatically. In addition, the average gestational age for Indian infants is 38.5 weeks.

**Skewed sex ratio**

The summary outcome of the highest mortality of females is the sex ratio in both India and Pakistan: 933 and 904 women per 1,000 men respectively in 1981. In India women have higher mortality rates than men up to 35 years of age, the most significant difference occurring from birth to age five. The large number of deaths in this age group accounts for most of the skewedness in the sex ratio, and malnutrition is a significant underlying factor in many of these deaths.

**Role of working and non-working women in growth stages of adolescent**

Women form a major segment of our society, as homemakers and nurturers their knowledge, awareness and efforts have a marked impact on growth, development and nutritional status of their family members. Before the advent of the
modern era, women in India were generally confined to home, within the four walls of the house. However, in the past independent India, many new vistas have opened up and the women how made themselves free of the fetters in an effort to establish their own identity. In the recent years many of them have had an access to education, which has resulted in their intellectual awakening and broadened thinking. Education of women especially the nutrition and health related education should be our major thrust area. Nutrition education should be our major thrust area. Nutrition awareness for women is extremely important because they, as nurturers, are engaged in bringing up future generations.

The first education of the child takes place within the periphery of the family where he/she inherits a certain culture, imbibes certain values, habits and come to term with his/her immediate environment. A women’s contribution in molding the child surpass that of any other member of the household and, therefore, it is the mother who needs to be targeted and made nutritionally wiser. The educational level, position, health and nutritional states of the women are central to the quality of life and are a key determinant of family health (Jyothelakshmi, 2004). Her food preferences are reflected in the food purchases she makes and the meals she serves to the family. This in the early years of life will affect the child’s food habits, which will rather be passed on to the next generation when, today’s young will become parents and will serve as role models for their children. As such special attention should be given for the improvement of nutritional awareness among the women, which is also clear from the words of Dr. M.S. Swaminathan, good nutrition is a function of both economy and education. Women’s education is hypothesized to exert a major influence on health and nutritional status.

Today many women are moving out form their home in search of better job prospect. Money earning capacity build status of women not only in her home but
also in the society. This view is stressed by Sheela and Shashikala (2001) also; who believed women’s employment has the potential to benefit household nutrition through increasing the household income. It is an accepted fact that in household with low average food availability, women and children are especially at risk. Thus, the most important social, economic and cultural dimensions which effect women’s provision of nutrition are women’s employment and women’s decision making power vis-à-vis the disposal of their income including marketing of food purchased or purchasing food in the market, on the one hand, and their ability to cook and serve adequate quantities of food to individual household members. It encompasses their nutritional knowledge and autonomy in “kitchen” decision making, on the other (Khetarpaul, N. and Grover, I, 2001). Increased income in the family of working women may improve the nutritional status of the family but it may also affect her health indeed if she is not nutritionally aware.

“A man may work from Sun to Sun but women’s work is never done”.

This old adage serves as the basis for account of the role of women as provider of nourishment and other caring to the family. Women are by nature more pliable and less ruthless. The society’s expectations from working women at the domestic front remains the same as those from a non-working woman. Therefore, even when the woman in the house has a job outside the house too, her first responsibility is considered to be towards her family while there is no concession for her in the office work for her being a woman. This change in the lifestyle of working women in urban India has brought about a change in their eating habits too. They are always on the rush that they don’t eat breakfast and nibble whatever they can at lunchtime. As a result majority of women are suffering from lot of nutritional deficiencies. Medical practitioners say that there is a high increase in mineral related problems, obesity, anemia, osteoporosis and chronic degenerative diseases like cardiovascular problems
and diabetes. Woman of different age group face health problems due to poor nutritional intake.

Women are vulnerable to malnutrition for social and biological reasons, throughout their life cycle. As children in some parts of the world, girls are discriminated against in access to health care to food and education and in other ways. As teenagers are prone to the risk of early pregnancy and suffer with more risk of retarded growth. Reproductive aged women are subject to numerous stresses affecting their health and well being. Elderly women in many societies are deprived too. Thus, it exists as an intergenerational cycle of growth failure for women. As such women are generally prone to malnutrition if proper means are not available to them i.e. adequate foot, money or knowledge about the selection of right kind of food.

It has been brought out through a number of surveys that the food consumption both quantitatively and qualitatively, is highly inadequate among a large segment of our society. While poverty is an important limiting factor. Ignorance regarding the right kind and the right amount of food coupled with non-availability of the required food items, however, play a significant role.

**Women's nutritional roles**

**Care of female children**

Gender differences in nutritional status in childhood initiate women's nutritional handicap and are also evidence of the problems experienced by women (mothers) in exercising their nutrition-related roles, especially childcare and feeding. Although children's nutrition status is clearly the outcome of a host of factors, starting with the nutritional status of pregnant women, gender differences are established during the breast-feeding and supplementation stages. Micro-studies have observed anthropometric differences in infancy that persist through children.
Girl infants are breast-fed less frequently, for shorter durations, and over shorter periods than are boys, a situation that may be exacerbated among the poor for social and economic reasons. A study in Tamil Nadu found that, while male children were breast-fed for five months longer than females on the average, male children in landed families were breast-fed almost ten months longer than female children in agricultural labour households. Weaned earlier, young girls may not receive the required quantities of supplementary food.

Discrimination against female children in the quality of food given was shown in cultures as diverse as those of Tamil Nadu and Punjab. Male children receive larger quantitative of cereals, fats, milk, and sugar than families. Higher calorie and protein intakes by males of all ages also were documented in Bangladesh. The difference in feeding girls is accompanied by lower levels of health care (discussed below), so that they are simultaneously exposed to higher rates of malnutrition and longer periods of more severe morbidity, ultimately resulting in their significantly higher mortality.

Women's roles as providers

Women affect the household’s nutrition by acquiring food through work, as well as by preparing it. Thus, their employment, income, and decision-making power vis-à-vis the disposal of their income on the one hand and their ability to cook and serve appropriate quantities of household members (based on nutritional knowledge and autonomy in “kitchen” making) on the other are important determinants of their nutrition-related roles. Therefore, the performance of these roles is related to women’s social and economic status.

Women’s social status

Women’s inadequate dietary intake and poor nutritional status are largely a result of the fact, established by anthropological observation, that women and girls eat
last and least, a reflection of the inferior social status they are accorded in Indian society throughout their lives. We can explore their social status through two important manifestations; marriage and childbearing patterns, and education levels.

**Early marriage and high fertility**

Marriage and childbearing affect women’s nutritional status directly, as well as indirectly through associated, socio-cultural norms and practices. They also affect women’s education and employment, which exert considerable influence on household nutrition. Indian women have one of the lowest mean ages of marriage in the world. 18.3 years, with lower average in rural areas and in some states (particularly in the north). These low ages are reflected in the proportion of girls married among younger age groups; almost 8 per cent of those 10-14 years old and 44 per cent of those 15-19 years old. Marriage is almost universal by the age of 24 years among women in most states of the country.

The nutrition status of women can be considerably influenced by attention during adolescence; with spin off benefits also to the children they bear later. Even children who are stunted and malnourished throughout childhood can experience catch-up growth if fed adequately during their adolescent growth spurt, and can achieve an adult size almost as great as children who were better nourished in their early years. For example, one African study demonstrated complete catch-up during adolescence of a cohort of girls who at 10 years of age were 20 cm shorter than a normally nourished cohort. Thus, midday-meal programmes for adolescent girls could have long lasting benefits.
Effects of Maternal Employment

Women’s Economic Status

That women’s nutritional status and health are related to their “economic status” is demonstrated both by macro or regional-level analyses as well as micro-(household) level data (Chatterjee, 1988b). The North-South dichotomy in nutritional levels and differentials discussed above suggests that where females have high economic “value”, they receive larger shares of food and health resources; where their economic value is lower, they remain at considerable disadvantage. Regional analyses of health indices other than nutritional status, such as mortality rates or sex ratios, further substantiate this relationship. Two particular aspects of women’s economic value have been related to health status – labour force participation and inheritance of property, including payment of dowry. Bardhan (1974) first hypothesized that greater demand for female labour in the rice-growing Southern region of the country supports higher female survival rates, compared with wheat cultivation in the North. Analysing sex ratios in different regions, Miller (1981) found a clear relationship between high labour force participation rates among 15-34 year old women and young girl’s survival. However, in some areas where female work participation was low, such as West Bengal, Assam, Orissa and Kerala, the sex ratios were not unfavourable to females, as “culture” protected females, despite economic backwardness.

Rosenzweig and Schultz (1982) provided further evidence of a relationship between women’s work and survival through a two-stage regression analysis of an all-India sample of rural household, first demonstrating a correlation between rainfall and female employment, and then a negative correlation between female employment and the male-female survival differential. Higher female employment in wetland cultivation decreased the difference in the survival rates of males and females.
Female employment was more significant than present wealth or parents’ educational status in explaining variations in sex-specific survival rates. Significantly, a rise in male employment exacerbated the difference between boys and girls survival in favour of boys.

Regional differences in female survival are also related to the payment of dowry, a practice which is more prevalent in the North than in the South, Miller (1981) noted that high dowry and marriage expenses were associated with adverse sex ratios. There is also an inverse correspondence between female work participation and dowry – the lower the former, the higher the latter. Thus, in areas where female work participation is low, a daughter’s value is considered to be below the cost to parents of her upbringing and marriage, including dowry payments (The value of domestic labour is not considered as it is perceived to accrue to marital and not to natal families). The low value attached to young girls underlies lower investment in their education in areas where female work participation and survival are low, marriage costs high, and early marriage and early childbearing the norms.

**Effects of Women’s Employment through Income**

There is some evidence that women’s employment has the potential to benefit household nutrition through increasing household income. Gulati (1978) found that daily nutritional adequacy in agricultural labour households in Kerala was related more to women’s employment than to men’s employment. She estimated that on days when both the male head of household and his wife were employed, their shortfalls in terms of calories were 11 and 20 per cent, respectively, while on days on which the women was unemployed, the shortfalls increased to 26 and 50 per cent. Kumar (1978) found a strong association between child nutrition and mother’s income in low-income households, but no significant association with father’s income. Female children were particularly dependent on their mother’s wages.
Women's Decision-Making Power

Women's employment may also exert influences on household nutritional status through increased women's "status", "power", "autonomy" or "decision-making ability". There is some evidence that women's earnings are spent preferentially on goods and services, which improve the health of children, implying an increase in women's decision-making power. For example, a study of women participants in Maharashtra's Employment Guarantee Scheme reported that the nutritional status of children was better when women received the cash or grain payments directly (ILO, 1979). Mencher and Sardamoni (1982) have also reported that where women exercised control over their wages, these were spent on food and other basic needs.

However, women's participation in wage work alone may not guarantee then greater decision-making power. Harriss (1986) found that men made market decisions relating to food in 60 per cent of households in three Tamilian villages she studied, and made joint decisions with their wives in another 15 per cent of cases, leaving women primarily responsible only in 25 per cent of households. In the majority of households women had some say in the "qualitative" issues (e.g. "choice of ingredients"), but did not have much say regarding quantities, regardless of whether or not they participated in wage work.

Other characteristics of Female Employment

Some characteristics of women's employment, such as seasonality, have important implications for household nutrition. For example, Palmer (1981) reported that pregnant/lactating women often lost weight during peak work (low food) seasons, and infants were summarily weaned at such times. As women's agricultural work tends to be seasonal because of its task specificity, households that are dependent on women's work for their nutritional adequacy would be especially vulnerable.
Seasonal variations in food availability often exaggerate differentials in food intake between men and women. When more food is available, it appears to be preferentially allocated to males, thus increasing the gap. However, in households with low average food availability, women and children are especially at risk during lean periods and may fall below the survival line, as the shortfalls in caloric intake would be exceedingly drastic. Even among slightly better off households, discrimination against females in the allocation of food renders them more susceptible to malnutrition. Thus availability of off-season employment and food-for-work schemes may mitigate these detrimental effects of agricultural seasonality on nutritional status to some extent.

**Adolescence**

The nutritional status of women can be considerably influenced by attention during adolescence, with ‘spin-off’ benefits also to be children they bear later. Even children who are stunted and malnourished throughout childhood can experience catch up growth if fed adequately during their adolescent growth spurt, and achieve an adult size almost as great as children who were better nourished in their early years. For example, one African study demonstrated complete catch up during adolescence of a cohort of girls who at 10 years of age were 20 cms shorter than a normally nourished cohort (Rohde, 1987). Thus, mid-day meal programmes for adolescent girls could have very long lasting benefits.

**Improving Female Literacy, Education and Health-related Knowledge**

The critical role of female literacy in improving women’s overall health and nutritional status should be well recognised. The coincidence of girls’ adolescence and dropping out from school signals the need for education systems to focus on keeping girls in schools. Thus may be done through the provision of special incentives, public education and offering alternative forms of education. It is
important to provide basic vocational skills, enhancing girl’s employability, and delaying marriage until they are physically prepared for child bearing.

While these are longer-term goals, in the short-term efforts to specifically improve women’s knowledge of health, nutrition and hygiene must be increased. The communication of basic nutrition information, based on a proper understanding of existing knowledge, attitudes and practices, and involving health workers, primary school teachers, women extension officers, and other frontline workers, reinforced by appropriate use of the mass media, can help empower women to successfully address malnutrition.

**Employment and Nutrition**

Such economic factors as participation in the labour force, inheritance of land and dowry payment have particular relevance to women’s health status and survival. Women’s employment increases household income, with consequent benefit to household nutrition. Employment may increase women’s status and power, and may bolster her preference to spend her earnings on the health and nutrition of her children, but does not always guarantee her decision-making ability when contested by the husband. Agricultural work is affected by season, and women often lose weight during peak work (low food) seasons. Seasonal variations in food availability exacerbate food differentials between males and females. Off-season employment and food for work schemes could remedy this problem. Although female labour participation contributes to the dietary intake of children, the gain may be offset by diminished breastfeeding and childcare due to the absence of the mother; trade-offs between the domestic and productive role are inevitable. Facilities such as mobile crèches and day care centres are scare in poor communities.

There is a dearth of information available on the interaction of female occupation and child nutrition, this needs to be addressed as it is relevant to women’s
employment options, wage scales and support services. In addition, domestic constraints and drudgeries need to be measured and appropriate technologies directed to minimize the effort of fuel and water collection.

**Health Status and Nutrition**

Women’s knowledge of nutrition and access to health care services has a crucial bearing on their own health and that of their children; infant mortality is lowest where access is easiest. Access means both physical availability of services (convenient times, suitable personal and medicines, trained birth attendants) and a cultural environment which allows women to use health services for themselves, in distinction to, or together with, their children. In both India and Pakistan a preponderance of males receive hospital treatment, while women end to rely on traditional remedies. This tallies with social devaluation of women and women’s deliberate self-neglect associated with her lesser status. Health services must be consumer-friendly in order to encourage women to use them. In this regard, health education is best delivered to women by women from a similar socio-economic background. “Womanpower” requirements need to be met by training female health workers (Pakistan has recently substituted 50 % females for males in a proposed community health workers (CHW) scheme covering 50,000 villages due to pressure from UNICEF and other donors).