CHAPTER 1

INTRODUCTION

Being a healthy adult depends on being a healthy adolescent. Adolescence is a distinct phase of development in the life cycle of an individual. Unique changes occur during this period and many adult patterns are established at the same time. Rapid growth of new tissues and other developmental changes are accompanied by increased nutritional requirements so that it may provide final opportunity to implement certain activities design to prevent adult health problems. The body gets essential nutrients from the consumed food and enhances the growth and development. So there is a deep relationship between the kind and amount of food intake and physical growth. Besides the kind and amount, the quality of food plays vital role in the physical and mental well being of an individual.

Normally, nutrient requirement of an individual is influenced by the age, sex, physical activities, physiological status and environmental factors. Besides this, numbers of other factors also affect the acceptability and utility of food, which are: habit, availability, familiarity, taste, cultural practices and knowledge about health and nutrition (Nutrition, 1996 / 97). Beside this, the quality and quantity of food consumed is also a matter of concern. But, food consumption of an individual largely depends on the socio economic condition of the family. However, it is always not true assumption that the low economic group population consumes nutritionally very low quality food because numbers of nutrition related researches have shown that affluent family and rich people also have tendency to eat poor quality food (Ortega et. al 1998). So, it could be predictable that lack of awareness about nutritional value and wrong food choices especially with the influence of media; people are facing various nutritional deficiency syndromes not only in developing countries but also in developed countries also.

Though, significant of the proper nutrition implies at all age groups, the issue of proper nutrition varies at different age groups. In some stages of life the question of proper nutrition arises very prominently especially for vulnerable group such as .infant, young children and adolescents. Expectant and nursing mother also fall in the same category. Infant, young children and adolescents need more nutrients because of their rapid physical growth and expectant and nursing mother need more nutrients for growth of the unborn child and growing infant. These groups are so susceptible that they easily

affected by under nutrition / malnutrition if their food lacks certain nutrients even for short period of time. Here, the study is focused on adolescence's nutrition so emphasis has also been given to the said area.

Adolescence is an important phase where a person prepares to enter into adulthood. Adolescence is a word, which comes from the Latin word "**adolescere"** that means **'to grow**' or '**to grow to maturity'.** Webster's New Collegiate Dictionary, USA (n.d.) has defined adolescence as – **the state or the process of growing up from childhood to manhood or womanhood: youth, or the period of life between puberty and maturity.** Similarly, Oxford Advanced Learner's Dictionary (1998) explains adolescence as **- The time in a person's life when he or she develops from a child into an adult.** WHO (1997) has defined adolescence as the period of life spanning the ages between 10 and 19 years. Youth is defined as the age between 15 and 24. Similarly, the population between 10 and 24 years of age are referred as young people.

Adolescent group is considered as a more vulnerable group. The major reason for this vulnerability is their long but faster growth phase. After 1st year of human life, adolescence is second important decade, which is characterized by rapid growth and development both physically and psychologically. So, it is a phase of life rather than a particular age. Approximately, 11-18 percent of adult height, 50 percent of adult body weight and 45 percent of adult skeletal mass is gained during this period (WHO, 1997). Weight and height velocity are greater than between 5 – 10 years ages. Growth occurs not only in the skeleton and the muscle but in almost every system and organ of the body. So it is a high time of accelerated growth. But at the same time, this growth demands more nutrition to the body. For example- bodily demand of calcium increases by 50 percent to support the growth of stature. Likewise, in addition to the increased iron needs of the expanding red cell mass and myoglobin in newly gained muscle tissue, adolescent girls have a further iron requirement up to 15 percent to compensate for menstrual blood losses (Helen Keller International, 1999). So happening of so many crucial changes and development, adolescence period is taken as a very critical nutritionally.

This period of life is also crucial because the girls' body need to prepare for nutritional demands of menstruation cycle, pregnancy, lactation, and heavy workloads that girls are going to experience. At the same time nutrients store is needed to increases also to support her total reproductive health system. Because of the happening of all these crucial physical growth and development, this period is taken as a very critical from nutrition point of view. The only thing which supports all these activities of the

adolescents is not other than correct quality and quantity of foods. In the absence of proper food all these functions could be hampered and the consequences are seen in the form of acute malnutrition and other health conditions.

Another very important part is – the catch-up of incomplete childhood growth in the period of adolescence. If adolescents get proper nutrients during adolescence they might catch-up the growth which they failed to gain in childhood. Study results, which were carried out on undernourished children from poor families who were adopted by age five, into middle class families had showed positive results about catch-up growth. Those adoptees did catch-up lost growth to some extent (Lindsay and Gillespie, 2001). So, even a person had poor nutritional status during his or her childhood and has low height and weight, it can be recovered if provided good quality and quantity of food during this age bracket. That's why this phase of life is very important and also a high time to correct the physical growth which can have marked influence on the quality of their life.

The adolescent period is also characterized by the onset of puberty, which is the final growth of childhood. This growth is normally accelerates by hormones. But abundant amount of good quality nutrients are needed to produce and channelize hormone and its activities. So, this period demands heavy calorie and protein as well as vitamin, calcium, iron, zinc and other nutrients in sufficient amount so that they grow timely with their optimum.

Adolescent girl requires proper nutrition because it is important not only for improving the quality of her own life but for the future generations also. It has proven by various studies and researches that the well being of children depends largely upon the health of their mother. Generally, the health and nutritional status of a girl is largely affected by the cycle like: conception, pregnancy, birth, infancy, childhood, early adolescence, womanhood, marriage and again conception. It is the girl that carries, gives birth and nourishes her baby also. So if the mother is undernourished and could not receive required nutrients, her child might be undernourished and falls under cycle of under nutrition if he or she could succeed to survive.

Accelerating of such a life cycle is determined by the nutritional status of the girls when they are 10 - 19 years age bracket. Here, one thing is very noticeable that individual differences in the timing and intensity of the growth spurt and change in body composition have important implications for the nutritional need of the adolescents. For example - at the peak of the growth spurt, nutrient needs are greater than during early or late adolescence. Similarly, it is also important that physiological growth or age of maturation is a better indicator of adolescence nutritional needs than chronological age.

So it is necessary to think of better nutrition for whole adolescent phase rather than particular age.

Hence, the adolescents' nutritional and health status is a crucial one and its impact can be seen generation to generation, but were less recognized or emphasized. There is direct linkage between nutrition and adolescent's health. This group deprived not only from food security but from their basic rights to health, education, development and independence. So, majority of adolescent girls caught in the vicious circle of malnutrition. Health and nutrition needs of adolescent girls are mostly ignored in all societies thinking they are enough grown to take care themselves. Traditionally, the main health indicator used by health planners is mortality rates. So, records say that adolescents have the lowest mortality among the different age groups. This is the reason that this phase of life normally indicated as healthy phase and therefore they received low priority. That's why health and nutrition of adolescent girls are mostly ignored. It is only late 80's; the world community formally recognized the seriousness of the young people's health and its impact on the health and development of future generations. In May 1989, the World Health Assembly passed a special resolution to highlight these issues. Besides various other things this resolution has urged its' member states to give priority to the **health and need of the adolescents**. After this, the **International Conference on Population and Development (ICPD) Cairo 1994** also gave more emphasis on the **"special need of adolescents and youth"**. Again the Fourth International Conference on Women (ICW) in Beijing 1995, resolved to protect and promote the adolescent's right to sexual and reproductive health information and services.

Talking about youth, today, 20 percent of the word populations - nearly one-fifth of the world's population (more than 1.03 billion youths) are living in this world. Statistics tells that 85 percent of the world's young people live in the developing region. It has been estimated that over the 50 –year period between 1975 and 2025 the number of urban youth will increase by 600 percent (Robert, 2004). Among these nearly 60 percent of the world's youth live in Asia only. Data also revealed that about 85 percent of economically active youth are in developing countries (FAO, 1999).

The nutritional situation of the world is not so enthusiastic. When looking at the nutritional scenario of developed and developing countries, both have different types of nutritional problem related to adolescents. Developed countries have different dimension of nutritional problem with obesity, high cholesterol problem, early pregnancy, eating disorder, dieting, lack of physical activities and drug abuse (alcohol and other drugs). A

study done among American adolescent showed that the prevalence of shortness tended to be around 5-14 percent among Mexican American children aged 2-17 but the thinness is less than 5 percent. The same study showed that the prevalence of over weight ranges from 7 – 18 percent among the same sample group (Harrison, Fleming, Briggs and Rossiter, 1985). But, in the contrary, developing countries have chronically widespread prevalence of malnutrition especially under nutrition, micronutrient deficiencies, early marriage, reproductive health problems, ignorance, STI/HIV AIDS and low access and availability of health care facilities. The majority of Asian, especially the South Asian girls is chronically ill as a result of under and malnutrition. About 60 percent of the South Asian adolescents are underweight and stunted by inadequate diet during their own childhood (UNFPA, 1998). In Bangladesh, 78 percent girls are chronically undernourished, as measured by body mass index (BMI). Maternal mortality is also very high - ranges from 450- 600 in Bangladesh (ICDDR, 2006). Similarly the average height and weight of the Indian girls were below NCHS standards by 10 – 14 kilograms (Oxford University Press 2000). Maternal mortality rate is also very high in these regions. In Pakistan, nearly 15 percent of pregnant women develop life-threatening complications during pregnancy and 1 in every 38 women die of pregnancy related causes..

Furthermore, early marriage is very much a common traditional and religious practice among the Asian societies. Physiologically, it has been proved that pregnancy is a serious health risk for those who are less than 19 years of age because they are physically not mature enough to go in reproductive cycle. They are still under growing phase. If they go for reproductive activities in this tender age than it increases maternal mortality, malnutrition, birth complications, still birth, low birth weight baby, low survival rate of baby and increases the morbidity rate of both mother and child. According to Human Development Report (UNDP, 2004), about 60 percent girls were married by the age of 19 in South Asia including Nepal and 40 percent among them give birth to at least one child during this age bracket.

Economic condition of the country can have direct impact on the health and wellbeing of its population. Despite many efforts and larger concentration, some 1.2 billion people still remain in absolute poverty (less than $1/ day) and do not get enough to eat (Human Development Report, 2001). About 90 percent of the developing world's poor now live in Asia and Sub Saharan Africa. In Asia only, about 800 million people are living in poverty and have very poor access of food. Two third of these Asian poor- predominantly rural poor, live in South Asia, who have no means to buy the food they need (despite its ready availability) and over half of its population are malnourished. In

this alarming situation of poverty a sole development of normal physical and mental status of a human being is very difficult (ebid).

In the context of Nepal, it has characteristics of very young population structure. Approximately, 45 percent of the population is under the age of 15 and an additional 19 percent is between the age of 15 and 25 (Thapa, et.al, 2001). According to the national census 2001, adolescents comprise 24 percent of the total population. Country is lacking sufficient human and capital infrastructure to provide the basic needs of its people. So the people are being sufferer generations to generation. The situation became even worst by the decade long internal conflict and most effected one is the adolescent girls. This conflict and disproportionate share of burden of the poverty and malfunction of the system rests on the shoulder of the women. This situation undermines their health and nutritional status totally. So**,** in spite of considerable improvements over the last two decades, the health status of the children, adolescents and women in Nepal remains very low even among South Asian context.

Nepal has some of the poor health indicators among South Asia Region. Nepal's population of 23.1 million people is growing at the rate of 2.2 percent (2001 census) which is expected to be double in 25 years. Average annual per capita household income of around $386 in 2007 (Travel Document System, Nepal Asia, http://www.traveldocs.com/np/economy.htm), and over 85 percent of the population works as subsistence farmers in rural areas, which is not able to sustain a large population. Poverty is characteristics of Nepal. It also has one of the highest maternal and infant mortality rates in Asia. Most available indicators paint a bleak picture of Nepalese health. The current country report (Ministry of Health and Population, New ERA and Macro International, 2007) indicated that infant mortality rate (IMR), under-5 child mortality rates (U5MR), and maternal mortality rate (MMR) are among the highest in the South Asian region with 48 / 1000 live births, 61 / 1,000 live births and 281 / 100,000 live births respectively. Life expectancy at birth is among the lowest in the region that is 62.2 years (of both sexes) (CBS 2004). The use of contraceptive among currently marriage women is 44 percent and unmet need is 28 percent, similarly the fertility rate decreased from 4.1 per woman (Ministry of Health, New ERA and ORC Macro, 2002) to 3.1 (Ministry of Health and population, New ERA and Macro International, 2007) during last five years period.. Most women lack access to basic maternity care. Only 44 percent of women receive antenatal care during pregnancy and just about 18 percent births is attended by skilled birth attaindents (doctor/nurse/ANM) (Ministry of Health and population, New ERA and Macro International, 2007). UNICEF, 1996 had reported that 48 percent of lactating mothers have calorie intake of less than 70

percent of the recommended level and more than one-third of all babies in Nepal are born with low weight i.e. less than 2500 grams. One in four women of the age 15-19 years, are already pregnant and 40 percent give birth at least one child during this age bracket (Ministry of Health et, al, 2002).

The health / nutritional status of the adolescent girls/ women are very discouraging in Nepal. More than 50 percent of women are chronically ill as a result of under nutrition and malnutrition, lack of adequate health care and frequent childbearing. About 60 percent of women in their childbearing years in Nepal are under-weight and stunted by inadequate nutrition during their own childhood (UNICEF, 1998). Eight out of ten women are anemic during pregnancy, and many suffer from chronic energy deficit (UNICEF, 1996). The prevailing of thinness among adolescents (BMI[1] less than 18.5) is 25 percent and the stunting is 51 percent which shows the seriousness of the under nutrition or malnutrition problem in Nepal. Likewise, deficiencies of vitamin A, iron, iodine and zinc are widespread in the region. Prevalence of Vitamin A deficiency (bitot's spots) is 2 percent, iodine 40 percent, and iron deficiency 65 -78 percent for women (Ministry of Health et.al.,1998). Initially, a micro level study of RIDA (1991) had already stated the seriousness of the problem and reported that stunted growth is more prevalent among girls as compared to boys (42 vs. 38 percent). Estimated numbers of adult infected with HIV/AIDS are 25,000. One third of these are women and among them 32 percent are adolescents (Ministry of health, WHO and UMN, 2001). As other countries of South Asia, widespread evidence of inequitable feeding and care practices for boys and girls still exist in Nepal. This discrimination is practiced from the very beginning of life - infancy to adulthood and results in chronic under-nutrition in girls and women. For instance, boys consume more fleshy foods, poultry, milk and milk products than girls and boys receive about 10 percent more energy providing foods than girls. In some communities of Nepal girl children and women are used to take their meal after boys and men and become satisfy with whatever the food is remaining in the pots. This type of practice put girls always in nutritionally vulnerable condition. They become habituate of this practice and due to ignorance transfer the same mentality to their generations also.

This is the short glimpse of the situation of adolescents. Despite of these entire information researcher felt absence of precise and complete information about the ***nutritional status of adolescent girls*.** Without this information any health planner and policy maker could not give clear vision and program to make this young population very healthy and competent citizen of the nation. Till date, very few researches are

[1] BMI = body weight (kg) / height $(m)^2$

available about nutritional status of the adolescents which are done by Government and I/NGOs. These researches are mainly focused in reproductive and sexual health, knowledge and awareness but rarely spoke about nutritional status. So information about nutritional status of this particular group is extremely non significant. Even Millennium Development Goals (MDGs) of Nepal did not speak a single word about this important group. Viewing these situation and to fulfill the gap of information about nutritional status of adolescents, researcher felt a need to study the nutritional status of the adolescents girls age 12 – 19. This study could be important to know the nutritional status of the rural adolescents of Kathmandu so that it might contribute for the policy formulation and implication also. Keeping in mind the whole scenario, following principal objective followed by various specific objectives were set for the study.

1.1 Objectives of the study

The primary objective of the study is **'to examine the nutritional status of adolescent girls and identify the determining factors".**

Specific Objectives:

1. Collect information on determining factors of nutritional status (Social factors, exposure to developmental programs and media exposure)
2. To analyze the determinants of nutritional status
3. To carry out the anthropometric measurements of adolescent girls and calculate BMI.
4. To find out the relationship between nutritional status and the determinants

1.2 Justification of the study

Nearly one fourth population of Nepal is covered by adolescents of age 10 – 19, but has typically been considered as a low risk group for poor health, and often receives few healthcare resources and negligible attention. However, this approach ignores the fact that many health problems later in life can be improved or avoided by adopting healthy life style habits in adolescents.

Adolescence is a unique intervention point in the life cycle. It offers a chance to acquire knowledge about optimal nutrition during young adulthood that could prevent or delay adult-onset diet-related illnesses later on. It is a stage of receptivity to new ideas and a point at which lifestyle choices may determine an individual's life course.

There is evidence from research in countries as diverse as Peru and India that this population can be highly amenable to public health information as it relates to their own well-being (The World Bank, 2003). Adolescents can be motivated to adopt nutrition behaviors that improve their looks, school achievement and outdoor performance. Potentially, behavior change messages perceived by adolescents will contribute to more sustained health and nutrition impacts within a population as the cohort of adolescent's moves through its adult years. Undernutrition (being too thin or too short, frequently caused by chronic energy deficiency) in adolescents frequently goes unrecognized by young people or their families. Many reproductive health problems also originated during this phase may have life-long consequence if not handled with care. Besides the general health problem that originates as the result of fetal malnutrition and physical changes during this stage, it can have following consequences if they are not guided and helped properly:

- Affects their ability to learn and work at maximum productivity
- Increases the risk of poor obstetric outcomes for teen mothers
- Make vulnerable the healthy development of future children

Adolescents often encounter problems which include lack of awareness and knowledge about physical and mental growth and development and nutritional demand created by these growth, sexual and reproductive health, early marriage, early and frequent child bearing, unsafe abortion, STI/HIV AIDS and substance abuse. There is a mass ignorance among adolescents about all these things in Nepal. The young people of today are tomorrow's potential adult. The nation's fate lies on the strength and aspiration of its youth. They are creative, energetic and can accept new information/ values very fast. They not only take risk but also can be a potential change agent. So, maximum utilization of this strength urge the need of defining issues and problem related to them by which the policy, plan and intervention may effect and can reach the sizable number of these populations.

Women of adolescent age have certain high nutritional needs above those of adult males. One reason is that the rapid growth of the body mass and skeleton takes place and another is loss of blood during menstruation leads to a regular loss of iron and other nutrients and makes women more prone to anemia. In addition, women work much harder in our country. In rural areas, they are heavily involved in agriculture and in urban areas they may work-long hours in household as well as out side house jobs. The heavy burden of collecting fuels, transporting manure, work in agriculture field and water carrying are major responsibility of women. Nepal Human development Report 2004 has stated that average working hour of Nepali women is 16 hour /day which is much higher

than global average (UNDP, 2004). Another important thing, as a general practice, early marriage is widely accepted culture in our society. So engage in sexual activities and reproductive cycle from very early age is a normal phenomenon in the society. But this is very hazardous to the health of the girls. Addition to this, child bearing in an adolescent period is another highly risk activities that effects both mother and child immensely. Various national and pocket researches also showed that high maternal mortality, LBW baby, Still birth, complication during pregnancy and delivery, high neonatal death are common phenomena among adolescent mothers with poor nutritional status.

With above mentioned realities and statements, it is quite clear that adolescence age is the most vulnerable but potential age for direct intervention to improve their nutritional situation so that they could be very healthy and capable citizen as well as can give a healthy generation for the prosperity of nation. Data on the nutritional status of the adolescents is of vital important to the nation not only to improve the quality of their lives but also to plan methods for providing valuable insights into issue that are likely to have a profound bearing on the future generation. Till date very little information are available in Nepal about the nutritional status of adolescents but no such specific study on adolescent girls has been undertaken until now. So, beside immense interest in nutrition, researcher decided to conduct this study to narrowing the information gap about nutritional status of this age group. Data available from such study can help to give not only the information about current nutritional status of adolescents but also to identify factors that can influence the nutritional behaviors of the girls so that proper corrective measures may be recommended and applied. Researcher also hopes that this study may open various areas of researches about this particular age group for future as well.

1.3 Hypothesis

There is ***a strong relationship between nutritional status (dependent variable) and social and other determinants (independent variables).***

Dependent Variables

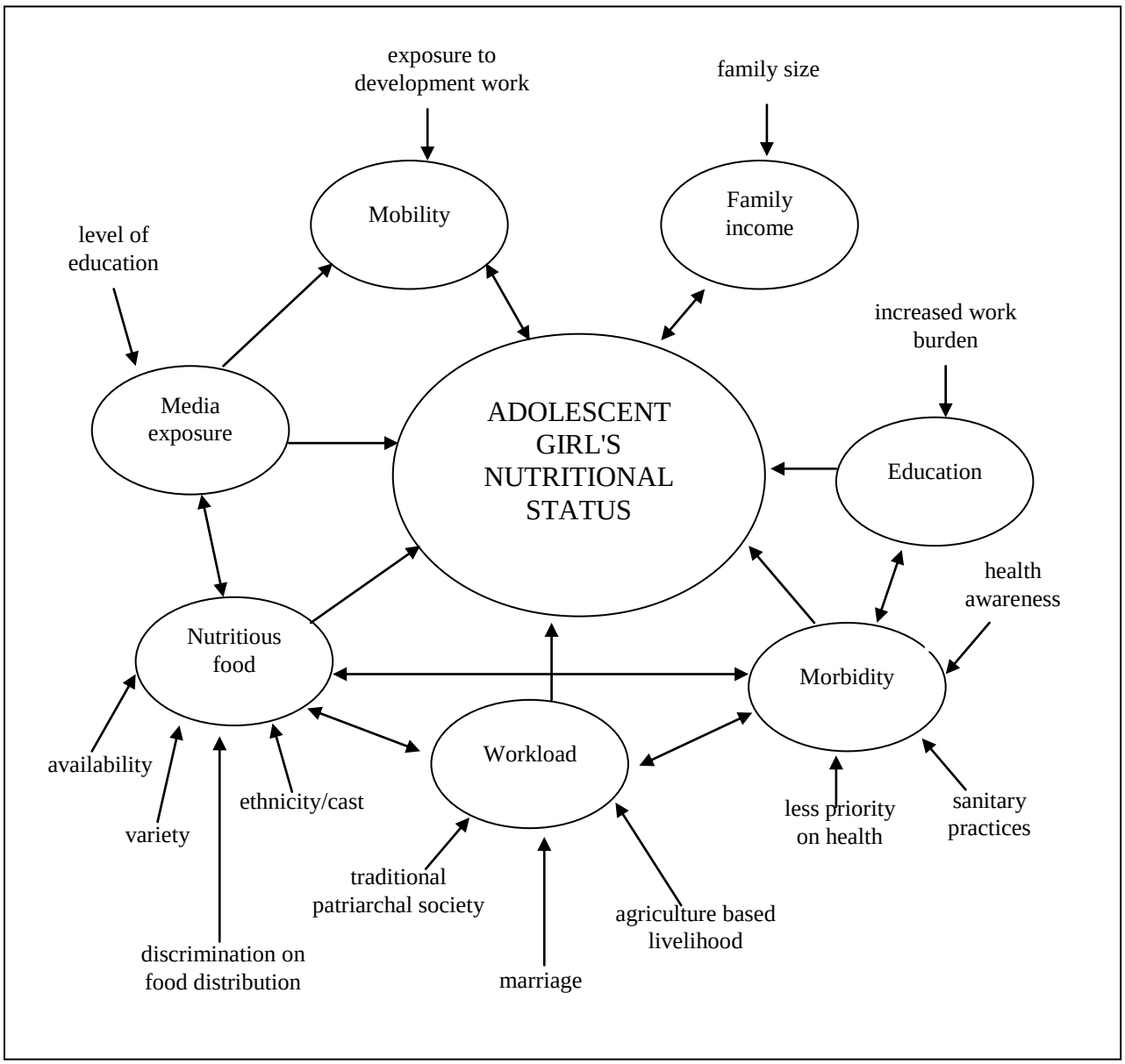
Dependent variable is the **Nutritional status** of the adolescent girls.

Independent Variables

In order to test mentioned hypotheses following independent variables were identified for this study - social determinants**:** caste, education, family size, food distribution pattern, menstruation status, morbidity pattern, marital status, meal, and other factors**:** working hour, training and media exposure.

Figure 1.1

Determinants of adolescent girls' nutritional status: a conceptual framework



CHAPTER 2
REVIEW OF LITERATURE

2.1 Nutritional Status of the Adolescents in International Scenario

In today's world adolescents comprise 20 percent of the world's population, with more than 85 percent residing in the developing countries. Over the 50-years period (during 1970 to 2025), it is estimated that the number of urban youth will increase 600 percent (Population Reference Bureau, Washington D.C, 2002). As the absolute number of youth changes, so too, the distribution of youth globally will continue to flow toward developing countries especially toward sub- Saharan Africa and Asia. Over the past 20 years, dramatic social, political and economic shifts, together with medical and public health interventions have radically altered the landscape of the adolescent health around the world. Though, the World Health Organization's seven Global Nutrition data banks have been set up to monitor worldwide malnutrition, these data provides lot information about children under five but does not focus on the nutritional status of today's adolescents (WHO, 1999). However, it notes that **malnutrition including undernutrition kills, maims, retards, cripples, blinds and impairs human development on a truly massive scale worldwide**.

Here, researcher tried to review the worldwide trend of adolescents' nutritional status but the main limitation describing international scenario of adolescent nutrition bases in the literature was that the literature available are very very limited (from both - language and access point of view) and those, which are available, did not reflect a world wide reality. It reflects only the work of those studies that have been successful in getting their result published and written in English language. In this case, these reflect only very narrow information about adolescent nutritional status. Another very striking reality is, there are number of studies done in sexual health, behavior and sexuality of adolescents but hard to find about the study on nutritional status or dietary pattern. With all these limitations, tried had been done to provide some short but overall picturesque of nutritional status and trends of adolescents.

North America

Canada – Normally countries of America and Europe is facing huge public health problem of obesity due to malpractice of food, wide availability of industrial ready to eat food and lowering physical activities. So these countries malnutrition problems are

different in nature. Almost all research of these areas shows vast problem of obesity and associated problems. A study of 2108 children of age 9 – 12 years done in the city of Montreal, who were living in multiethnic, low income, inner - city neighborhoods showed the high prevalence of overweight among girls (33 percent). Similarly, a study done among youth ages 5 – 19 years in Northern Ontario estimated obesity at 29 percent (Katzmarzyk and Malina 1998). This study also concluded that the fat distribution is more centralized among these youth than of European youth, a condition that places them at high risk for developing cardiovascular disease. Study of 1936 British (London) and 832 Canadian (Ottawa) school girls reflected that overweight students were more likely to smoke in an effort to curb weight gain than those who were not overweight. Here, the researchers suggested that teenage females need prevention programs that attend to smoking. A study was done on Toronto street youth of downtown area focusing food scarcity and under nutrition. During 30 days of research, almost half reported experiencing of hunger or food deprivation and were particularly vulnerable. The researchers referred that while study population were small in number, the national well being of street youth requires intervention (Antoniades and Tarasuk 1998)

United States – Various report published from United States and much quoted Navajo study of youth has placed the prevalence of overweight among US youths (6- !7 years) between 11 to 24 percent with the percentage of overweight youngsters increasing with age. This is very serious public health problem for the nation. Girls became more prone to obesity at earlier age than do boys, primarily from lowering their activities levels. Much of these weight gains are directly related with the inactivity and with viewing television. Second but very important predictive factors for obesity in this age group is the increases consumption of fast food and high calorie drinks, especially soda and juice drinks (Christoffel and Ariza, 1998). Despite the fact that US adolescents have increased their calorie intake over the past several decades, they remain at high risk for nutritional deficiencies. High calorie, limited diets put many adolescent at risk for sexual maturation, loss of final adult height, osteoporosis, hyperlipidemia and obesity. The major national concern is the increased risk of the typical adolescent diet for the development of cardiovascular and other diet – related diseases. For example, a nationwide study of post mortem examination of 212 adolescents who died between the age 15 and 19 years showed that all of them had right coronary arteries with lesions that would lead to atherosclerosis. Another nationally representative study showed that the increased risk of cardiovascular disease among children and young adults of age 6 – 24, were primarily related to nutrition. much of this nutrition risk is explained by the fact that for an American adolescent, more than one-third of all the calorie consumed are from fat (mostly saturated) and one-fourth of vegetables consumed are French fried

potatoes. One third of daily nutrient intake is from eating snacks between meals, usually junk food such as potato chips and cheeseburgers (Schneider, 2000).

In a comprehensive study of 36,284 adolescents of Minnesota revealed the fact that 28 percent had inadequate fruit intake, 38 percent had inadequate vegetable intake and nearly forty percent had both inadequate fruit and vegetable consumption. Native Americans had the lowest consumption of fresh fruits. Such dietary inadequacies suggest increased risk for cancer, diabetes, obesity and other chronic diseases later. Especially Native Americans youths are at increased risk of cardiovascular disease and non- insulin – dependent diabetes. US adolescents have increased their caloric intake (one third of all calorie consumed are from fat) over the past several decades so they remain at high risk for nutritional deficiencies (Ballew et.al. 1997).

Similarly, United State is facing increasing problem of adolescent pregnancy. Alan Guttmacher Institute (1999) reported that of all births in United State, 12 percent were by adolescents – 4 percent to those under aged 18 and 8 percent to 18 – 19 year olds. The increment of adolescent pregnancy was mainly due to the growing proportion of sexually experienced adolescents and the growing proportion of Hispanic teenage births. In figure, this was shown as- the birthrate for teenagers aged 15 to 17 years increased by 27 percent between 1986 and 1991, to 38.7 per 1000 and the rate for older teenagers aged 18-19 years increased to 94.4 percent per 1000 adolescents.

The same Institute observed during their research that teenagers also had short intervals between their first and second birth, especially compared with older mothers. About 20 percent of adolescents who become mothers at age 15 to 17 years and 25 percent of those who are 18 to 19 years old when they first gave birth have a second child within two years. Closely spaced births among adolescent mothers contribute to deficits in education and employment and increased welfare dependency. In addition, studies had shown higher rates of low birth weight, mortality and morbidity in second compared with first pregnancies of adolescents.

The severity of problem is also justified by the study of Story, Newmark, Sheerwood, Stang, Murray (1999) who revealed that almost one million adolescents in the United State under 19 years of age, or one out of every 10 teenagers, become pregnant annually. About half of these pregnancies (51 percent) end in birth, 35 percent in abortion and 14 percent in miscarriage. The researchers had also stated that the pregnancy rate among teenage women has increased in United State. Between 1972 and 1990 the rate of pregnancy among teenage was 23 percent but now at its highest level in nearly 20 years (117/1000). It is important to note that adolescent pregnancy and childbearing rates are

considerably higher in the United State than any other Developed Nations. Stating the major reason for growing tendency of adolescence pregnancy they mentioned that, in most industrialized countries there is greater openness of the sexual relationship, the media provide positive reinforcements for using contraceptives and reproductive health care is better integrated into general health services, which make contraceptives more accessible to teenagers.

South America

Brazil - Two population based cross- sectional study, one in 1974 on 27,960 youth and in 1989, 5969 youth were examined and found that under nutrition had been declined among subjects of all economic groups but at the same time obesity occurred in all age groups. The obesity prevalence among girls was 21 percent. The study also showed the prevalence of stunting was common on both sexes.

Chile - Chile has undergone a demographic and epidemiologic transition so that the major nutritional health problems are now non – communicable chronic diseases, especially those related to nutrition. Twelve percent of the school children were estimated to be obese nationwide in 1998. Factor contributing to this high prevalence of malnutrition was due to inadequate diet consumption with increased amount of fats and refined foods (Albala, Vio and Kain, 1998). Both short stature and overweight were more prevalent among those of low socioeconomic status. Researcher had noted that this is possibly due to both lower physical activities and indigenous ancestors. Similarly, in a study of 4509 of elementary and high school student in Santiago, under nutrition was identified among 31 percent of males and 28 percent of females. The study also detected the trend of obesity decreases with age but undernutrition increases with age (Ivanovic, Olivers and Ivanovic, 2000). While over viewing the studies findings of the country, it showed 28 percent prevalence rate of obesity among female adolescents - the similar pattern of malnutrition as other countries of America.

Europe

During these decades many surveys about food and nutrient intake in adolescents have been undertaken throughout Europe but it has been agreed by various researcher that studied data have no meaningful use due to small or unrepresentative samples, poor methodology and failure to provide sufficient details about the subjects. The value of the surveys for assessing the nutritional adequacy of the diet and nutritional status of European adolescents was limited due to lack of measurements of nutritional status. Though this has been rectified in some more resent surveys, The comparison with sets of

country specific – Recommended Dietary Amount are of little value since the methods used to established many of these have been called into question (Janet et. al., 2004). Various countries of this region have their own pattern of eating. In the countries and □ □ or areas with sufficient GDP and income the food intake has most often been too abundant when considering the real needs of the growing organism, especially from the point of view of energy output. The composition of the diet is not adequate and contains too much protein, fats, sugar etc. This situation is similar to that in Western countries like USA. On the other hand, adolescents in Central and Eastern Europe consume too few vegetables, fruit and milk products in their diet (i.e. low intakes of Calcium, fiber and vitamin C), which is less apparent in Western countries. This is mainly due to bad eating habits and nutritional traditions in the families, but also due to the changes of the prices of the mentioned foodstuffs after political and economic changes in this part of the world (Pařízková, 2000).

Some important picture of adolescent nutritional status around Europe -

Britain – English and Scottish school children representing fifteen birth cohorts from the period 1972 to 1980 were enrolled in a study to look for secular trends in weight, height and triceps skin fold thickness. Positive trends in weight were noted for both groups, that is, both groups were getting heavier. Scottish children remained shorter, lighter and thinner than English children, but were similar in weight-for-height. Here, the researchers concluded with realization that separate monitoring of ethnic groups is important for tracking the prevalence of childhood and adolescent obesity, as different ethnic stocks have differing body compositions (Chinn and Rona, 1997).

France – In a study, adolescents from the Paris suburbs (N=186) were interviewed about their nutritional habits. Findings revealed that 6 percent adolescents tend to escape breakfast, 58 percent ate three meals, and 14 percent ate three meals and three snacks the previous day. Twenty-two percent of 12-14 years olds and 32 percent of 15 to 18 years olds ate lunch outside their home or school in the past week. Fast food was a strong attraction for many. The authors had a view that while their study is not representative, more work or research should be done on the food habits of adolescents (Chauliac and Beco 2000).

Similarly, a nationwide study with representative sample to examine nutrition among the French population showed that those families with monthly incomes of less than 4000 francs often visit fast-food restaurants. Lower-income people eat alone more often, spend less time over the evening meal, and often have only a single dish served for that meal. Lower income people are less likely to have a balanced breakfast, are more likely to shop

in large supermarkets, eat less fruit and vegetables, and consume less pork, fish and shellfish (Schneider, 2000). These findings have relevance for adolescents living in low income families, as their dietary patterns are more dependent upon what is available in the household.

Germany –In a study, the dietary intakes of 627 German children ages 1 to 18 years were assessed. During study it was found that macronutrient consumption patterns (proteins, fat, and carbohydrates) were in general accordance with German and neighboring country recommendations but they exceeded the recommendation for saturated fat and were significantly low for fiber intake. In other words, the diets of children and adolescents were not in accordance with the recommendations for the prevention of chronic diseases in later life (Kersting, Sichert-Hellert, Alexy, Manz and Scholch 1998). A study of dietary intake pattern shows that German 10 - 12 year old adolescent consume 42.7 percent energy from carbohydrate and seen decreasing trend of taking carbohydrate percent with the age increase (Janet et. el. 2004).

Ireland – Similar to Germany, Ireland is also facing the dietary habit problem among adolescents. In a study, secondary students ages 12-18 years (N=390) were examined for demographic and anthropometric measures and their dietary histories were also taken. The main sources of dietary intake were bread, meat and meat products, potatoes or chips, confectionery and preserves, with snacking being a common practice. Most snacks were high fat and high sugar in content. Overweight was present in one percent of boys and 3 percent of girls ages 12-15 years. The prevalence of overweight among 15-18 year olds was 6 percent for boys and 8 percent for girls. The increasing number of obesity among girls were due to decreasing tendency of physical activities of them that is justified by the study result which shows sports activities claimed by 80 percent of boys and 68 percent of girls. Although the rates of overweight were less than in many cultures, and the rates for sports activity were high, the authors issue a call for changes in dietary practices for this group in order to reduce the incidence of chronic disease later in life (Hurson and Corish 1997).

Italy – As other countries of Europe, Italy is not exception to the obesity and eating disorder problems. More than 12,000 school children (ages 3-18 years) in Milan were screened for obesity between 1986 and 1988. The mean prevalence of obesity was 13 percent, with the highest prevalence among 11-13 years of age (17.9 percent). More than half of all adolescents had already attempted to lose weight at the time of the study

(Caregaro, 2005)[2]. Though the habit or willingness of loosing weight invited various eating problems like anorexia nervosa among adolescents and caused clinical cases of undernutritions. Rapid growing trend of taking fast food among adolescents is a serious matter of concern and can cause various health damages in later life.

Netherlands – Similar to the other countries of this region, various surveys report the prevalence of obesity among school attending Dutch adolescents (15-16 years) between 8 and 10 percent. Reducing the prevalence of obesity may be difficult as food choices were shown to be based on family influences rather than those of peers (Feunekes, Graaf, Meyboom, Staveren, 1998). This means that reducing obesity must be the focus of the whole family. Nutritional interventions are unlikely to succeed if only focused on the adolescent.

Northern Ireland - A representative, population-based sample assessed 1015 adolescents ages 12 and 15 for dietary intake. Survey result shows that boys had larger median energy intakes, but there were no differences in the types or percentages of foods eaten by the both sex. Major energy sources were bread and cereals, cakes and biscuits, chips and crisps, dairy products, meat and meat products, and confectionery. Intakes of fruits and vegetables were low, as was fiber intake while the percentage of dietary fat was high, at 39 percent. The authors conclude that there should be a watchful concern about the diets of adolescents and the study justified the same (Strain et al., 1999).

Norway - A nationwide study with representative sample of 1564 students in secondary schools indicated that half of the sampled population consumed a diet with too much fat and two-thirds consumed a diet too high in sugar compared with national dietary recommendations. Though, unlike other countries of the Europe, Norwegian Girls had higher nutrient density and lower fat energy consumption compared with boys (Andersen, Sandstad, Bjorneboe and Drevon.1999).

Spain - Surveys of food, energy and nutrient intakes were done for 60 adolescents to compare the food habits of those who were overweight with those who were not. Findings shows that energy intakes for those who were obese and those who were normal weight were the same, however macronutrient intake imbalances were apparent. In the overweight or obese subjects, a greater proportion of energy was obtained from fats and a lower percentage from carbohydrates. Among obese female adolescents, 50 parent of energy intake was obtained from fats. The authors conclude that increasing

[2] *classroom presentation by Caregaror, Lorenza in **che msde perche I'ostertrico-ginecologo deve ocuparsi di nutizione" (Italian) at Padova Universit, Italy.*

obesity among adolescents was from a diet higher in fat and lower in carbohydrates, independent of energy intake (Ortega et al 1998).

Sweden - Persson, Samuelson and Sjolin (1999) done a follow-up study of children 4, 8 and 13 years (N=572) in 1980 and noted an increase in the prevalence of obesity among 13 year olds when compared to an original study done in 1930. The researchers claimed that a nutrition transition has occurred in Sweden over that half century, with problems of protein-energy malnutrition in the 1930 cohort being replaced with problems of dietary excess (). A later study had examined two cohorts of school children (14 and 17 years; 366 boys and 365 girls) to compare their dietary intakes with those of previous studies. The authors found no statistically significant differences between age cohorts or between genders. Overall, however, they found a decrease in dietary fat and an increase in carbohydrate intake. But, Bergstrom, Hernell and Persson (2000) has stated that this type of change in adolescents diets may signal a reproduction of diet-related diseases in Sweden in future

Middle East

Egypt - A sample of 154 young male workers (ages 8-18 years) were recruited from workshop in the Abou El-Dardar industrial area. Their nutritional status was examined using anthropometric, biochemical, and diet-nourished criteria. Result reflected that 45 percent of studied populations were malnourished. Among these population 16 percent were wasted, 23 percent were growth stunted, 3 percent were both wasted and growth stunted, and 3 percent were overweight. Similarly, study also gave the result of about 77 percent anemic cases and also revealed that food-borne parasites were present among 72 percent of the subjects (el-Sahn, 2000).

Oman - A cross-sectional survey of 683 schoolgirls in Oman examined their height, weight and age at menarche. According to the study, median height fell between the 25^{th} and 5^{th} percentiles of the North American (NCHS) reference standard. Mean age at menarche was 13.3 years. This result showed the wide prevalence of malnutrition among adolescents. The authors than conclude that Omani girls are shorter and lighter than girls of similar age in the United States and other Arabian Gulf countries -Bahrain and Kuwait (Musaiger, 1999).

Africa

Belonging to developing countries categories, this region is still facing various problems such as mass poverty, hunger, ignorance, conflict and food insecurity. There are many countries in the African continent that share similar pattern of eating habit and nutritional

status. But data reflecting the situation of adolescent's nutritional status is very rare. So only available and relevant information though tiny, were tried to review here.

Nigeria - A study of 142 adolescent students found that street food supplied more than 50 percent of their daily food intake. This is a concern as street food is high in fat and may signal a trend towards obesity and other various nutritional problems in among Nigerian adolescents (Oguntona and Kanye 1999).

Senegal - A sample of 465 school children and adolescents in rural Senegal yielded a prevalence of hypertension at 5 percent for children and 2 percent for adolescents, with rates higher in girls. The prevalence of obesity was 3 percent for children and 2 percent for adolescents. The researcher did not observe any correlation between hypertension and obesity in this group. This may be because Senegalese adolescents (ages 10-17) are still impacted by malnutrition with puberty delay by about 3 years, to age 16 (Simondon, Simon and Simondov, 1997).

South Africa – In a longitudinal study of 447 rural African school children (ages 7-19 years) were investigated about the prevalence of and gender differences in obesity during adolescence. Study showed that skin fold measures were significantly greater among females than males throughout the age range among study population.. Study showed the prevalence of obesity was greatest in girls following menarche (17 percent; mean age 14 years) and was almost absent in males. The authors conclude that increasing fatness and obesity appear to be a post-menarcheal phenomenon, probably caused by hormonal changes (Cameron and Getz, 1997). A comparison of South Africa Black, Colored, Indian and White students (age 17 years) showed that mean triceps skin fold values in the different ethnic groups were similar, despite the fact that high percentages of obesity occur among the non-White groups. The authors suggest that once the demands of pubertal growth have been met, obesity occurs among all formerly malnourished groups, possibly aggravated by school feeding schemes that adversely impact those who remain growth stunted (Schneider, 2000)

Nutritional researchers in Southern Africa (defines as South Africa and its neighbors Botswana, Lesotho, Mozambique, Namibia, Swaziland, Zambia and Zimbabwe) have noted that urban-dwellers are generally happy with the new lifestyles that have resulted from recent economic successes. African wish to eat, smoke and drink like the White populations in the Southern Africa, despite efforts to teach health in schools and encourage health promotion practices through the media. Urban Africans already exceed Whites in dental caries, female obesity and hypertension. As Africa continues to urbanize, physical activity were continue to decrease and diseases of dietary excess were

increase (Walker, 1995). These diseases are likely to impact today's adolescents, the next generation of workers, if tuberculosis and AIDS can be controlled.

Asia

Asia is a larger continent with wide variety on topography, climate, socio-culture and economy. It constitutes very developed county like Japan to least developed Bhutan and Nepal. Though variation in above mentioned criteria, it shares common ground on malnutrition, especially under nutrition, which is one of the major characteristics of this reason also. Here the adolescent population constitutes about 18 – 25 percent of the total population. Most of the countries male adolescents outnumber female adolescents and gender discrimination are a system or culture of this region.

China - The China Health and Nutrition Survey collected data on 2236 and 2018 adolescents (ages 10-18 years) in 1991 and 1993, respectively. That survey showed the prevalence of stunting had declined from 23 to 19 percent between surveys. It also estimated under nutrition at 12 percent among study population. Overweight emerged as a problem for high-income urban adolescents, though the prevalence was low – only 4 percent (Shneider, 2000). The author here concluded that Chinese adolescents have experienced an improvement in diet and nutritional status.

Taiwan (Republic of China)- With the high economic growth, this country now facing many nutritional problem. A island wide survey placed the prevalence of obesity between 4 and 17 percent for children ages 3-19 years. Obese children in Taiwan have a high prevalence of hypertension, hyperlipidemia and abnormal glucose metabolism. About 40 percent of obese children have pigmented striae prominently located on thighs, arms and abdomen, marks that are stigmatizing. Here, the authors call for culturally sensitive weight reduction programs for developing countries (Chen, 1997).

Korea - The population of Seoul and Pusan comprise about 50 percent of the total population of Korea, the result of rapid urbanization and the movement of youth to these cities since the 1960s. An extremely uneven distribution of wealth had created both under and over- nutrition problems. Due to these reasons, under-weight and obesity are reflected among adolescents, with anemia and growth stunting in the low income groups (He, Yoon, Kim and Park, 1999).

Indonesia - The nutritional status of 89 school-aged children (8-15 years) who work "on" or live "of" the streets of Jakarta were examined. Growth stunting was apparent for 52 percent of subjects; 7 percent were wasted. A comparison with children living in the

slums showed that the street children weighed more and were taller than these peers. The authors suggest this is because the financial resources of street children are higher than for those children who are completely dependent upon the income of their parents (Gross and Herman, 2000). Another researcher Sunarno and Untoro (2002) had done a food consumption survey among adolescent of Indonesia and found that the energy intake was in between 1104 – 1238 calorie which is far below the recommended allowance. During survey it was also identified that reason for low energy intake was associated with food habit of not having breakfast among adolescents and school age children due to workload of the parents and availability of street food near school. Another group of researchers – Akhtar, Karim, Choudhary and Rahaman, 1998 had stated that intra household distribution of food is another reason for girls not getting enough food in terms of both quality and quantity. Because, culturally, it is expected that girls should eat after all family members were served. 'Boy should get bigger share' is a system, still Indonesian family believes, so discrimination among girls and boys has seen direct impact on girls' health.

Thailand – This country gaining economic prosperity day by day. With this progress many nutritional problems are also aroused among the adolescents. Despite undernutriton in some area, the problem of over nutrition has also being in increasing trend. In 1991, a study was started to monitor secular trends in the weights of school children of ages 6-12 years. Two year follow-up of 1106 subjects showed the prevalence of obesity rose from 12 percent in 1991 to 16 percent in 1993. Over consumption of calories, especially fast food, snacks and soft drinks were common among adolescents especially girls and very less physical activities has made them more vulnerable to obesity. The authors conclude that the increasing obesity of school children in this transitional society is a public health concern (Mo-suwan, Junjana and Puetpaiboon 1999).

Australia - A study of the dietary habits of 13 year-olds (N=699) showed that 12 percent skipped breakfast, with females skipping at three times the rate of males. While skippers were more likely to be dissatisfied with their body weight, reasons given for skipping breakfast were lack of time and not being hungry in the morning, not dieting. The authors conclude that among Australian adolescents, skipping breakfast is a matter of choice, in contrast with North American findings that link skipping breakfast with poverty (Shaw, 1998).

This is a short glimpse of the general nutrition condition of the adolescents that is available in very limited literature in international arena. Viewing these conditions, one

can make a conclusion that nutritional problem are facing by adolescents of every countries but its nature and magnitude are different. Industrial countries (developed countries) are facing increased number of obesity or overnutrition and its associated problems. Whereas, developing countries like Africa, Middle East and Asia are still fighting with many many setback created by undernutirion and crippling millions of potential life with entra –generational cycle of malnutrition.

2.2 Nutritional status of adolescent girls in SAARC region

South Asia Association of Regional Cooperation (SAARC) comprises eight countries: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Srilanka. The adolescent population constitutes about 18 – 25 percent of the total population in these eight countries. Though these countries are characterized by various diversifications, the adolescents face similar type of health and nutritional problems. The magnitude of malnutrition problem and socio cultural and economic condition which have boost the condition even more worse are more or less similar. But, availability of research done in the field of adolescents' nutritional status is extremely low in these countries, especially in Bhutan, Maldives and Nepal. With the background of such scarcity, here, researcher had tried to review some available literature as far as possible to know the nutritional status of the adolescents in these regions in brief. Afghanistan is newly included country in SARCC community. The data about adolescent's nutritional status of this country is not available so prominently in the literatures till date. So researcher here could not mention the literature review of adolescents of Afghanistan.

Bangladesh

In Bangladesh, young people dominate the total population: 40 percent of the entire population is under the age of 24, while 23 percent are adolescents. It has 41 percent adult literacy rate, adolescents' fertility is 144 birth / 1000 women below age 20 and 60 percent of these adolescents receive no antenatal care[3]. Bangladesh is facing various nutrition related problems and of course, adolescents' problem is also a key issue.

Many pocket survey has address reproductive and sexual health related issue of the adolescents but very few has shown the reality of nutrition of this particular group. In this context a group of researchers Ahamed et. al, (1998) conducted a cross sectional survey to investigate the dietary pattern and nutritional status of adolescent girls attending school in Dhaka city. That study revealed the intake of nutrients by the girls was much below the Recommended Daily Allowances (RDA). During the study,

[3] Bangladesh Bureau of Education, Information and Statistics, 2001

research was also done on the daily diet pattern of the adolescents and found that animal sources supplied only 50 percent of dietary protein and leafy vegetables and fruits were the main source of carotene for those adolescents.

Similarly, the base line survey 2004, of *Bangladesh National Nutrition Program* examined nutritional status, knowledge and practices among 5,106 never married adolescent girls (aged 13-19) living in rural Bangladesh from 708 clusters in 113 *upazilas* (about one quarter of the sub-districts of Bangladesh). According to the survey result, 69 percent adolescents had completed grade 6 or above, but only 6 percent had passed grade 10. The survey found that the adolescents of Bangladesh were of poor nutritional status where 9 percent were severely thin and 16 percent were moderately thin. More than half did not know the names of energy-dense and protein-rich foods but most of them (65 percent) reported understanding of the need to take extra nutrients during adolescence to attain potential growth (ICDDR, B, 2006)[4].

Another cross-sectional study was conducted in four villages of Rupganj Thana of Narayanganj district in 1996 to assess the nutritional status and age of menarche on 436 adolescent girls aged 10-17 years, among which, 165 (37.8 percent) girls had commenced menarche (Shahabuddin et al. 2000). In this study the mean age at menarche as determined by retrospective recall was 13 years. The median age at menarche determined by the *status quo* method was 13.0. Among the adolescents 60.1 percent were thin (BMI< 5th centile WHO recommended reference) and 48.2 percent were stunted (< 3rd centile NCHS). The mean weight and BMI were significantly higher among the menstruating girls of 13, 14 and 15 years than non-menstruating girls. The mean height was found to be significantly higher at 11-14 years among the menstruating girls.

It is an accepted phenomenon that family structure and socioeconomic factor has remarkable influences on the nutritional status of the adolescents. This is proved by the study done in Bangladesh to asses the nutritional status of adolescent boys and girls in a rural community (Ahmed, et al 2005). In this study total number of coverage was 1,483 healthy and unmarried adolescents aged 10-17 years (51 percent boys and 49 percent girls) by interviewing about their family structure and socioeconomic status. Study findings revealed that 67 percent of those adolescents were thin (defined as BMI < 5th centile of WHO-recommended reference). The study had given a very broad picture of the condition of adolescents in Bangladesh. According to the study result 75 percent of the boys and 59 percent of the girls were thin. The study also showed the prevalence of

[4] ICDDR, B, - the International Centre for Diarrhoeal Disease Research, Bangladesh

stunting (height-for-age < 3rd centile) was 48 percent for both, girls and the boys. On clinical examination, angular stomatitis was found to be present in 46 percent of the adolescents; 27 percent had glossitis, 38 percent pallor, 11 percent dental caries, 3.2 percent an obviously enlarged thyroid, and 2.1 percent eye changes for vitamin A deficiency.

Like other countries of the region anemia is also a critical public health problem in Bangladesh. Large no of population are affected with this problem. A study done in the adolescent schoolgirls (n=548) aged 11 - 16 in peri-urban five sub-districts of Dhaka Bangladesh, to know the anemia prevalence and iron deficiency showed that the prevalence of anemia (Hb<120 g/l) among the participants was 27 percent. Seventeen percent had depleted iron stores. Of all anemic girls, 32 percent had iron deficiency anemia (Hb<120 g/l and SF<12 microg/l). The high prevalence of anemia is also conformed by the INACG (International Nutritional Anemia Consultative Group 1985) who shed 94 percent of the boys and 98 percent of the girls were anemic in Bangladesh (Ahmed, 1998).

Early marriage is also a big problem and issue of adolescents in Bangladesh. Bangladesh Demography and Health Survey, 1997 had found that 14 percent girls of age 15 were already mother or pregnant of their first child. This situation has not been changed with the time. A figure cited by the Botts and Jejeebhoy. (2003) has stated that by the age of 15, 47 percent and by the age of 18, 73 percent girls are already married in Bangladesh. The researcher further mentioned that though fertility rate is declining through out the SARCC region during these decades but due to high rate of adolescent marriage, pregnancy in the early age is still very common.

Bhutan

Bhutan is a small country in Southern Asia (46,500 sq. km), which is landlocked between China and India**.** Bhutan has a very young population. Table 1 shows that in 2000, 52.1 percent of the population of Bhutan was below the age of 20, with another 9.0 percent between 20-24 years old. Adolescents (10-19 years old) comprise 23.9 percent of Bhutan's population, with adolescent boys accounting for 12.2 per cent and adolescent girls for 11.7 percent of this population group. Bhutan faces great challenges in addressing the need for reproductive health services and counseling for its young people in the future.

Table 2.1

Age distribution of Bhutan's population (percent) in 2000

Age group	Percentage of total population in 2000
0-9	28.2
10-19	**23.9**
20-24	9.0
25-59	32.2
60+	6.7

Source: World Population Prospects: The 2004 Revision

Overall, various nutrition surveys of the rural population show that calorie intake is mostly adequate but there are still many areas with high incidence of chronic and transitory food insecurity in southern and eastern Bhutan. Nutrition issues are across gender and do not specifically target women and girls. However, the overall nutritional status of the population of Bhutan is still unsatisfactory. This may be attributed to food shortages, exposure to adverse conditions, infections, poor dietary habits or other factors such as low birth weight. Much information and data are not available about Bhutanese adolescents but severity of the problem can be seen as 56 percent prevalence of anemia is cited among Bhutanese adolescents by WHO (1997). The Government has recognized adolescent's problem as an important key component to add in national priority but major focus has been given to reproductive health (teenage pregnancy) and other problems but not nutrition.

Adolescence pregnancy is a critical problem of the country though its magnitude is not so prominently shown by the researches like in Nepal, Bangladesh or Pakistan. According to the National Health Survey 2000 of Bhutan, nearly one third of births in a given year are attributed to women in the age group 15-24 years. Detailed statistics regarding the age of the mother at her first delivery are not available. But it is noticeable that schools in Bhutan do not allow young women to continue schooling if they are found pregnant, however, there is no written policy to enforce this. Reasons cited include that the emotional and physical strains of being a young mother are too great for an adolescent to continue school and the notion that doing so will influence and encourage other girls. In a small study on youth perspectives regarding teenage sex, pregnancy and early marriage, conducted in June 2000 by the Youth Guidance and Counseling Division, indicated lack of awareness in young people of rural areas as one of the main reasons for early adolescent pregnancy. Unplanned sex and lack of precaution and guidance were also cited.

India

Population Division of the Department of Economic and Social Affaires, UN, has stated that the adolescent population of India is 20.5 percent in 2002**.** Despite of various positive developments in all sectors of the country, India still struggling with the problem of illiteracy and malnutrition. During these decades various indicators have shown that the food grain production of India has increased fourfold, famines have been eliminated but 53 percent of children fewer than 4 years remain undernourished. At the same period, literacy rates more than doubled, yet half the population is still illiterate and for females aged 7 and above, the proportion is 61 per cent. More than 45 per cent children do not reach grade five. Over the period, life expectancy almost doubled to 61 years. Even so, each year, there are 2.2 million infant deaths and most of them avoidable. More than 90 per cent of the population has access to safe drinking water. But declining levels, quality problems and contamination threaten the advances. As a result of systematic deprivation, women have always fared worse than men.

As other countries of this region, the adolescent population of India is facing enormous challenges and nutrition problem is one of the major issues, though the literature about it is vary limited. Regarding this issue, a very comprehensive study was done by National Nutrition Monitoring Bureau (NNMB), India, and had done an assessment of the current diet and nutritional status of 12,124 adolescents which was carried out in village of 10 states of India in 1996 and compared it with the data of an earlier survey conducted in 1975 – 79 in the same villages. This survey studied average daily food and nutrient intake of different groups and compared it with the recommended dietary intake for Indians. The result revealed that intake of most foods, except cereals, millets, roots and tubers were below the RDI in all ages of adolescence. Consumption of green leafy vegetables, fruits, pulses and milk was grossly inadequate. The mean nutrient intakes were below the RDA in all adolescent age groups irrespective of sex. Micronutrient such as iron and vitamin A. consumption was found much lesser than protein, energy and fat (NNMB report 1998).

The same survey revealed that almost half of the adolescents were not getting even 70 percent of their daily requirements of energy and a quarter of them were getting less than 70 percent of RDA of proteins. Another survey was conducted by NNMB in 2000- 2001 among the rural population of nine states of India. This survey also revealed the lower consumption pattern of nutrients among adolescents of both sex. More than 80 percent adolescents getting less than 50 percent of their daily dietary requirements of vitamin A and more than 70 percent had iron – deficient diet by more than 50 percent of RDA.

Similarly, study said more than 50 percent adolescents were getting less than 50 percent of required calcium. The Family Health Survey 1998- 99 (NFHS-2), India, also had showed that 50 percent households were not consuming adequately iodized salt.

Indian adolescents are also facing anemia problem. A collaborative study done in Hyderabad, New Delhi, Calcutta and Madras also revealed it and showed the prevalence of anemia as 63.8 percent, 65.7 percent and 98.7 percent respectively amongst girls between 6 – 14 years of age (Kumar Ananta, n.d). Similarly, a review of Indian studies on anemia also revealed that more than 70 percent of adolescent girls in low income communities had hemoglobin levels < 110g /L (if WHO cutoff of 120g /L was applied, the prevalence was even higher: 80 – 90 percent) (Shubadha and Poojara, 2000). The same researchers conducted a study on adolescents girls of age 10 – 18 years in urban areas of Vadodora, to conform the effect of Iron-folic acid (IFA) supplementation which resulted enhancing adolescent growth else where in the world. Result showed that a significant weight gain of 0.83 kg was seen in the intervention group, whereas girls in the control group showed little weight gain. The growth increment was greater in the 10- to 14-y-old age group than in the 15-18 years old group, as expected, due to rapid growth during the adolescent spurt.

Similarly, Pathak, Singh, Kapil and Raghuvanshi (2003) made a study to assess the prevalence of iron, vitamin A and iodine deficiencies amongst rural Adolescent Pregnant Mothers (APM) in a rural block of district Udham Singh Nagar, Uttaranchal State. One hundred and fifty one APM, belonging to low socio economic group, were selected for the study. The mean age of the APM was 17.8 +/- 1.5 year. Eighty nine percent of the APM were in the age group 16-19 year with sixty percent in the gestational age of 24 weeks and more. During study it was found that 46.0 percent of the APM were anemic (Hb < 11.0 gm/dl). Sixteen percent of the study subjects had presence of night blindness. Fifteen percent of the subjects had Goiter. Median UIE level in the subjects studied was 95.0 micrograms/l. The 24-hour dietary intake revealed that the mean consumption of retinol and iron was only 13 and 28 percent of the recommended dietary allowance, respectively. The researcher here concluded indicating anemia, vitamin A, and iodine deficiency existed as public health problems among the APM of the study area.

In the same context, Kodavanti et. al. (2006), done an assessment of the diet and nutritional status of adolescent population from the different tribal areas of India. Study was done among 12,789 adolescents (10-17 yrs). The available database collected by National Nutrition Monitoring Bureau (1998-99) was utilized for this purpose. Result showed that the mean intake of all the foodstuffs, especially the income elastic foods

such as pulses, milk and milk products, oils and fats and sugar and jaggery were lower than the recommended levels of Indian Council of Medical Research (ICMR). The intake of all the foodstuffs except green leafy vegetables was lower than that of their rural counterparts. The intake of all the nutrients were below the recommended level, while that of micronutrients such as iron, vitamin A and riboflavin were grossly inadequate in all the age and sex groups. About 63 percent of adolescent boys and 42 percent of girls were undernourished (<5th BMI age percentiles, NCHS). The researchers also observed a significant association between undernutrition and socio-economic parameters like type of family, size of land holding and occupation of head of household.

Thinness prevalence is also seen in India as a problem which is proven by the various researches conducted in different areas of India in different periods. In a study among adolescent girls in Rajasthan, only 6.5 percent of the girls were found to have a BMI of more than 18.5 percent and rest majority were with low BMI. In another study of government and public school of Delhi, the prevalence of stunting was 9.9 percent in upper socioeconomic class girls and 35.3 percent in lower middle class girls (Kapoor and Aneja,. 2002). Similarly, with the objective of study the nutritional status of adolescents in rural area of Wardha, a group of researches –Deshmukh et. al (2006), conducted a cross-sectional study in two areas of Wardha district. The mean BMI for age was used for classifying the nutritional status. Result showed that overall, 53.8 percent of the adolescents were thin, 44 percent were normal and 2.2 percent were overweight. The mean BMI for boys and girls was 16.88 and 15.54 respectively. Study also revealed that the prevalence of thinness was significantly higher in early adolescence, girls, lower education (< 8th standard) and lower economic status.

In this regard, Mukhopadhyay, Bhadra and Bose (2005) also conducted a cross-sectional study of 559 Bengalee adolescents (314 boys and 245 girls) of North 24 Parganas, West Bengal, to find their age and sex differences in nutritional status. Survey result showed that the overall rate of undernutrition was 36.49 percent among adolescents. Regardless of sex, the rate of undernutrition progressively increased from 31.88 percent to 39.80 percent with the advancement of age. However, a clear-cut age variations in the change of the rate of undernutrition have been observed in both the sexes. The authors argued that this study provided evidence that the Bengalee adolescents have moderate rates of undernutrition and claimed that these rates were, in general, lower than those reported in other developing countries including previous Indian studies.

Singh, Maheshwari, Sharma and Anand (2006) carried out a study among 510 students of the age group 12 - 18 years in urban New Delhi to evaluate the prevalence of lifestyle

associated risk factors for non-communicable diseases in apparently healthy school children. The study documents the inappropriate dietary practices (fast food consumption, low fruit consumption), low physical activity, higher level of experimentation with alcohol and to a lesser extent smoking, high prevalence of obesity and hypertension in the school children. The study also showed an association between BMI, systolic and diastolic blood pressures amongst children and other lifestyle factors. The researches recommend the urgent necessity of School based interventions to reduce the morbidity associated with non-communicable diseases.

Early marriage is also a faced problem by adolescents in India. K Venkaiah (2002) has stated in their research study that about 23 percent of Indian adolescent girls were married before the age of 18 year. It is well known that in growing children conception leads to cessation of growth. Researchers further documented that about 24 percent of the married adolescent girls had short stature (<145 cm) and 18.6 percents were underweight (<38 kg; Nutrition Foundation of India, 1989), who could be considered as 'at risk'. However there were no significant differences between the married and unmarried adolescent girls in anthropometry within age groups. Here the authors suggested for behavior changes in the community so that early marriages are not practiced.

Maldives

The population of Maldives was 270,101 in 2000. Between 1995 and 2000 the average annual population growth rate was 1.96 percent. Despite a declining population growth rate during the decade 1990-2000, it is still high and alarmingly significant given the size of the country and the available resources. The mean age at marriage in 2000 was 24 years for males and 18.9 years for females respectively. In 2000 the population below 15 years was 40.7 percent and above 65 years of age 3.7 percent, which reflects a high dependency ratio.

Maldives has achieved considerable success in achieving food security and food availability. Nevertheless, nutritional problems continue to exist. A survey of maldives (MICS2 -2001) showed that 25 percent of children fewer than five years of age were stunted and 30 percent were under-weight. Anemia is also common and available statistics has indicated that 52 percent of children, 55.4 percent of pregnant women and 49.6 percent of non-Pregnant women are anemic (http://www.searo.who.int/EN/Section313/Section1521_6914.htm).

Maternal mortality rate and infant mortality rate continue to be high in Maldives, with MMR-1.5/1000 live births due to maternal undernutrition, inadequate availability of

antenatal and post natal services and closely spaced pregnancies. Nationwide, the prevalence of stunting is 30 percent, wasting 16 percent and underweight around 39 percent (FAO 1999). The statistics about nutritional status of adolescent girls are extremely scarce so it is hard to indicate real pictures of them.

Pakistan

Pakistan is the ninth most populous country in the world -more than 140 million people with very high fertility rate (4.1, expressed by preliminary DHS survey 2006 - 07 report of Pakistan) The majority live in rural areas, but urbanization is rapidly increasing. This country now is classified as food deficient because its current food production does not satisfy the total demands of its rapidly growing population.

In the context of nutrition, various levels" researches have shown that 40 per cent of children are underweight, over one-half of the children are affected by stunting and about 9 percent by wasting. Though significant provincial variations exist in malnutrition rates, the prevalence of stunting appears to be associated with the overall level of development of the provinces, being lowest in Punjab and highest in Baluchistan - the least developed province. These anthropometric deficits are also systematically higher in rural areas, due to the lower socio-economic status and poor access to basic health services. A nationwide average daily calorie intake among adults in Pakistan is also low so this could be a reason to say that the health of average person is below the slandered status. According to the researchers Chatterjee and Lambert (n.d), approximately 60 percent of the adult population consumes less than the RDA, and around 40 percent consume less than 80 percent of the RDA.

Pakistan currently has one of the largest cohorts of young people in its history. Out of the total population, 29.6 million are adolescents. Until recently, little was known about the details of the lives of Pakistani youth. To fulfill this knowledge gap the researchers conducted the largest nationally representative survey *Adolescents and Youth of Pakistan* (AYP) 2001 – 2002, to focus on this age group. For the first time, a total of 8,074 young people were interviewed in 254 communities directly about their lives. This survey revealed that the adolescent status scenario is not so panoramic in Pakistan. Approximately, 65 percent of Pakistani households contain one or more adolescents. The education levels of adolescents and young people in Pakistan are at a troublingly low level, especially for girls. Nearly 30 percent of adolescents in Pakistan have never attended school, though this figure is higher for girls (44 percent) and rural adolescents (36 percent). Roughly, one third of adolescents reported working in either paid or unpaid

employment (excluding housework). The majority of adolescent girls were engaged in housework activities.

Early marriage is a problem equally facing by the adolescents of Pakistan. Especially girls in rural areas are facing this problem and continue to marry below the legal age. The AYP survey showed that 7 per cent of males and 14 per cent of females marry before the legal age of marriage (16 years for girls according to the Muslim Family Law Ordinance 1961). Consequences of this early marriage, pregnancy is inevitable and they (adolescent Pakistani women) become pregnant under very risky conditions. Among 15-19-year-old married women in the AYP 2001-2002 survey, only less than 50 per cent had had an antenatal care visit by any medical or community-based health worker for their first pregnancy; over three quarters of first births took place at home (78 percent); and the majority of first deliveries were attended by a traditional birth attendant

In Pakistan, the maternal mortality rate is also high. Literature shows varies in estimation with a range of 300-700 maternal deaths per 100,000 live births. Trained or skilled health providers attend only 18 per cent of deliveries. Some 30,000 women die each year due to complications of pregnancy, and 10 times more women develop lifelong, pregnancy-related disabilities. Rural women's health is generally poorest due to the lack of health facilities and skilled health providers. Inaccessibility to high-quality, emergency obstetric services and traditional health practices are cited as key constraints to improved maternal health (Chatterjee and Lambert (n.d).

Several studies in both rural and urban areas in Pakistan have found a strong gender bias in access to health services. Transport, finances, family's reluctance to bring a woman to hospital, husband's absence from the house, and inadequate or inappropriate referral services contribute to a delayed access of girls and women to health services. For example, the AYP 2001-2002 survey found that the majority of young women needed permission of their parents to visit health facilities

Sri Lanka

Adolescents (aged 10-19 years) comprise 17 percent of the total population. Over all situation of Srilanka is quite better than other countries of this region. Despite progress in various fields Srilanka still has experiences of malnutrition and micronutrients deficiency among population. National health profile says that the adult population group is affected by undernutrition as indicated by the prevalence of chronic energy deficiency which is more than 33 percent in women and nearly 37 percent in men. Desegregated data show that 9 percent of the female population suffer from severe chronic energy deficiency with

a BMI value lower than 16.0, while one quarter of the women have a BMI between 16.0 and 18.5 and suffer therefore from mild and moderate energy deficiency. (Ramanujan and Nestel, 1997). Although the prevalence of severe energy deficiency is slightly lower in men (5 percent), overall 37 percent of men suffer from chronic energy deficiency (BMI<. 18.5). Here the very well said remark - The high percentage of chronic energy deficit in the population is likely to be reflected in lower labor productivity, is very appropriate because chronic energy deficiency makes people weaker physically and mentally than capability of doing things may impair.

Health profile of Srilanka regarding micronutrient deficiencies shows that, nearly 19 percent of the population was diagnosed as iodine deficient. About 45 percent of pre-school children, 58 percent of children 5 to 11 years old, 36 percent of adolescents and 45 percent of non-pregnant women suffer from anemia. Women 18-45 years old seem to be the most affected and significant inter-provincial variations in the prevalence of anemia were observed in this group. More than 30 percent of pre-school children have marginal serum values of vitamin A. A group of researcher Hettiarachchi et.al. (2006) had conducted a cross-sectional survey in 2003 at the Galle district among 945 school children of ages 12 - 16 years. The purpose of the study was to determine the prevalence of micronutrient deficiencies i.e. iron, zinc and folate in Srilankan adolescent school children and the extent to which multiple micronutrient deficiencies exist in this population. Study showed that the prevalence of anemia (Hb <120.0 g/L) was 58.1 percent in adolescent females. Folate deficiency (<6.80 nmol/L) was found in 52.5 percent of girls whereas zinc deficiency (<9.95 µmol/L) occurred in 58.3 percent. This study revealed multiple micronutrient deficiencies prevalent in Srilankan adolescents.

Maternal undernutrition is a matter of concern in Srilanka. A web based country profile of WHO (2002) (WHOhttp://searo.who.int/LinkFiles/Maldives_maldives.pdf) has shown that the nutritional status of children has not significantly improved over the years. About 16.7 percent of newborns at government hospitals have a birth weight of less than 2500 grams, largely associated with maternal undernutrition. A high proportion of pregnant and lactating women suffer from iron deficiency anemia (haemoglobin less than 11 g/dl). Malnutrition is probably a reflection of the increased cost of living that has affected the purchasing power of families. Wasting was, however, significantly lower in the first year of life and this is due to the strong emphasis being given to improved breast-feeding practices. Still, 70 percent of the population lives in areas where iodine deficiency exists and some areas (districts) have shown goiter prevalence among school children 5-18 years as high as 25-30 percent.

These are brief glance on the nutrition condition of adolescents in SAARC region (except Nepal, which were discussed in following pages). The adolescents are facing enormous problem and many challenges in the society. Similar type of nutritional problems are experiencing by adolescents of this region. While collecting these review, researcher felt that this group is really the most neglected group in the society. It is also felt that, very few or can say no perfect and widely covered sufficient researches were done about the adolescents and their nutritional need though this was much talked issue after Cairo conference. So lack of information about adolescents was seriously felt during this write-up.

2.3 Nutritional status of adolescent girls in Nepal[5]

Though much have been talked about the adolescent health and nutrition after ICPD 1994, still the reliable and strong nationwide statistics about the nutritional status of adolescents is not available, only pocket surveys and some extracted of national survey are the source of information about them. Though then Ministry of Health with the support of the World Health Organization a comprehensive "National Adolescent Health and Development Strategy" was developed and adopted to address adolescent health and development issues in 2000 with the goal to 1) increase the availability and access to information about adolescents' health and development, and provide opportunities to build skills of adolescents, services providers and educators; 2) increase accessibility and utilization of adolescents health and counseling services for adolescents; and 3) create safe and supportive environments for adolescents in order to improve their legal, social and economic status (Ministry of Health, 2005). But this National Strategy failed to address the nutritional need of the adolescents. A recent draft paper of National Plan of Action on Nutrition 2007submitted to UNICEF, prepared by New ERA has set the goal to improve the nutritional status of the Nepalese with a focus on women and children. This strategy has targeted only the women of reproductive age and has aimed to improve their status. It has mentioned the plan for promotion of girls' education/nutrition education and eradication of gender discrimination. This plan of action might bring changes in the status of the adolescents in a long run but there is lacking especially

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5 Appendix O : Major Physical Changes during Adolescence, and
Appendix P : Recommended Dietary Allowances (RDAs) for Adolescent girl

focused program for them. Even Tenth Plan (2059 – 2064) of the country has mentioned this age group only for the need of reproductive health but not for the nutrition need.

Even very recent survey done by Ministry of Health and Population et. al. (2007) could not absorbed adolescents in their research cohort to get exact situation of this group, only 15-19 age group is categorized to analyze some of the health condition. So scarcity of information is always there.

Stunted growth is one of the major setbacks of the malnutrition which are more seriously seen in Nepalese adolescents. The more risky is the factor that stunted is associated with the pelvic size. Short women tend to have small pelvic and therefore, more likely to have obstructed and prolonged labor. Cited literature shows that first time, a noticeable emphasis was given to adolescents by a micro level survey (RIDA and UNICEF 1991).This survey first time spoke about the stunted growth of the Nepali adolescents and reported that stunted growth is more prevalent in girls as compared to boys (42 percent vs. 38 percent) in Nepal.

Another pocket study was conducted by Regmi and Adhikari (1994) in three remote rural village of western Nepal. The study found that the majority of adolescent girls were stunted and undernourished (72 percent of girls aged 10–14 and 45 percent of girls aged 15–18). The same study found that adolescent girls achieved menarche later and continued to grow beyond the period when girls in the reference population stopped gaining height, and the final height attained by the majority of girls remained below the third percentile. Similar observations have been reported from other developing countries, including Colombia, Guatemala and India (Kurz and Johnson 1994).

Similarly, as reported by the Nepal Family Health Survey (Ministry of Health et.al, 2056), fifteen percent of Nepalese women are less than 145 centimeter and according to BMI, one of four women falls below the cut-off point, indicating that the chronic energy deficiency is relatively high. This survey had indicated that 30.6 percent of girls had a low body mass index (BMI<18.5), which is indicative of a high prevalence of chronic protein energy malnutrition among adolescent girls. In the same context, Nepal Demographic Health Survey (Ministry of Health et.al, 2002) has indicated that 40 percent of mother (based on height for age criteria) between the age group 15 –19 were below –2SD and 13.7 percent were below –3SD. Based on weight for age criteria survey indicated of 9.6 percent and 38 percent adolescents were below –2SD and –3SD respectively. This reveals the fact that more than half the adolescence population is malnourished in Nepal.

This Demographic Survey (Ministry of Health et.al, 2001) used the BMI indicator first time to asses the nutritional status of the women. According to this survey, the prevalence of thinness among women (BMI less than 18.5%) was 25 percent nationally with the highest prevalence in the terai – 36.9 percent, which is defined as high if compared with WHO standard cut-off points (that is 20). Regmi and Adhikari.(1994) during their study found majority (70 percent) of younger girls had a BMI less than 5 percent, as did 15 percent in aged 15–18. Very recently published Nepal Demographic Health Survey 2006 (Ministry of Health and Population et. al., 2007) showed that 24 percent of women are undernourished nationally but if looked into the 15 to 19 years age cohort this prevalence ratio is much higher- that is 26.3 percent. This showed that too little attention has been focused on the nutritional care of girls to break the inter generation cycle of under nutrition.

Iron deficiency anemia is a serious nutritional problem in Nepal which is affecting nearly two third of the population of the country. Two decade ago -according to New Era study (1986), nutritional anemia was widely prevalent in Nepal, affecting women in their reproductive years, particularly during pregnancy when folate deficiency is also prevalent. This study reported a very high prevalence rate of anemia, ranging from 68 percent in Syanja district to 95 percent in Nawalparasi district, with a cut-off point of Hb-level at 12gm/dl. The situation has not changed much during theses years despite various efforts done by Government, I/NGOS and social sectors. A UNICEF report (1992) had indicated that at least 70 percent of pregnant women in Nepal are at risk from nutritional anemia. Nepal Micro Nutrient Status Survey (Ministry of Health et.al, 1998) reveled that anemia prevalence in Nepal was 75 percent among pregnant and 67 percent among non-pregnant women, but this survey did not say about the suffering figure of adolescents. Similarly, Bondevik et. al (2000) did a survey in Kathmandu and showed a high prevalence of anemia among teenagers, farmers, women of short height, certain ethnic groups and women married to illiterate men. A comprehensive study of anemia among adolescent girls of Kathmandu valley shows 46 percent prevalence rate where in Kathmandu it was 54 percent (Toru, Joshy and Pandey 2004). Unlike pocket survey, National health survey (Ministry of Heakth et. al, 2001), gave little focus on adolescents health and revealed that 47.4 percent adolescents of age 15 – 19 had nutritional anemia but the recent survey done by Ministry of Health and Population et.al., 2007 showed marked improvement on that condition and indicated only 36 percent women of age 15 – 49 were suffering from anemia nationwide and among them, 39 percent of girls age 15 - 19 years were suffered from any kind of anemia. This survey had indicated the severity of problem in terai.

Iodine deficiency is still identified as a public health problem in Nepal. Researchers had stated that the prevalence of goiter increase with age and it peaks during adolescence (Lindsay and Gillespie, 2001). Goiter itself is unsightly but usually harmless. Importantly its presence indicates that other damaging effects of iodine deficiency are already present. Iodine deficiency has been described as a worlds' single most significant cause of preventable brain damage and mental retardation. Ministry of Health et. al. (1998) study had indicated significant progress towards the control of iodine deficiencies in the country with biomedical indicators indicating adequate iodine intake among school aged children and women. However, the proportion of household consuming adequately iodized salt (with 15 ppm or more iodine) was just 55 percent. According to the study of National Planning Commission and UNICEF (2000), the proportion of household consuming adequately iodized salt was 63 percent. But recent study of Nepal Iodine Deficiency Status Survey 2005, (Ministry of Health and population et. al. 2005) has found that 95 percent household consumed salt with some iodine, whereas over 42 percent households were still found consuming large crystal salt (*phoda salt*) which have very marginal level or no trace of iodine.

Early marriage and early child bearing is quite common in Nepal but is an issue of adolescence health. Very recently, this issue is tried to address through reproductive health but has ignored the role of nutrition - as an effective remedy. Ministry of Health et. al. Survey (1996) showed that nearly half (50 percent) of 15-19 year old adolescent girls (20.6 percent) were married and one fourth (24 percent) of adolescents are already pregnant or mother of their first child. Similarly NMIS Fifth Cycle (1997) made aware the risk of adolescence pregnancy and indicated that women younger than 19 years or older than 35 years at the time of giving birth have 1:2 times the risk of having low birth weight babies compare with women giving birth at age over 19 years. This survey also revealed the fact that one percent of women up to the age 15 and 41 percent women up to the age group 16-24 were pregnant. The same trend is seen in the latest survey of Ministry of Health and Population et. al. (2007) though marriage age has been increased during these years. To know the behaviors and awareness about reproductive health, Thapa and Mishra (2001) made a survey about sexual behavior of the adolescents and reported that majority of adolescents (64 percent) had their first sexual intercourse when they were between 15-17 years of age. The mean age of first sexual intercourse among female was 16 years (Thapa and Mishra, 2001). Normally early sexual activities lead to early pregnancy. It is generally accepted fact that childbearing among women aged 15–19 doubles the risk of death due to pregnancy-related causes compared to women in their twenties. Beside early pregnancy, indulge in sexual activities also incites problem of HIV / Aids as well. Study showed that, of all HIV cases, 13 percent were found in the

14-19 years age group and 70 percent of them were female in Nepal (Population Reference Bureau, 2000).

Various hospital-based studies showed the seriousness of teenage pregnancy, pregnancy-induced hypertension and anemia in Nepal and found that fetal loss and abnormal deliveries were higher among teen mothers (Malla and Shrestha, 1996). This loss can be minimizing by doing regular antenatal checkup during pregnancy. But the percentage of pregnant women attending antenatal care (ANC) is low in Nepal, probably due to a lack of adequate services. Even in urban areas, where health facilities are within easy reach, pregnant adolescents attend antenatal facilities at lower rates than adult women (Adhikari and Amatya, 1996). Similarly Family Health Division (2056) had found that neonatal mortality among children of adolescent mothers was 73 percent higher than children of older mothers, and 25 percent higher than children of mothers aged 30–39. Ministry of Health and Population et.al. (2007) also highlights about this issue and revealed that more than 50 percent of adolescent mothers do not receive antenatal care and the majority of adolescent mothers deliver their babies at home- a trained health worker assist only 18 percent of those delivery. This practice of lower access to health care facilities and ANC service increases the risk of neonatal mortality, birth complications and health hazard. Similarly several other studies of Nepal have also documented poorer outcomes for children born to adolescent mothers compared to older mothers. The contraceptive is a effective tools to delay child bearing for adolescents but its prevalence rate is also poor - reportedly only 6.5 percent adolescents use contraceptives (Ministry of Health et. al, 2056) and this trend is been increased very nominally (11. 5 percent) among married 15 – 19 years age group girls as reported by Ministry of Health and Population et.al. 2006.

Beside, vitamin A deficiency is also a faced problem by Nepalese adolescents. According to Ministry of Health et. al. (1998), the prevalence of current night blindness was 6.1 percent, and was high among pregnant women with highest rate recorded in the east terai (13.4 percent) and east hill (9.3 percent).

With the pace of modernization, other problems are also emerging as an issue in modern period. Increasing number of commercial sex workers are seen in the country which is estimated to 25,000, of them 20 percent are estimated to be under the age of 10-14 years. Though data is not available about total adolescent engaged in labor force, nearly 62.8 percent of 15-19 age groups are reported to work in this category (Thapa et. al. 2001) Coupled with low school enrolment, especially for girls, and entry into the labor force, these trends adversely affect the health and development of adolescents

This is a general scenario of nutritional status of adolescents in Nepal overviewed through available research data. It is felt that there is a lack of nationwide as well as pocket studies assessing nutritional status of the adolescent girls and the interrelationships between nutrition and determinants among adolescent girls in Nepal. Availability of food, seasonal variation and its impact on nutritional and development of adolescent girls has not been documented yet. It is now realized that a life cycle approach is also required to address the special health and nutritional needs and behavior patterns of this particular age group.

CHAPTER 3
RESEARCH METHODOLOGY

Figure 3.1

Place of Study	Goldhunga VDC, Kathmandu.
Study population	Adolescent girls of age 12 – 19 adopting convenient sampling techniques.
Sample size	254
Time of data collection	November to February
Study method	1. Anthropometric Measurements
	• Weight, Height, BMI
	2. Clinical examination – Hemoglobin
	3.. Interview
	• Social determinants
	• Work Pattern
	• Exposure to development activities and
	• Media Exposure
	4. Focus group discussion
	5. Case study
Analysis of data	SPSS 11.4 version and Excel software were used for
	• Frequency distribution
	• Grouping of the sample
	• Simple cross tabulations
	• Mean and
	• Regression analysis
Limitations	• Since this study is limited to a VDC so are representative only of the study area, therefore, the findings of this study cannot be generalized for the country as a whole. • An extra effort has been made during data collection to minimize recall errors. • seasonal variation in eating pattern could not be avoided

Frame work of Research design adopted for the study

3.1 Study Design

The synopsis of the study design is figured out in the above figure 3.1. This research had adopted convenient sampling techniques. Under this techniques, the person who falls under preconceived criteria (in this study, girls between 12 and 19 years) and whom the researcher met, were the sample respondents. Adolescent girls between the ages of 12 to 19 years residing in the nine wards of Goldhunga VDC were sample population. Based on the above-mentioned procedure, 254 respondents were interviewed with the help of structured questionnaire. In fact, proximity to Kathmandu Metropolitan city makes this area nearly semi-urban for different reasons such as: availability of modern utilities like electricity, transportation services and access to market in Kathmandu city. However, large numbers of people are still deprived from education, health, nutrition and sanitation. Very low availability of modern utility such as transportation and health services has made the life of VDC very hard and pitiful.

3.1.1 Place of Study

Goldhunga village development committee is selected for the study place. This VDC is just approximately 8 km west from Kathmandu metropolitan city. It lies on the base of Nagarjun hill with dense forest popularly called *rani ban*. This VDC covers a total land area of 451 sq. Km. It takes nearly 45 minutes walking distance to enter the VDC boarder from Balaju bypass but to reach various households is much time- consuming because there are no internal public transport systems yet. There is only one health center in the whole VDC, but have no other facilities like bank, post office and cooperatives in the village.

There are nine wards in Goldhunga VDC. During the process of random sampling of the population, seven Wards fell under the study circle were three to nine. Ward number three, four and five were near to the VDC office and convenient to reach because of its close proximity to the highway but wards six, seven, eight and nine were far from the highway and situated in a hill side thus making it difficult to reach these wards (details is in appendix A)

3.1.2 Study Population

This study includes both married and unmarried and school going or dropped out adolescent girls between the ages 12-19 years of the proposed study area. Study specially

targeted to the adolescent girls. Therefore, all adolescents of the Goldhunga VDC were taken as a study population irrespective of their school enrollment. The census data (CBS 2001) revealed that on an average, adolescents between 12 to 19 years are estimated 23 percent of the total population of Nepal. If these statistics are taken as base to estimate sample population, the total number of adolescent girls of this VDC were 461. For the analysis of data, the age groups of the studied population were divided into two broad groups: 12 -14 and 15 – 19. This format is adopted from Demographic Health survey, Nepal 2006.

3.1.3 Sample size

Out of 461 population size, 254 adolescent girls (both married and unmarried) have been taken as sample in this study using convenient approach. Here the particular age group sample were taken randomly. This sample represents approximately 53 percent of the target population of the study area.

3.1.4 Time of data collection

The data for this study were collected during winter season – November to February. So seasonal biasness can be observed in meal pattern and mature of work

3.2 Study Method

Various researches and reviewed literature has shown that social determinates along with media and developmental activity exposures are the determinant factors of nutritional status of the adolescent girls. This may be true for the girls of Goldhunga too. In this context, a conceptual framework of these determinants of adolescent girls' nutritional status is constructed (figure 1.1).

So, in order to test these determinants and hypothesis outlined earlier this study had used **quantitative** method of data collection. A data collection instrument - Structured questionnaire (appendix S) were developed and pre-tested in another area in Kathmandu valley to test whether the intended variables were measured correctly. Depending on the findings of the pre-test, the questionnaires were revised and final version was adopted for data collection. In order to explain the findings from the quantitative data collected from the questionnaire, **qualitative data** were also collected through the household visit along with the focus group discussions. Discussions were recorded and transcribed for the interpretation of the findings. Besides demographic issues, the quantitative questionnaire contained questions on the following topics:

→ Anthropometric Measurements

→ Clinical examination - Hemoglobin

→ Interview

→ Food intake pattern and activity recall

- Health and sanitary behaviors
- Exposure to development activities
- Media exposure

3.2.1 Anthropometric Measurements

The most important part of the study was based on the anthropometric measurements of the study population. In this criterion, it was determined earlier that weight, height and BMI are the important determinant factors of the health of the respondent. It provides the most sensitive facts about the nutritional status of the study population and the relationship among the adequacy of food intake and expenditure and morbidity pattern as well. Though the study was aimed to investigating nutritional status, anthropometric measurements along with age were also taken.

Age – Though the respondents were grown enough to say their age, it was recorded by asking with the respondents as they said by themselves. Only the girls who were on the age bracket of 12 to 19 was included in the study.

***Weight* – A** solar bathroom scale was used to take the weight in kilogram (kg). Effort was made to take weight with normal dress up by putting-off heavy sweaters and shawl if they had any. Weight was taken barefoot. For the accuracy, repeated weight of the same respondent was also taken as cross check to minimize the error.

***Height* -- Height** in centimeter were been obtained with the help of measuring tape. All respondents were measured against the wall where the length of them is marked by a marker. The girls were asked to remove the footwear and stand with heels together and head positioned so that the line of the vision was perpendicular to the body. A glass scale was bought down to the topmost points on the head. Height was recorded to the nearest 1 cm.

Body Mass Index (BMI) **--** It is a new index derived from the individuals' weight and height. The WHO has recommended it specially to assess the nutritional status of the adolescents and women. BMI is calculated as an individuals' weight in kilogram (kg) divided by the square of her height in meters (Ministry of Health et. al.1998). For the standard reference of BMI, format used by Demographic Health Survey (2006) is adopted which have following scale –

Normal BMI – BMI > 18.5

Mild thinness - BMI 17 – 18.49

Moderate thinness – BMI 16 – 16.99

Sever thinness - BMI < 16

3.2.2 Food intake pattern and Activity recall

The questionnaires were used to collect information on food intake and activities undertaken by adolescents during a preceding 24-hour period. Questionnaire also sought information about the general food eating practice of the adolescent girls. All the respondents were asked about their daily activity pattern and total time spent for that.

3.2.3 Clinical examination

It is tried to take information about visible presence or absence of the sign and symptoms of Vitamin A deficiency, goiter and nutritional anemia. General observation was done during the time of interviewing the cases by researcher her self.

Hemoglobin test - Hemoglobin measurement is considered as the primary method of anemia diagnosis. Since nutritional anemia believed to be very common in Nepal, the study sought information on adolescent girls' hemoglobin level. A hemoglobin test is performed to determine the amount of hemoglobin in a person's red blood cells (RBCs). The process consisted of collection of blood samples from more than 29 percent (n=74) adolescent girls among studied cases so that its reliability would be established. Sample blood were collected by expert laboratory technicians and tested in certified laboratory. The standard hemoglobin levels adopted by MOHP et. al., 2007, was taken as reference to standardize the hemoglobin level of studied cases.

Prior to blood collection, the finger was wiped out with an alcohol prep swab and allowed to dry naturally. Then palm side of the end of a finger punctured with a sterilized, no reusable self retractable lancet were observed. After this a drop of blood

was collected with a HemoCue microcuvette and placed in a HemoCue photometer where results were displayed.

3.2.4 Focus Group Discussion

In order to collect qualitative data to supplement the quantitative data a series of focus group discussions were carried out. The focus group discussions provided information on why the things are as they are and what can be done to improve the nutritional situation of adolescents. For this, about 4 focus group discussions were carried out in the study area. For focus group discussions the participants were selected in such a way that each group consisted of 9 - 10 girls who are homogenous in age, education and economic status so that no member of the group dominated in the discussions. Moreover, since the major purpose was to solicit maximum amount of qualitative data each member of the group were motivated and lead to fruitful dialogue and discussions. For this, the investigator had to divert attention from those who were extremely extrovert and it was necessary to take this step so that other members also get a chance to discuss their opinions and ideas.

Focus group discussions mainly concentrated on the following issues.

a. Availability of different food items in the households.

c. Food usually taken by adolescent girls.

d. Awareness of nutritious food among adolescents.

e. Who gets to eat first in the family, if the food is inadequate who suffers the most?

f. Any positive and negative restrictions on food intake i.e. what sort of foods are usually avoided and what sort of food is usually taken without any restrictions.

g. Discussions on specific food items such as proteins, carbohydrates rich foods

h. how to improve the eating habit of the adolescent girls?

Synopsis of focus group discussion is in appendixes B.

3.2.5 Case Study

To make the study effective and reveal the situation of the adolescents more precisely, some specific cases were tried to catch in details. Among the adolescents, who were

really in vulnerable condition and seen critical from nutrition point of view were included in the study (appendix C).

3.3 Analysis of the Data

Quantitative data was computerized using the SPSS 11.4 version and Excel software. At this stage, following methods of data analysis were been adopted

a. Frequency distribution

b. Grouping of the sample

c. Simple cross tabulations

d. Mean and

e. Regression analysis

Keeping in view the stated objectives of the study, data were also analyzed as follows.

- Preparation of simple table and computation of some descriptive statistical measure such as mean and percentage.
- Simple cross tabulation to see relation ship between nutritional status and various other set factors affecting nutritional status.
- Use of linear multiple regression to observe the relationship between nutritional status on the one hand and many other variables on the other.

Apart from above, some graphs and charts were also used to analyze the data.

3.4 Limitations

This study, nevertheless, cannot claim to be free of all the errors. In this study, economic factors were not emphasized more because almost all households had similar economic condition and very few are really considered as poor. Furthermore, most of the household had similar eating and work pattern either they have good income. Similarly, the sign and symptoms of the goiter and vitamin A were not so significant for prediction because some clinical study need to be done to detect the exact extent of problem, which is lacking in this study. At the same time, since this study is limited to a VDC and so is representative only of the study area, therefore, the findings of this study cannot be generalized for the country as a whole.

Normally, reproductive health covers a wide range of components but this study limited to only age of menarche because it has direct link with nutritional status. According to

the WHO webpage (*WHO_TRS_854_ (chap6*), the variation in mean age at menarche is the result of genetic and environmental differences. Similarly differences between rural and urban groups or between poor and better of girls within given areas are primarily due to differences in health related components of socio economic status such as nutrition, hygiene, health care. The same webpage also indicated that a lowering of mean age at menarche are seen in some population and such change is the result of improvement in health related factors sufficient to allow more rapid maturation at the time of adolescents and refered the example of Norway where the mean age of menarche decreases from 15.6 years for women born in 1860 to 13.3 years for women born after 1940.

Since, this study is dependent on the information obtained from the respondents and recall. Some of the information was totally depend upon the recall of the cases such as information about morbidity pattern and food intake pattern. Though, extra efforts have been made during data collection to minimize such recall errors and to improve the measurement of key variables. However, as a student of social science, researcher does not guarantee that extra efforts have completely removed possibility of occurrence of such errors.

Seasonal variation in eating pattern is another limitation of the study. During study period there were plenty of green leafy vegetables and other fresh vegetables in the field side and in kitchen garden. So normally girls used to eat whatever they have in the house. Goldhunga people have less habit of buying vegetables from the outside. This is been reflected in the result as well.

Though, there are huge discrimination in food distribution among male and female members of the family and a issue of investigation as well but this study has aimed to included girls only in this study.

CHAPTER 4

RESULT AND DISCUSSION

4.1 Social determinants of the population

This chapter presents findings of the study, which include social and demographic characteristics of the sample adolescents. Besides this, the onset of menstruation of the respondents; marital status; age at marriage; household food distribution patterns, which are influencing factors of adolescent's nutritional status and health, are included in this chapter. These indicters are very important to predict the actual condition of the study cases. These are also the determinants of the health and nutrition status of the adolescents in the society.

4.1.1 Age of the respondent

The target population of this study was adolescent girls of age 12 – 19 years, so altogether 254 purposely selected adolescent girls were study sample of this research. All the adolescents irrespective of school enrolment were included in the study. This study also included both married and pregnant girls of that age group. Age wise distribution of number of the study population shows that 25 percent (n = 64) fell in the 12 year age bracket and 20.1percent (n = 51) were in 19 year age bracket. The sample with the smallest number (5.5 percent) was 16 years' old (n = 14).

4.1.2 Caste wise distribution of the population

Eating pattern and nutritional status of the family / person is largely associated with the caste system in our society which ultimately reflects in health and wellbeing of the person. In general, caste system influences the family tradition of eating which determines the nutritional status of the individuals also. So this study also tried to see the caste of the study cases.

Table 4.1

Caste wise (percent) distribution of the study cases

Cast of study cases	Age	
	12~14 n=105	**15~19 n=149**
Brahmin	76.2 (80)	77.2 (115)
Chettri	-	0.7 (1)
Newar ethnicity	19.1 (20)	14.8 (22)
Ethnic group (Tamang, Sherpa, Lama)	1.9 (2)	7.3 (11)
Schedule caste (Damai)	2.8 (3)	-

The digit in parenthesis indicates n

According to caste distribution, Brahmin group is seen as majority in Goldhunga VDC and is reflected in the study also (table 4.1). Among the study samples, majority (76.8 percent) of both age group (n = 195) were belonged to the Brahmin caste. Second largest group was found of Newar population - 16.5 percent (n = 43) and most of them concentrated around ward no 3, 4, and 5. Beside that some ethnic population i.e. Tamang, Sherpa, Lama were also among the respondent and they were represented with 5.1 percent (n =13). Scheduled caste population (Damai) was 1.2 percent but Chhetri caste representation was very low (< 1 percent) found in the study.

4.1.3 Education

Adolescence period is a window of opportunity and golden time to gain knowledge through formal education. It is a key factor for better and healthy life. Many researches have shown empirically that education has direct relationship with healthier life and reduces morbidity pattern as well. Continuation in education also helps girls to delay marriage, which gives them the opportunity to strengthen their nutritional store in the body and make reproductive health more sound (Ministry of Health et. al. 2001).

Table 4.2

Schooling profile of adolescent girls by age (percent)

Schooling	Age	
	12~14 (n=105)	**15~19 (n=149)**
No schooling	3.8 (4)	10.7 (16)
Left school	-	31.5 (47)
Continue schooling	96.2 (101)	57.7 (86)

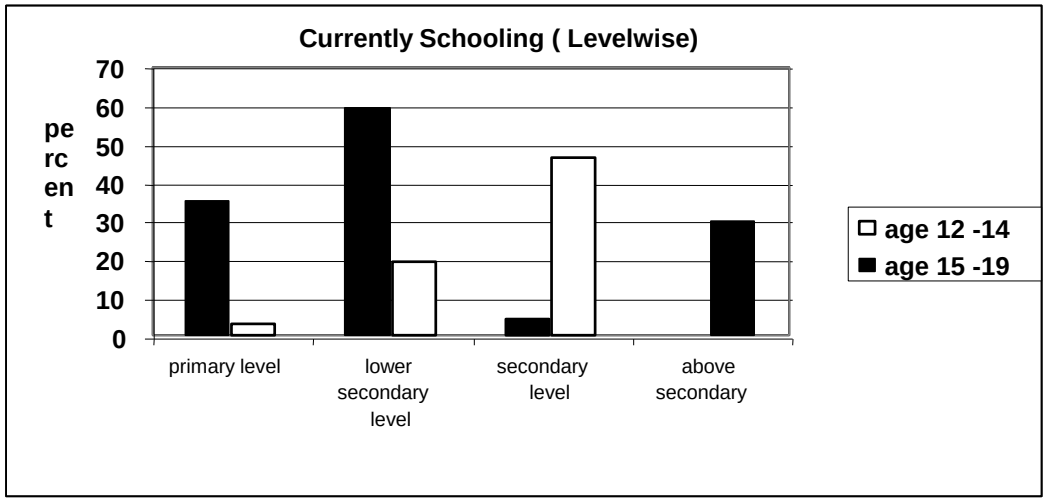
The digit in parenthesis indicates n

Present study reveled that nearly 74 percent girls in total were currently going school (table 4.2). Remaining 26 percent were at home without any formal education though it is the crucial time to have formal education. Altogether 7.3 percent girls were found illiterate.

The national literacy rate of the population aged 6 years and above for female in the census of 1991 was 25 percent, whereas in NMIS (Ministry of Health et.al,.1998) survey it was 37. 8 percent and BCHIMES (National Planning Commission and UNICEF 2000) survey showed 44.9 percent. Recent national survey (Ministry of Health and Population et. al., 2007) has shown that nearly 80 percent women of age 15 – 19 were literate nationally and the percent literacy rate of central hill is 66. Viewing all these figures on educational attainment, the literacy status of Goldhunga adolescents is very encouraging but situated so close to the capital city that has large number of private and public schools, more percentage of adolescents would be continuing their education. Millennium Development Goals (MDGs) has set universal primary education by 2015 for Nepal. The Tenth Plan also emphasizes the universal primary education to equip citizen with knowledge and skill to lead better life and targeted to 63 percent literacy for 15 plus age group, and female literacy to 55 percent by 2007 (MDG Progress Report, 2005). Comparatively the literacy rate of Goldhunga adolescents is good but still much encouragement should be given to the girls/ parents for getting formal education in its highest level.

Figure 4.1

Age wise distribution of adolescent (percent) according to their level of education



This study found that altogether 21 percent respondents were studying in the primary level, 41.2 percent in lower secondary level, 24 percent in secondary and 13. 9 percent had above secondary level education (figure 4.1). Age wise analysis shows that still 3.5 and 19.8 percent girls of 15 – 19 age group were studying in primary and lower secondary level respectively. This shows the trend of delay in education which is a loss of girls themselves. This delaying in education can increase the rate of drop out of girls from the education. Altogether 14 percent adolescents had education above secondary level. Goldhunga VDC has no colleges that provide higher education, so student had to go Balaju or near by city's college/institute to get higher education, which is very difficult for village girls because of lack of public transportations and high tuition fees of colleges. So getting higher education is not so easy matter for Goldhunga girls.

Dropout

One of the major hurdles of the girl's education is untimely drop out from the school. This type of trend not only makes a girl apart from the study but decreases marriage age and increases work burden also. Early marriage makes reproductive age longer and the consequences could be seen in the form of low nutritional status of mother and child, larger family, poverty, high morbidity and malnutrition. Beside various effort of the Government, social sectors and I/NGOs with incentives like free book distribution, free schooling and oil distribution, the dropout cases are still a normal phenomenon.

Present study showed that the total drop out rate among study cases is nearly 19 percent (table 4.2). During analysis of the data all dropped out cases were found from the age group 15- 19. This figure is very high if compared with national average of 9.6 percent

(3.5, 1.3 and 9.6 percent for primary, lower secondary and secondary level respectively) shown by BCHIMES (National Planning Commission and UNICEF, 2000) study. This shows that the Goldhunga VDC also has similar trends of drop out which is seen nationwide as well

In Goldhunga, the trend of girl's dropout from education is seen relatively high especially in lower secondary (59.6 percent) but lowest possibility of dropout was seen in above secondary level (2.1 percent). Dropped out from secondary and primary level were 29.8 and 8.5 percent respectively. This trend showed that it is really hard for the girls to reach and finish secondary level. Here, delay in education is one of the influencing drawbacks seen in continuation of education.

Table 4.3

Reasons of drop - out from school by age (percent)

The digit in parenthesis indicates n

When asked about the reason of not going school, commonly cited answer of more than

Reason of dropout	**Age**
	15~19 (n=47)
no money	7.5 (4)
parents not allowed	9.3 (5)
no mood to study	37.3 (18)
due to marriage	19.0 (9)
Others (reasons not mentioned)	24.1 (11)

37 percent was that they did not like to study (table 4.3) whereas BCHIMES (2000) study showed 38.9 percent for the same reason. Nearly one fifth of the respondents of age 15 – 19 reveled that their parents did not allow them to go school but BCHIMES (2000) survey revealed only 14.4 percent for the same reason that is lower than that of Goldhunga study. Similarly, unlike BCHIMES (2000), which showed 12.9 percent, 9 percent respondent said that they had no money to bare the expense of the school. A big number of girls (24.1 percent) did not say any reason for left schooling. This study result revealed that Goldhunga people are still unaware about the importance of education and quite reluctant to send their daughter for study. Observation and informal talking showed that household work load and money is the major constrain for girl's education.

Besides various above mentioned causes, marriage is also seen as a major cause of leaving school study. When girls reach certain age level then they get married. After marriage girls hardly get chance of continuing study so their dropout rate remains high in lower classes. This is the major reason of dropout for nearly 19 percent girls among dropout cases in Goldhunga. This type of tendency not only increases dropout rates but decreases marriage age and increases early pregnancy / reproductive age also. BCHIMES, 2000 showed national average of only 4.7 percent girls left schooling due to marriage but the case of Goldhunga is fairly high than shown by BCHIMES, 2000. These behaviors have negative impact in the health and nutritional status of the adolescent girls. Once they cross the secondary level of formal education than the chances of leaving education is minimal. It is a matter of satisfaction that no one from age 12 – 14 who was studying had left schooling during the time of data collection.

4.1.4 Family structure

Family is a powerful unit that plays an important role in the life of its members. Healthy growing up of the individual (physically and mentally), largely depends upon the family system and its structure. Family structure is taken as an influencing unit for the nutritional status of the adolescent girls in this study.

Table 4.4

Family structure of the adolescents by age (percent)

Family type	Age	
	12~14 (n=105)	15~19 (n=149)
Nuclear	66.7 (70)	57 (85)
Joint	33.3 (35)	43 (64)

The digit in parenthesis indicates n

This survey basically wanted to have a better understanding of the structure of the family and recorded that altogether 61percent of the respondents were found in nuclear and remaining 39 percent were in joint family system (table 4.4). Mean family size of the surveyed household was 6.1. Study result showed that the household size is relatively larger in Goldhunga than of national average shown by NDHS, 2006 (4.4 in urban and 5 in rural area). Family size can have direct impact on the nutritional status of the family member especially adolescent girls because they are least cared one. Survey reveled that 15 members' joint family was also existed there in Goldhunga. There was a family

having that large number of family members and on the contrary, one family had only 2 members. Among the joint family, 22 percent family had 5 family members and 6 and 7 members containing family was 19.3 percent for each in the structure. Going with the worldwide trend, Nepal is also taking a shift from joint to nuclear family system which was also reflected in Goldhunga where majority were in nuclear family structure. Despite many other prose and cons literature shows that family members get better nourishment in small family than in extended family.

4.1.5 Menstruation Status

Menstruation is a turning point of adolescent's life. Age of onset of menstruation is a good indicator of nutritional status of the adolescents. It is an established fact that better nourished girls reach menarche earlier than undernourished ones. The latter grow more slowly but for longer, because menarche is delayed. Delay in menarche is thought to be partly related to low iron stores and malnutrition in childhood. (Lindsay and Gillespie,. 2001).

Present study shows that 68.1 percent of the respondents already started menstruation but 31. 9 percent were yet to be. However, all the respondents were of and above the age of 12, these big numbers were in the process of reaching menarche. Among the respondents who already started menstruation, 38 percent reported of starting it at the age of 14 and 32.4 percent reported at the age of 13. A noticeable size of the respondent- 13.9 and 5.8 percent revealed that they started menarche at the age of 15 and 16 years respectively. Only 1.7 and 7.5 percent respondent reported of starting menstruation at the age of 11 and 12 years respectively. So in an average 13 and 14 was the pick age to start menstruation for Goldhunga girls. National Planning Commission and UNICEF (2000) had reported 13 years as a mean age of menarche of Nepali adolescents. Similarly, study done by Regmi and Adhikari. (1994) reported the average age of menarche as around 14 years. This Goldhunga study also showed the similar pattern of maturation process of adolescents. Nevertheless, mean age of starting menstruation was 13.7 among study cases. Though matches with national average, the first starting of menstruation is relatively late if compared with other nutritiously good or developed countries context. This delay menarche is due to poor eating pattern of the girls which can be seen in their eating habit. Taking the reference of Lindsay and Gillespie (2001), this late maturation / delay menarche has effected in their physical growth i.e. weight, height and BMI equally.

4.1.6 Marital status

Marriage is universal in Nepal and early marriage is a social/ religious system still deeply rooted in the society. It is one of the crucial issues of adolescent health as well. Various issues are associated with marital status of the adolescent girls. High dropout, early pregnancy, high maternal mortality, high morbidity, low birth weight baby, low nutritional status of mother / child are some of the most talked issues related to adolescents' marriage. In this study, tried were made to see the influence of marriage in the nutritional status of the adolescent girls.

The study showed (table 4.5) that the percentage of married respondents among the age group 15 – 19 was 38.3 in Goldhunga (overall 22.4 percent). This figure is closely matches with the national figure reported by NDHS (Ministry of Health et. al, 2001) that was 39.8 percent among the same age group. However, unlike national survey, this one was a study of small village, which is located very near to the capital city. So, it is a matter of concern that being near to the city, still they have such a high percentage of early marriage. Mean age of marriage is 15.8 in Goldhunga. Study also reflected that, among married adolescents, 15 years was a peak period of getting married (28 percent) whereas Ministry of Health et. al, 2001 survey showed the national figure of 16.6 years among the ever married 15-49 years' women in Nepal. It is matter of satisfaction that this study revealed the decreasing trend of marriage in early age, and no one is seen married presently in the age group 12 – 14 years among study population in Goldhunga. According to the study finding, minimal age of marriage was 12 in Goldhunga. Marriage in such a tender age could be a damaging event for adolescent girl's physical development and for nutrient store also. Customary of entering into child bearing immediately after marriage is major drawback of adolescent marriage and a strong contributing factor for school dropout, low nutrient store, more workload, early pregnancy/ childbirth, increased morbidity and week health condition of the girls.

Table 4.5

Marital and motherhood status of the adolescents by age (percent)

Marital and motherhood status	Age	
	12~14 n=105	**15~19 n=149**
Unmarried	100.0 (105)	61.7 (92)
Already married	-	38.3 (57)
Pregnant (among married population)	-	8.7 (5)
Already mother (among married population)	-	30.0 (44)
Mother with one child (among married population)	-	52.3 (23)
Mother with two children (among married population)	-	47.7 (21)

The digit in parenthesis indicates n

4.1.7 Pregnancy status

Adolescent pregnancy and motherhood is a major social and health issue in Nepal. Early pregnancy and motherhood can cause sever nutritional problem for both the mother and child. Adolescents are still in their own growing phage, so being pregnant or mother in this stage is very critical nutritionally for both mother and child. Number of literature has cited about the teenage pregnancy and its association with high risk pregnancy, low birth weight baby, low survival rate of both mother/ child and high prevalence of anemia.

In this study the pregnant adolescent girls were also included in order to collect information about teenage pregnancy situation of the Goldhunga. Study found that among the married adolescents, 8.7 percent (2 percent in total) were pregnant (table 4.5). This figure is similar to the result reported by Ministry of Health et. al, 1998 survey. Though the pregnancy percent is low, being in a very vulnerable age the cases cannot be ignored. Among these, one of the pregnant respondents was in a very tender age of sixteen and rests were in the age 19. The details about the pregnant respondents were given in 4.8.

4.1.8 Adolescents with children

Early motherhood is associated with higher level of fertility and thus reducing the chances of educational and employment opportunities of women. It is also a contributing factor for poor nutritional status / health of the girls as well. This factor is then considered in this study to see the trend of childbearing among Goldhunga adolescents.

Among the surveyed adolescents of age group 15 - 19, 30 percent (17.3 percent in total cases) were already mothers of one or more children. This figure reflects exactly the same trend shown by Ministry of Health et. al, 2001 NDHS survey where it was revealed that 17 percent adolescents living in the hills have begun childbearing compared with 20 percent in mountain and 26 percent in terai region. Among married studied population of Goldhunga, 52 percent girls had one and 47.7 percent had two children. It also reflects the similar trends shown by last census of Nepal where half of the 15-19 age adolescents were married and one fourth of girls were already a mother of first child. Being a mother in her own "still growing age" is very critical and risky for both mother and child.

This Goldhunga study reveled that approximately 19 percent adolescents of study area were pregnant or already a mother of their first child. This result is showing the same result if compared with Ministry of Health and Population et. al, 2006 which also shows 19 percent of women age 15 – 19 have already had a birth or are pregnant with their first child.

4.1.9 Food distribution pattern within the family

Food distribution pattern in a sense shows the family system whether they are still in traditional way of "first male" system or changing with the time and have more liberation in food distribution. It is well documented in research literatures that Nepali society is predominantly patriarchal and it reflected as well in the food distribution system. Last person to have his/her meal is always a looser in terms of nutrient sufficiency. This study shows that still more than one fifth (23.6 percent) of the family had the system of "male first" while eating. Though some figures were also very encouraging, for example – more than half (54.3 percent) family had a practice of eating food together and 7 percent family had a system of giving food to children first. Whatever the practice family has, the study also revealed that almost half (49.2 percent) respondents admitted that the last eater were the mother in the family and 11.8 percent admitted for the female members. These figures show the existence of the discrimination on food distribution pattern and the practice of "women eating last" what ever remained is still prevailing in the society which is one of the crucial social reason of high rate of under nutrition (almost 50 percent) among women (Ministry of Health et. al, 2001) in Nepal. One thing is noticeable in Goldhunga, especially during morning time whoever goes out from the house earlier (for selling things, for schooling or for other purposes) s/he/he eats first and so on. So some time it is not so significant that who eats first but as a system it is ***male first*** traditionally which was confirmed by almost 50 percent respondents. This

practice is harmful in the sense that last eater is a looser nutritionally and this could be one of the contributing factors for low nutritional status of the girls in Goldhunga.

This research also tried to gather information whether there were discrimination among sons and daughters. It is quite enthusiastic that majority (90 percent) respondents of both age groups denied about discrimination during food distribution. Only nearly 10 percent of the respondents admitted that there are discriminations which the researcher found very positive. About the type of discrimination while distributing food in household level, most of the respondent (56 percent) among who claimed there is “discrimination”, said that their brother were given more food than her while 44 percent said that their brothers get nutritious food (ghee, curd, milk etc.). Though research had shown that the level of discrimination is low but the practice and its' effect cannot be ignored. Goldhunga village is also a typical Nepali village having system of male supremacy in their behavior but changing lifestyle with the pace of time is also noticeable.

4.1.10 Household work distribution system among boys and girls

Study tried to see the work distribution system among son and daughter. This factor is helpful to assume the share of workload and its impact on girls’ nutritional status. When asked about responsibility of doing household chore, one fifth (20.1 percent) of the respondent informed that it is the responsibility of daughters but rest 80 percent respondent denied for only of their and said that male members also do the household chore. This was also an encouraging fact the research reveled and showed the increasing trend of participation of male members in the household activities.

4.2 Nutritional/health status of the respondents

This chapter mainly focuses on the nutritional status of the study adolescents such as height, weight and BMI. Here, attempt has also been done to analyze general health condition including nutrition deficiency symptoms of the adolescent girls. Besides this, morbidity pattern, meal pattern, habit of taking locally available nutritious food and normal food habit are also mentioned in this chapter. This chapter also dealt with the work pattern of study population.

4.2.1 Height

Normally, the height of the women is associated with past socio economic status and nutrition during childhood and adolescents. But in the case of adolescent girls one can not predict that it is her real height for her life. They can reach their pick height during any stage of the adolescence period depending upon heredity and environment. In the case of adolescent pregnancy a girls height is used predict the risk of difficulties in deliveries because small stature is associated with small pelvic size and the potential for obstructed labor. The cutoff point for the height at which a mother can be considered at risk can be varies between population, but normally falls between 140 -150 cm (Ministry of Health and Population et. al, 2007).

Table 4.6

Mean Height (cm) of the respondents compared with NCHS reference standard

age (yrs)	*mean ht. of the respondent*	*NCHS standard (ht.)*			
		mean	***-1SD***	***-2SD***	***-3SD***
12	132.53	151.2	144.7	137.9	131.1
13	141.41	159.5	152.4	145.7	139.0
14	143.47	161.5	153.7	147.0	140.3
15	149.78	162.4	155.0	148.3	141.5
16	147.92	162.8	155.7	149.1	142.4
17	148.57	163.0	156.7	150.4	144.1
18	148.20	163.1	157.7	151.8	145.8
19	147.35	*na*	na	na	na

This study showed a very week status of height among the respondents (appendix Q). When calculated age wise (12 to 19 years) mean height of the respondents, it gave the mean of 132.53, 141.41, 143.47, 149.78, 147.92, 148.57, 148.2 and 147.35 respectively according to chronological age (table 4.6). When comparing with NCHS reference mean height, all the respondents fall below -2 SD and are categorized as high risk (according to Ministry of Health and Population et. al, 2007 description). This is the reflection of inadequate consumption of nutritious food during their lifetime. NDHS 2006 (Ministry of Health and Population et. al 2007) also shows the problem of stunted growth among population despite years of effort to reduce malnutrition. Research have shown that it is hard to achieve reference height unless consumption of very good nutritious diet along with sufficient protein, calcium and vitamin D.

4.2.2 Weight

Weight shows the density of the bone and muscle mass of the body. In a normal condition, proportionately a good body mass (according to reference weight for age) is a symbol of good nutritional status and can lead healthy life.

Table 4.7

Mean Weight (kg.) of the respondents compared with NCHS reference standard

age (yrs)	*mean wt. of respondents*	*NCHS standard (wt.)*			
		mean	*-1 SD*	*- 2 SD*	*- 3 SD*
12	28	41.5	34.5	27.4	20.4
13	35	46.1	38.4	30.8	23.1
14	37	50.3	42.3	34.2	26.2
15	42	53.7	45.5	37.4	29.2
16	46	55.9	47.9	39.8	31.8
17	44	56.7	49	41.3	33.7
18	46	56.6	49.4	42.1	34.8
19	46	*na*	-	-	-

Unlike height, the weight of the respondents seems fairly good if compared with NCHS slandered reference. This might be due to short stature of the studied girls which is already reflected in the figure 4.2. Mean weight of all the respondents were fall between -1SD and – 2 SD of reference weight- for- age (appendix R). Table 4.7 shows the mean weight of the study cases. According to age range of 12 – 19 years the mean weight (kg) of the study cases were 27.97, 35.25, 36.98, 41.94, 46.39, 44.04, 46.24 and 45.94 respectively. Though satisfactory if consider this variable as an only parameter to see the healthiness of the subject but weight only is not sufficient to predict nutritional status of an individual independently. So, more elaboration has done in the following chapter of BMI.

4.2.3 Body Mass Index (BMI)

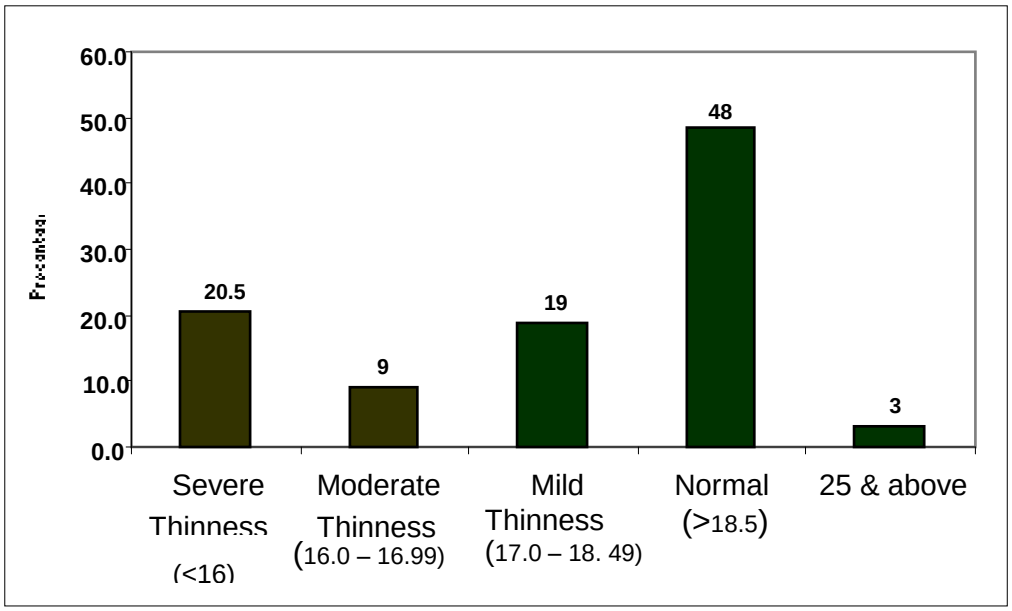
Good nutritional status is essential for the well-being of women and for the growth and development of their children. Nutritional intake and store of the mother determine the child's nutritional intake and in turn physical growth in uterus. Basically, BMI tells two things about the nutritional status of women. First, since many nutrition-related problems are linked to underweight or overweight, BMI gives an indication of women's health status. Second, BMI is an important indicator of the probable outcome of a woman's

pregnancy. A study in India, for example, found that 41 percent of babies born to moderately underweight women (BMI of 16 to 17) were born underweight (less than 2 500 g). The figure climbed to 53 percent when the mother's BMI dropped below 16. Likewise, an obese woman runs a much higher risk of complications during pregnancy and of having a difficult delivery.

WHO has recommended Body Mass Index (BMI) as an appropriate parameter for the assessment of nutritional status of the female population. Among the various national level researches, only Ministry of Health et. al (1998) MMSS survey had used this indicator to assess nutritional status in Nepal first time. This research also adopted same parameter used by NMSS to estimate nutritional status of adolescent girls through BMI in study area.

Figure 4.2

BMI of the adolescent girls (percent)



Above figure 4.2 shows the prevalence of thinness among study adolescent girls that is relatively very high in Goldhunga village. Normal BMI (BMI > 18.5) percent in study area was 48.4 where as national average as shown by NDHS (Ministry of Health and Population et. al, 2006) was 71.6 percent among adolescents of 15 – 19 age group. Mild thinness (BMI between 17 – 18.49) prevalence rate was 18.9 among study adolescents that was almost the same figure as shown by NDHS (2006) that is 18.2. However, sever thinness (BMI < 16) prevalence rate was again very high among study cases i.e. 20.5 percent, but the national average (ibid) was 8.1. WHO has recommended that the prevalence of over 20 percent with a BMI less than 18.5 constitutes a serious public

health problem (Ministry of Health et. al,, 2001) and highlights the urgency to ensure that the nutritional requirements of girls need to be satisfied. Otherwise, a larger number of future generations and their children will be, malnourished, less productive and will be a big burden for the nation's prosperity. Here, urgency to take immediate action to improve nutritional status of the adolescents is a felt need because of exceed in cutoff point set by WHO.

Weight, height or BMI are the strong indicator of nutritional status of a person. The major intention of the present study was to asses the nutritional status of adolescent girls so these measurements were taken to assure the status of target group. Viewing these measurements, it is predictable that the nutritional status of the adolescent girls is poor in the study area. The mean height and weight of the studied adolescents are far below the NCHS mean. Height of the girls is seen even poorer – fell bellow - 2 SD. It is identified as chronic malnutrition in the form of stunted growth. Various researches show that stunted growth influences whole life cycle including reproductive health of the girls. So more attention should be given to this group and nutrition program need to be focused by which stunted growth can be reduced.

It is obvious, if weight and height is low then BMI is also expressed as low. This study result also justifies the same. More than 50 percent girls have shown low BMI in the study analysis. Though matches with national figure of malnutrition prevalence, it could have marked influence to their reproductive health. Low BMI is associated with anemia, low nutrient store, low pregnancy weight gain, low birth weight, high maternal mortality, high infant mortality, still birth and small for stature baby.

4.2.4 Anemia prevalence

The adolescents were asked about various symptoms related to low hemoglobin concentration in blood to know whether they were anemic or not. The questions were mainly focused on the problem like feeling of fatigues after doing even a little work, headache, breathlessness and craving to eat clay.

Table 4.8

Sign & symptoms of anemia among adolescents (percent by age)

Reported sign & symptoms	**Age**	
	12 -14 n= 105	**15 -1 9 n= 149**
feel of fatigue even after doing few works	29.5 (31)	37.6 (55)
headache	51.4 (54)	59.7 (88)
difficulty in breathing	10.5 (11)	18.1 (27)
craving to eat clay	2.9 (1)	4.7 (7)
want to sleep without doing anything	14.3 (15)	16.8 (25)
Observed Sign & symptoms of anemia		
pallor in lips		
yes	33.3 (35)	34.2 (51)
no	66.7 (70)	65.8 (98)
Color of inner eyelid		
yellow	6.7 (7)	5.4 (8)
white	41.9 (44)	43.0 (64)
redishpink	51.4 (54)	51.7 (77)
Color of tongue		
yellow	1.0 (1)	0.7(1)
white	40.0 (42)	43.6 (65)
redishpink	59.0 (62)	55.7(83)

The digit in parenthesis indicates n

Above table 4.8 shows the sign and symptoms of anemia which were commonly felt by the study cases and observed by the researcher herself. Study revealed that majority of the adolescents (65.7 percent) did not feel tiredness whereas only 34.3 percent made positive response for it. Relatively high percentage (58 percent in total) of adolescents of both age groups expressed that they have frequent problem of headache in comparison to total 43.1 percent who respond negatively for it. Nearly 15 percent respondent said that they have a problem of breathlessness in contrary of total 85 percent who responded that they had no such problem. More than 4 percent in total respondent said that they had a willingness to eat soil and 15.4 percent respondents admitted of sleepy tendency during the daytime also. Beside that 2.4 percent adolescent complained about the tendency of

nausea (*ringata lagne*). When these symptoms were compared with the sign suggestive of anemia, a general pattern of similarity between these sign and symptoms was noted.

These biomedical sign of anemia among respondent were justified by the sign and symptoms observed during the study particularly to observe the pallor in lips and paleness of the inner eyelids and tongue. Survey result showed that nearly 33.9 percent adolescents had pallor lips and 48 percent had pale/ white inner eyelid and paleness of the tongue was observed in 43 percent. This showed the possibility of nearly 50 percent adolescents of Goldhunga are suffering from anemia. Though, these sign and symptoms were more self reported and observed by the researcher herself, the severness of problem cannot be ignored especially in the case of adolescent girls.

4.2.4.1 Hemoglobin (HB) level

Anemia is very commonly cited nutritional problem of adolescent girls. This study also tried to examine HB level of the girls so that the status of anemia problem could be determined. So clinical test of HB was done among more than 29 percent (n=74) of the total sampled population. Only non pregnant adolescent were included in this test.

Table 4.9

Anemia prevalence (by hemoglobin) among adolescents (non - pregnant)

Type of anemia		Frequency	Percent
1.	Moderate anemia 7.0-9.9 g/dl.	13	17.6
2.	Mild anemia 10 -11.99 g/dl.	29	39.2
3.	Normal 12 & > 12 g/dl.	32	43.2
	Total	***74***	***100.0***

Result showed that altogether 56.8 percent adolescent were suffering from mild to moderate type of anemia (by hemoglobin) in study area (table 4.9). Among them, 39.2 percent mildly and 17.6 percent were moderately anemic. According to the NDHS, 2006, national figure of any kind of anemia (HB < 12 g/ dl) prevalence percent is 39 in age 15-19. It is satisfactory that sever anemia was not observed and also not seen while doing HB test among the sampled population where as Ministry of Health and Population et. al,, 2007 has shown 0.4 percent prevalence nationally. The result obtained from the sign and symptoms of anemia among study cases is being justified by the hemoglobin test also. In the basis of these results, it can be predicted that more than 56 percent

adolescents of the study area were suffering from any kind of anemia. A cut off point for the diagnosis of anemia was 11.9 g/dl (ibid.)

Table 4.10

Nutritional status of Goldhunga VDC adolescent's in-comparison with nutritional status of SARCC countries adolescents

Country	**Total % Of Adolescent Population (census report)**	**Study**	**BMI (%) (thinness < 18.5)**	**Stunting (%) (ht. for age)**	**Anemia (%)**
Bangladesh	23	Sahabudin et.al. (2000)	67	48	Girls; 98.8 at 10yr. to 100 at 17yr.
Bhutan	23.9	WHO (1997)	na	na	56
India	21	web*	53	32	> 70 in rural communities
Maldives	23.6		39	30	40.7
Nepal	23	Ministry of health and Population et. al. 2007	26.3 (< 18.5)	14 % are shorter than 145 cm	36 (15-49 yr.age)
Pakistan	23.3	na	na	na	-
Srilanka	17	Family Health Survey 2000	9 % with BMI < 16	na	40
Present study	**54 (of total adolescent girls of VDC)**	**Goldhunga**	**48.5**	**Mean ht. of all studied girls are < NCHS reference mean**	**50**

Source -* **http://www.searo.who.int/LinkFiles/Nutrition_for_Health_and_Development_6-Nutritional_Issues_Among_Adolescents.pdf**

Above table 4.10 is the summary of nutritional status of the girls of Goldhunga compares to the SARCC countries adolescents including Nepal. Result gives very painful picture of malnutrition in the form of stunting of the studied girls. Thinness prevalence is also

high among the girls. Similarly iron deficiency is high if compared with Maldives and Pakistan but seems little better than Bhutan, Bangladesh and India.

4.2.5 Eye problems

Adolescents were questioned i.e. regarding ability to see in bright light and in dark light and other problems to know whether they were suffering from eye problems though it was not possible to do clinical examination due to constrain of resources.

Table 4.11

Percent (by age) distribution of adolescents for various eye problems

Eye problems	Age	
	12 -14 n=105	**15- 1 9 n=149**
no problem	59.0 (62)	79 (53)
problem in bright light	19 (20)	20.1(30)
problem in night vision	1.9 (2)	0.7 (1)
pain/burning sensation/ itching / tearing	16.2 (17)	16.8 (17)
visibility problem while reading	1.0 (1)	0.7 (1)
problem in bright light & problem in night vision	-	2.7(4)
all problems	-	3.4 (5)
problem in bright light & visibility problem while reading	1.0 (1)	-
problem in bright light & pain/burning sensation/itching/tearing	1.9 (2)	2.7 (4)

The digit in parenthesis indicates n

Study reveled that (table 4.11) nearly 20 percent adolescents complained about the photophobia (difficult to see in bright light) and more than 2 percent in total complained about inability to see in dark. Conversation with respondents about various eye problems and presence of various related symptoms made a ground to say that it as night blindness. According to Regmi and Adhikari (1994) the cutoff value that defines public health significance for night blindness is > 1.0 percent. Considering this reference, eye problem in Goldhunga is emerging as a public health problem. Among the respondent, nearly 19 percent had complain about the problem of bright light, pain / burning sensation/ itching / tearing of the eyes. Similarly, 1.6 percent had problem of both photophobia and inability to see in dark and 2 percent adolescent had all above-

mentioned problems related to eye. In totality, this result gives a clear vision of various eye problems prevailing among Goldhunga adolescents that shows vitamin A deficiency status as well. Another interesting thing is – the adolescent girls of age 15 – 19 are more sufferers of the eye problems than the age 12–14. Poor diet but more work has created a high deficiency of vitamin A and other nutrients which support for vision.

4.2.6 Iodine status

This research tried to know about the practice of type of salt consumption, respondents knowledge about iodine availability in food, iodine deficiency syndrome among survey adolescents by observation of visible goiter (if any), mental retardation and dwarfism among study population.

Table 4.12

Percent (age- wise) distribution of adolescents for awareness about Iodine

Listened about the need of iodine	**Age**	
	12 – 14 n=105	**15 -19 n=149**
yes	91.4 (96)	89.9 (134)
no	8.6 (9)	10.1 (15)
Known about the availability of iodine in		
salt	89.6 (86)	91.8 (121)
green vegetables	2.1(2)	2.9 (2)
pulses	1.0 (1)	-
leaf vegetables	1.0 (1)	0.7 (1)
meat / fish	-	-
salt & green vegetables	3.1 (3)	3.0 (4)
in all above mentioned item	3.1 (3)	2.2 (3)
Types of salt used		
phoda	5.7(6)	3.4 (5)
packet salt	92.4 (97)	95.3 (141)
both	1.9 (2)	1.3 (2)

** The digit in parenthesis indicates n*

Result showed in table 4.12 reflects some interesting findings that among surveyed adolescents, 98.4 percent had no any significant sign and symptoms of iodine deficiency. One among the surveyed adolescent had visible goiter and 3 were mentally retarded.

According to the Director of *Micronutrient Initiative* (personal communication, February 1, 9 2006), there are 350 causes that make man mentally retarded. So here, one can not conclude that mentally retarded adolescents of Goldhunga were due to lack of iodine solely, there might be the Jens or other environmental factors that contribute for it and this could be an area for further study or investigation. Study was also able to say that nearly 10 percent adolescents of the study area were still unaware about the need of consumption of iodine, whereas 90 percent adolescents were aware about it. This study also tried to asses the knowledge of respondents about source of iodine. This study findings reveled that among the aware adolescents, 90 percent knew that salt is the unanimous source of iodine. Other remaining 10 percent indicated green / leafy vegetables, pulses, meat and fish as source of iodine. The awareness level of the adolescents about source of iodine was better among the age 12 – 14 than the age 15 – 19 group.

Asked about the type of salt consuming by the respondents, almost 95 percent adolescents admitted the practice of using iodized packet salt (*aayo nun*) where remaining 4.3 percent were still using *phoda* salt (crystal salt) in their households. One percent respondent's family were using both *phoda* and *aayo* nun in a regular basis. NMSS (Ministry of Health et. al, 1998) study has showed the percent of central hill population (27.5 percent) who were using refined salt was high than other parts of the country. Kathmandu and surrounding villages are located in central hill and present study showed the practice of using packet salt is very common / highest too and justified the results shown by NMSS survey of Ministry of Health et. al, 1998.

Normally anemia, eye problems and iodine status is closely associated with nutritional status and are taken as an indicator while assessing it. In this study, it was tried to see whether these indicators support the prevalence of under nutrition. Here, positive link is seen while analyzing the result. Almost similar percent of girls were seen under normal category of hemoglobin and BMI. This reveled that those who have lower BMI are likely to fall under any kind of anemia or visa verse. Similarly eye problems are seen widely among study cases. Going through the meal pattern and eating habit of the respondent, it can be predicted that low consumption of nutritious diet including meat, fish, fresh vegetables, fruits are the root cause of various eye problems. These all factors are associated with under nutrition and contribute to low nutritional status.

Iodine consumption seems satisfactory. But number of things such as – air exposure of iodized salt while storing and cooking, amount of taking iodized salt, length of packaging and expiree date of iodized salt are matter of concern and more research is

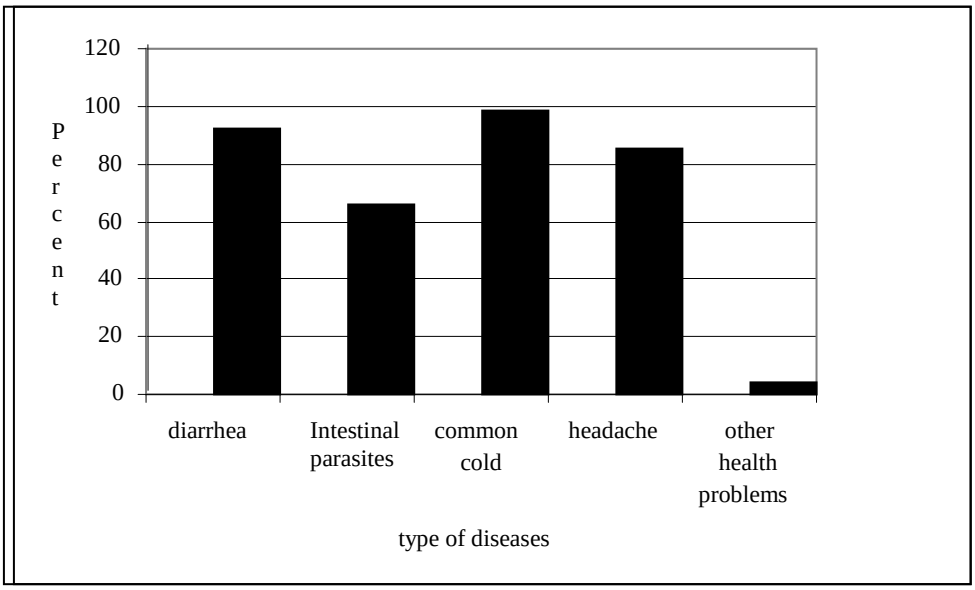
needed to answer those questions. Here, researcher does not claim of finding accurate information about iodine status only by asking question. More clinical based research is needed to see the iodine status of the girls.

4.2.7 Morbidity pattern

Normal health condition of a person is the key factor for healthy living and is due to achieving a good nutritional status also. It is an established fact that frequent illness and infection have a negative effect on their weight, height and BMI. To know whether the adolescent girls were suffering form frequent illness by common infectious diseases like diarrhea, worms, fever, common cold investigator tried to collect data about the prevalence of above mentioned diseases. This study also tried to find out the frequency of prevalence and its effect on their overall nutritional status.

Figure 4.3

Common morbidity pattern of the adolescents (by percent)



4.2.7.1 Diarrhea

Diarrhea infection is one of the main contributing factors to high morbidity and mortality among children and young people in Nepal. Though precise and nationwide study have not yet done among the adolescent population to look these aspect but various other health related researches showed that the consequences of frequent diarrhea episodes may lead to high morbidity by which negative impact could be seen in the total health and nutritional status of the adolescents.

Table 4.13

Morbidity prevalence pattern (per year) among adolescents (percent by age)

Prevalence of various infections	once	twice	three times	four times	five times	many times
diarrhea						
12 - 14 years	11.0 (11)	42.0 (42)	21.0 (21)	11.0 (11)	6.0 (6)	8.0 (8)
15 - 19 years	5.2 (7)	46.3 (62)	17.2 (23)	15.7 (21)	5.2 (7)	9.7 (13))
intestinal parasite						
12 - 14 years	8.5 (6)	80.3 (57)	5.6 (4)	2.8 (2)	-	2.8 (2)
15 - 19 years	8.3 (8)	78.1 (75)	7.3 (7)	2.1 (2)	-	4.2 (4)
common cold						
12 - 14 years	-	13.7 (14)	18.6 (20)	22.6 (20)	8.8 (9)	38.2 (40)
15 - 19 years	0.7 (1)	11.5 (17)	18.9 (28)	18.9 (28)	15.5 (23)	33.8 (50)

The digit in parenthesis indicates n

Present study findings (table 4.13) revealed that 92 percent of respondents had reported the episode of diarrhea one or more time in a year. Only 8 percent of the respondents had no diarrhea infection during the year. The prevalence rate of diarrhea is very high in study area comparing to the study done by BCHIMES (National Planning Commission and UNICEF, 2000) and Regmi and Adhikari (1994) where the reported case of diarrhea was 35 percent. Very common and 24 hour excess of tap water is a good facility of the village but viewing the larger percent of diarrhea affected population, researcher assumed that the water is not pollution free. They have a habit of drinking tap water directly without boiling or treatment to make it germ free. During observation, it was noticed that they (villagers) were not much concerned about the sanitary habit of living and conscious about water pollution. May be this is a cause of high rate of diarrhea prevalence. Looking at the frequency prevalence of episodes, study showed (table 4.13) that 44.4 percent reported 2 times, 18.8 percent reported 3 times, 13.7 percent reported 4 times and 5.6 percent 5 times in a year. Nine percent had many times of diarrhea episodes and 7.7 percent faced only one time of this infection. Almost common episode of this infection showed the poor sanitary practices and less awareness about the sanitation among the households. Raising cattle and other domestic birds and animals (chicken, duck, pig, dog etc) freely in the same house where they were living, poor cleaning practice and poor but open drainage system were also contributing for the high prevalence of diarrhea.

4.2.7.2 Intestinal Parasite infestation

Several studies have proved that parasite worms (hook worm, tapeworm etc.) are the major cause of poor nutritional status and consequences of high rate of anemia among the people especially children and adolescents. Due to the water pollution and poor sanitary practice/handling of food, this type of parasitic infestation is very common among the people. But major national surveys are mainly focused on children for this type of morbidity though adolescents are also seriously affected by it and its consequences.

This study revealed (table 4.13) that, in total, 66 percent adolescents had experienced one or more times of worm prevalence but 34 percent respondent never experienced this infection. Looking at the frequency of episodes (table 4.13) 79 percent reported 2 times, 6.3 and 4.3 reported of 3 and 4 times of prevalence in a year respectively. Similarly, 2.3 percent said many times of suffering from this infection through out the year. Observing the sanitary practice of the village and prevalence of diarrhea disease, intestinal parasite prevalence rate is relatively low because de -worming tablets are distributing through school twice a year so those who are attending school were benefited by it. Beside this, those who visits clinic were also given de-worming tables besides other medicine or iron tablets.

4.2.7.3 Common cold

Due to heavy pollution of air, common cold is very frequently prevalent infection in cities and surroundings. This common infection has a synergistic relationship with malnutrition. Infections interfere with the absorption of micro nutrients. Sick person eat less due to anorexia for the exacerbating the infection. Continuation / repetition of this condition cause bad appetite and ultimately fall under malnutrition cycle.

This study revealed (table 4.13) that adolescents of Goldhunga fall sick more frequently due to common cold. Majority of adolescents (98.4 percent) were victim of this infection one or more times a year. Frequency of episode of prevalence (figure 4.3) showed that among the total studied adolescents 35.4 percent were caught by common cold many times in preceding year. Some 12, 19, 19.5 and 13 percent adolescents were affected by this infection 2, 3, 4 and 5 times a year respectively. Among the study population, only a small portion of respondents (1.6 percent) reported of never affected by this infection. Though national level survey failed to cover adolescents in this area, pocket survey done by Regmi and Adhikari (1994) in far western had reported ARI as a common ailment where 32 – 48 percent was suffered. Compare with findings of Regmi and Adhikari (1994), the problem of common cold is very high in Goldhunga and overall impact of

this problem can be seen very clearly as a poor health and nutritional status of the adolescents.

4.2.7.4 Other health problems

Beside above mentioned pattern of sickness, some data were also taken if adolescents had any other health problems. More than 80 percent girls reported that they have problem of headache which is show in figure 4.5. This problem is seen as a common problem of almost all girls of the study area.

Table 4.14

Age- wise (percent) distribution of adolescents suffering from other health problems

Other problems (health related)	**Age**	
	12 – 14 n=102	**15 -19 n=146**
body pain	2.0 (2)	2.7 (4)
ringatalagne	2.0 (2)	2.7 (4)
irritation	-	0.7 (1)
waist pain	3.9 (4)	3.4 (5)
leg pain	1.0 (1)	0.7 (1)
blood in stool	1.0 (1)	-
hearing problem	1.0 (1)	
chest pain	-	0.7 (1)

∗ The digit in parenthesis indicates n

Analysis of the study results (table 4.14) give ample of base that this headache problem could be the result of anemia, long working hour and intense work under sun/ wind along with poor diet. About other health problems faced by the studied adolescent girls, result showed that some 11 percent had problems such as – body pain, leg pain, waist pain, irritation and *ringatalagne*, but most cited problem of both age groups was waist pain (3.6 in total). This problem might be created by heavy works done by them such as- carrying firewood from the jungle, carrying manure, cloth washing and others.

Though, respondents suffering from various health problems were less but keeping in mind the healthy phase of life, these number are not ignorable. These adolescents are already associated with health problems as shown in figure 4.5, so mentioned problems

were additional one. Here the major concern is the nutritional status, and if adolescents faces these types of infections and other various health related problems regularly than their health might be poor which may lead to poor nutritional status. This type of condition can be seen in this study. Frequent morbidity weaken their productivity (physical and mental both) strength in present and in future as well. This could be a greater loss for these girls because they can suffer from intergenerational cycle / vicious circle of malnutrition and diseases which ultimately a great loss of nation itself.

4.2.8 Problems related to menstruation

Though the study was related to nutrition, so some information was collected about the problems related to menstruation also because this can influence the health of the girls as well. Present study reflected that nearly 40 percent respondents were suffering from one or more problems associated with menstruation.

Table 4.15

Common menstruation related problems faced by the adolescents (percent)

Menstruation related problems	Age	
	12~14 n=29	15~19 n=145
no problem	37.9 (11)	44.1(64)
no menstruation timely	-	3.4 (5)
heavy bleeding	-	3.4 (5)
less bleeding	6.9 (2)	4.8 (7)
pain in uterus	20.7 (6)	11.0 (16)
no menstruation timely, heavy bleeding & pain in uterus	20.7 (6)	30.3 (44)
less bleeding & pain in uterus	13.8 (4)	2.8 (4)

The digit in parenthesis indicates n

About the nature of the problem, nearly one fifth of the respondents (19.5 percent) were suffering from multiple problems of no timely menstruation, heavy menstruation and pain in uterus (table 4.15). Similarly 8.6 percent were suffering from pain in uterus. Here, it is seen that most of the adolescents were suffering from uterus pain that urge the need of further investigation and clinical examination also. Heavy bleeding (even hard to walk and sit) was experienced by 2 percent and less bleeding (only trace of blood loss) by 3.5 percent. Various health related studies showed that heavy bleeding could lead to anemia if plenty of nutrient stores are not in the body and failed to supply more iron /

nutrients in the body at that time. This happens to be one of the major causes of very week BMI and poor health of the adolescents which could be fatal in such a vulnerable age. Similarly, according to the gynecologists, hormonal imbalance could be a cause of low blood loss during menstruation and can be corrected after treatment.

Nutritional status is directly influenced by morbidity condition of the girls. It is proven by various researches that the growth of weight and height of girls could be stagnant if she is suffering from frequent illnesses. Present research find that overall health conditions of the adolescent girls are not satisfactory. The diarrhea prevalence is very high and frequency prevalence of common cold is also noted high. Frequent prevalence of these infections may lead poor health which could be seen in the form of poor nutritional status of these girls. Headache is another major problem faced by many adolescent girls of this village. Seeing all the conditions in which these girls are living, it could be predictable that low hemoglobin status, poor diet and more laborious work are major causes of headache. Here, more clinical investigation is needed to find out the root cause of frequent headache.

Looking at the relationship of morbidity pattern with nutritional status (BMI) of the studied adolescents, it is visible that more percent (96.2 percent) who fall under the sever thinness were suffered from diarrhea and the same percent of adolescent girls who fall under the sever thinness were suffered from common cold as well (appendix E). The percent of girls who suffer from common cold are seen critical because most of the girls are suffering from sever, moderate and mild thinness. Though, due to regular de-worming, intestinal parasites prevalence is relatively low than other infections. Its prevalence is seen and can be listed as another active cause of low BMI of the girls. Overall, less percent of girls of Goldhunga are seen in normal category of BMI. This result could be a predictor that frequent morbidity has influenced negatively and has created nutrient deficiency in the girls. This analysis result gives the ground to say that frequent morbidity is the cause of low nutritional status among girls of Goldhunga.

4.3 Meal pattern

Meal is a milestone of good health. The adolescent period is been trace out as an opportunity to catch-up growth next to the first year of life. More than 20 percent of height and up to 50 percent of bone mass are achieved during adolescence. These growths may not be achieved if proper and sufficient amount of nutrient are not supplied to the body. So food is crucial for the body development process and its normal functioning.

Table 4.16

Frequency of eating of food (including main course) per day by adolescents (percent)

Frequency of eating / day	Age	
	12 – 14 n=105	**15 -19 n=149**
two times	30.5 (32)	30.9 (46)
three times[6]	65.7 (69)	64.4 (96)
four times[7]	3.8 (4)	4.7 (7)

The digit in parenthesis indicates n

This study tried to collect information about the frequencies and types of meal taken by the adolescents. Results are expressed in the above table 4.16. According to the table, almost 65 percent of the total respondents of Goldhunga were eating three meals (including snacks in between) a day but only some 30 percent girls were taking food 2 times a day. Frequent eating is very suggestible especially for adolescents to meat their nutritional requirements in this rapid growing stage. But survey showed long gap between two major meals and in the mean time majority of the respondents were deprived from other complimentary food (snacks) for a long time of day. This could be a contributing factor for poor height, weight and BMI of the adolescents in study area. There is no any significant difference in frequency of eating between two age groups adolescents percentage.

Present study has given idea about the general food pattern of adolescent girls including main meal that were: tea in early morning, and *bhat (*cooked rice) *dal (*pulses of black gram or red gram popularly known as *musuro), tarkari (*vegetables), *achar* (pickles) in both main morning and evening meal (table 4.17). Some of the respondents were taking snacks in between two main meals. This is very normal food pattern and applicable for most of the study population. Almost all have similar meal pattern of the same above mentioned items, only the seasonal variation in *tarkari* could be observed. During the data collection period they mostly consumed *rayoko sag (mustard leaves), mula* (turnips) *& aalu (potatoes).* Tea is very popular beverage to drink. Morning tea was taken by more than 90 percent adolescent girls among study cases. Milk in morning drink was

[6] Three times meal includes 2 major meals and a snack in between.
[7] Four times meal includes 2 major meals and 2 time snacks in between

consumed only by 4 percent of the age 15 – 19. No one in the age group 12 – 14 drank milk according to study result though most of the family sells milk in a regular basis.

Bhat is the major food item and universal one in this study area. All respondents were eating it both the time – morning and evening and sometime as a snack in daytime also. *Da*l (*mas or musuro*) was also taken by majority (70 - 80 percent) of adolescents. These are main calorie and protein providing food consuming by the Goldhunga adolescents. Some 13 percent adolescents are taking milk or curd regularly with meal. *Achar* is also a popular item of the meal and taken by nearly three fourth of the respondent. This provides a trace of vitamin C which is essential for regular body functioning. But eating of animal product (goat meat, buff and poultry) was very optional and nominal portion of adolescents were taking it regularly. Surprisingly, no adolescents were found consuming fish.

Goldhunga study has proved the evidence that eating habit is largely influenced by the economic condition of the family and availability of food around. Except some differences among haves or have-not, more or less all studied family has similar economic condition so as eating pattern.

Table No. 4.17

Eating pattern of the daily food by the adolescents (by age)

age group	Early morning		Morning Food					Evening Food				
	tea	milk	*Bhat (Rice)*	*Dal (Mas or Musuro)*	*tarkari*	*achar*	other	*Bhat (Rice)*	*Dal (Mas or Musuro)l*	*tarkari*	*achar*	Curd/milk
12 - 14 years	104	-	105	86	102	75	17	105	75	101	74	15
Percentage	99	-	100	81.90	97.10	71.40	16.20	100	71.40	90.20	70.50	14.30
15 - 19 years	144	6	149	129	148	111	39	149	103	148	111	30
Percentage	96.60	4	100	86.60	99.30	74.50	26.20	100	69.10	99.30	74.50	20.10

Viewing at the eating pattern of the adolescent girls it could be easily generalized that they all have similar eating habit of taking *Bhat, Dal, vegetables, achar and milk / curd* during main meal. Qualitative data has revealed that the families have very rare habit of buying vegetables from the market. So, if they have vegetables in their land they eat but during off season only potatoes / dry beans and *maseura* (bought from market that is made up with low quality flour or *khesari- a verity of dal considered as non edible)* popularly known as nutrinuggets are the common *tarkari* of the kitchen. This type of habit largely influences the health of rapidly growing adolescents. Less consumption of fresh vegetables means low intake of vitamins and minerals which ultimately effects in the immunity power of them. This is proven true in the case of Goldhunga adolescent girls. Here, direct link between low consumption of fresh vegetables and high morbidity pattern is been observed.

4.3.1 Snacks

Snacks are important complementary foods that help providing important and required nutrients for the body. It also fills the gap between two main meals by giving some thing to the stomach for its natural functioning. Below are details about the type of snacks eaten by the adolescents in study area.

Table 4.18

Types of snacks eating by adolescent girls (percent by age)

Type of snacks eating	Age	
	12~14 n=101	**15~19 n=145**
chiura / tea	28.7 (29)	35.2 (50)
roti / tea	10.9 (11)	19.3 (28)
chauchau	8.9 (9)	4.8 (7)
makai / bhatmas / tea	13.9 (14)	17.2 (25)
bhat	7.9 (8)	4.1 (6)
biscuit/ dalmoth / pauroti / puffs	26.7 (27)	15.2 (22)
tea only	3.0 (3)	4.1 (6)

The digit in parenthesis indicates n

Based on 24 hour recall method, major portions of the adolescents (32 percent in total) had taken tea or *tarkari* and *chiura* (beaten rice) as snacks that are shown in table 4.18. Nearly 15 percent had taken *roti,* 15.4 percent took *makai / bhatmas* / tea and 5.5 percent ate *bhat* as a snack. Nearly, one fifth of the total studied adolescents took **'ready to eat food'** like biscuits, c*hauchau, pauroti*, puffs, *dalmoth*. These ready to eat food are very popular among them especially in the age group 12 - 14 and it is easily available in their doorsteps. Result shows that tea is universal items along with the snacks.

Looking at the eating practices of snakes, it is satisfactory that more than 70 percent adolescents were taking *chiura, makai, roti, bhat* for the snacks as these foods are considered nutritionally good food. But the portion of adolescents using 'ready to eat food' cannot ignore. These foods are considered not so nutritious and supplies low quality carbohydrates to the body. Habit of taking these food never support the rapid growth of body so retarded growth could be the result. Altogether more than three percent respondents were not taking any snacks and same percent of adolescents were drinking only tea during snacks time. In total, 6.6 percent adolescent among study cases were deprived from taking any snacks. Overall result of snacks eating pattern is not satisfactory. Adolescents need quality food eaten frequently but Goldhunga adolescent girls are not consuming snakes as a compulsory item. It is considered as optional. During conversation girls said that they eat snacks if available. This habit supports the result of anthropometric measurements. Survey result showed no significant differences in percent of respondent age wise for eating various above listed snacks (table 4.18) except in consumption of fast food like chauchau, dalmoth, pauroti, puffs/ biscuits. These food items are consumed more by 12 – 14 age group (26.7 percent) compare to 15- 19 age group (15.2 percent).

Frequency of eating is another important influencing factor when talking about nutritional status. Frequent eating is suggested to meet the need of fast cell multiplication in adolescent's body. This research showed that only little more than half the studied girls is taking food three times. Rest is taking only two times meal but no snacks in between. This type of habit is a strong contributing factor for low BMI of the adolescent girls of study area. Only two meals a day could not supply sufficient food / nutrients to support the growth of adolescent period that is proven by the cross tabulation of frequency of meal eaten and BMI (appendix F). The table shows that more number of girls fall under normal BMI who were eating 3 meals a day than their counterpart who eats two meals a day. Furthermore, long gap between two major meals may create health problem or gastric problem among girls.

Snacks are important complementary food to support nutrition and balance in the body. It helps to fulfill daily requirement of nutrients in the body as well. Present study shows that only less than half the studied population consumes snacks. Similarly, the type and amount of snacks consumed is not so satisfactory from nutrition point of view. More popular snacks are chiura / tea, roti / tea or fast food like biscuit, *dalmoth, puffs*. Study showed that less percent of the studied girls used to consume *makai bhatmas* that are available from their farm land and highly nutritious also. Here, more awareness about the need of frequent food and types of snacks is needed for the mother and the girls herself. Study analysis has also shown very positive association between snacks eaten practice and BMI of the adolescent girls (appendix G). It revealed that altogether more than 32 and 20 percent girls fall under the sever thinness who consumed *chiura* / tea and fast foods respectively. Though, *chiura* is considered as nutritious food, association with tea has degraded its bioavailability after consumption. In the case of fast food it is well-known that these foods are low in quality nutritionally, so it was expected that those girls who were consuming fast foods might have low BMI and study have proven it. Similarly, more percent of girls fall under any type of thinness who consumed only tea or chauchau as a snack, but, *makai/ bhatmas* consuming girls are less likely to fall under any type of thinness. So, as sown in the study result, one can predict that the nutritional status of the adolescent girls could be better if right type of snacks is eaten along with major meals.

4.3.2 Intake of common nutrient rich foods

Here, an attempt had made to take information about the eating pattern of nutrient rich but common foods that have a marked influence in the health, wellbeing and immune system of the adolescents. These nutrients rich food supplies protein, vitamin A, iron, calcium and other micronutrients which are not so much expensive and can be obtained from locally available foods. Adolescents are still on the phase of rapid growth and development, and need these nutrients more to support their growth and development. These foods not only contribute for physical growth and development but also reduces adolescents morbidity ratio so that they can precede life very productively.

Table 4.19

Frequency eating of some nutrient rich foods per week by the adolescents (percent by age)

consumption of some nutrient rich foods /week	Age	
	12~14 n=105	15~19 n=149
green leafy vegetables (GLV)	99.0 (104)	99.3 (148)
meat / fish	80.0 (84)	81.2 (121)
seasonal fruits	93.3 (98)	94.0 (140)
milk / curd	87.6 (92)	90.6 (135)

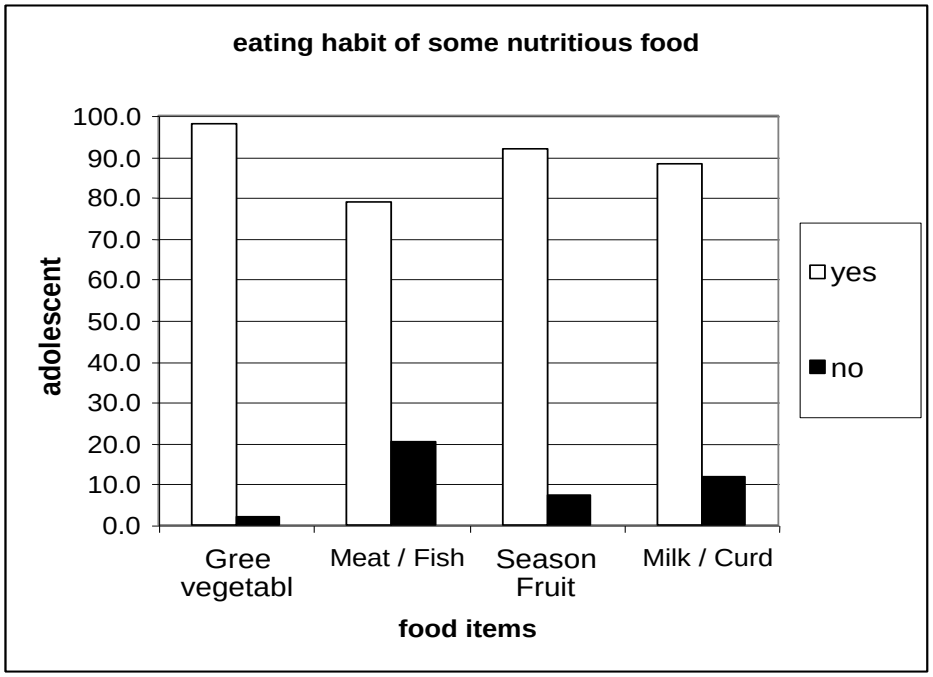
The digit in parenthesis indicates n

Green leafy vegetables **(**GLVs*)*

Figure 4.6 and table 4.19 explains nutritious food consumption trend among adolescents of Goldhunga VDC. Green leafy vegetables are popular and common *tarkari* of Nepali household which is a rich source of micronutrients. Goldhunga is not exception of this. The major season of GLVs (popularly- rayo / toriko sag) is December, January and February. Every household of study place, who has even a small piece of land, had planted GLVs undoubtedly and it is main *tarkari* at that time. Incidentally, the data collections were done during those seasons so result was very positive and little bias also. It is quite encouraging that almost all respondent had eaten GLVs any time of the week. Looking at the frequency of eating GLVs per week, in total, 54 percent adolescents were eating daily, 34 percent respondent had a practice of eating three times and 25.2 percent four times. Very nominal percent (0.8) did not like GLVs and some occasional eater's households had no land to plant it. Both age group had almost similar percent of respondents who were eating GLVs. Regmi and Adhikari (1994) survey also reported of eating GLVs by more than 90 percent of the respondent within past two week's period in the study area. To some extent these practices of taking GLVs definitely enhance their micronutrient status but reduction of GLV intake during off season is a matter of concern. Though it is available in and around Kathmandu through out the year but Goldhunga people have less habit to buy vegetables from the market, so during conversation they admitted of rare GLV consumption during off season.

Figure 4.4

Graphic view of adolescents (percent) who consume some nutrient rich foods



Meat / fish

These richest sources of protein are not so commonly taken among the study population. Result showed that about 20 percent adolescents (figure 4.4) denied taking any kind of meat and meat product and 47.2 percent used to take it occasionally. Almost 14 percent used to eat meat once and 11.8 percent twice a week. Very negligible percent (1.6) adolescents were taking meat daily. While talking during data collection it was noticed that goat meat is popular in this categories but nobody was taking fish though compare to goat meat, it is good source of protein and less expensive also. It is a matter of concern that very poor consumption of protein giving food is a cause of poor health and nutritional status of the Goldhunga adolescents including very poor BMI.

Ethnicity has a direct influence on the frequency and kind of meat consumption. Newar community was preferably consumed buff meat with more frequently so adolescents of such family were also benefited by it. But Brahmin families were restricted for it so they (who could consume) consume goat meat only. This is a common ethnic and cultural practice of Nepali household.

Seasonal fruits

Seasonal fruits are also a rich source of micronutrients and vitamin C that provide iron and strengthen immunity power besides other various benefit to the body. Survey report showed that almost 10 percent (figure 4.4) denied eating seasonal fruits and larger portion (64.6 percent) of surveyed population reported of eating it occasionally. Nearly 25 percent adolescents were consuming it one or more time in a week. This consumption pattern is relatively low compare to survey of Regmi and Adhikari (1994) where consumption was reported 70 – 74 percent. Not so good economic condition and far from easy excess are the main cause of lower consumption of fruits.

Milk and curd

Milk / curd are considered as healthy food for every stage of the human being. Especially it is more essential for the growing person because of its richness in calcium. Consumption practices of these animal product foods are relatively better than other protein and micronutrient rich foods in Goldhunga. Survey showed that 48.4 percent adolescents were taking milk / curd daily whereas 33.5 percent consuming only occasionally. Compare to the Regmi and Adhikari's (1996) survey where it was reported of only 40 - 50 percent adolescents consuming milk, this result is satisfactory. In total the consumption pattern of milk is good than other foods like meat and fruits in Goldhunga. The very positive thing of this VDC's household is - even poor families also raising cow or buffalos, so milk / curd are easy excess for the girls. Only 10.6 percent respondent denied taking it. Those were the adolescents of such households who had no money to buy cattle or milk.

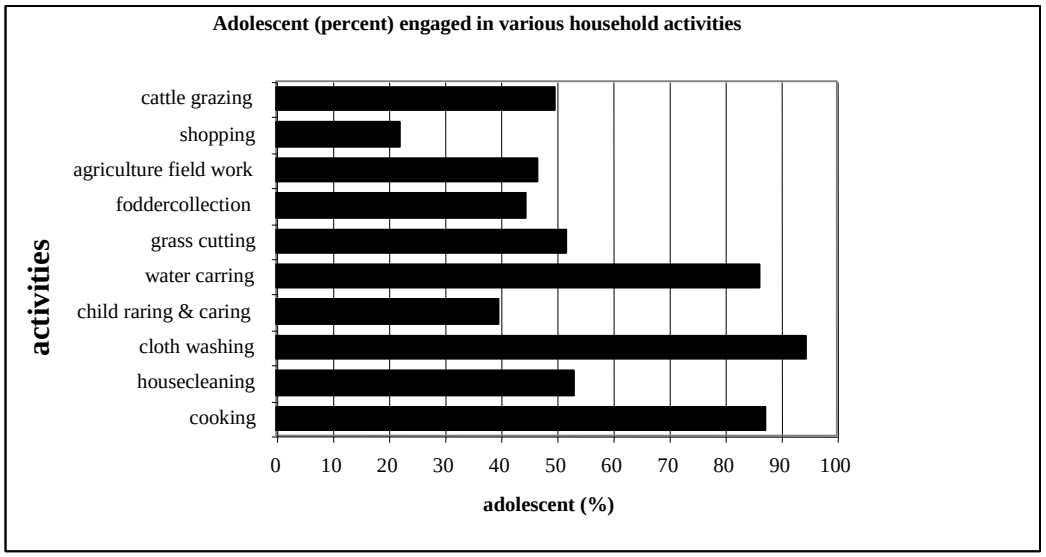
Above mentioned foods are considered as nutritious food because they provide required nutrients to the body such as protein, vitamins, minerals and other essential trace elements. Besides various activities these nutrients help growth of the cell and strengthen immunity power. But consumption of nutrient rich food by the girls is not so satisfactory in Goldhunga (figure 4.4). Animal protein – meat and fish consumption is very low. Milk and milk product consumption is also low though most of the family owns cows and buffalos and they sold milk for cash income. Lack of protein food might be responsible for the low BMI of the adolescent girls in Goldhunga. GLV's and fruits consumption seems better but it is highly seasonal and only for the short season period (2 – 3 months). But for the remaining period, the families of adolescent girls hardly buy fresh GLV and fruits for their own consumption.

4.4 Work pattern of the adolescents

Goldhunga adolescents are very laborious. They have to do various household chores beside study. Survey result showed that most of labor intensive work was performed by the adolescents. The landscape of the Goldhunga is hilly with full of up and down place so even those who were doing nothing have to spent more labor to go from one place to another or just to and fro from school. The nature of works (figure 4.20), according to survey is: cloth washing, household cleaning, water carrying, cooking, fodder collection, agricultural work, carrying of manure to agriculture field which were normally done by adolescents of Goldhunga along with other family members or alone. The average working hour of the studied adolescents was 7 for both age groups. Analysis says that both age groups have more or less similar working hour and pattern of work as well so result were calculated in an average of whole cases.

Figure 4.5

Work pattern of the adolescents (percent)



Large numbers of respondents in survey area were doing household chores like cloth washing (94 percent), cooking (97 percent), water carry (86.2 percent), housecleaning (53 percent) and fodder collection (45 percent) as major activities. These unproductive works consumed most of the time and labour of adolescents. During data collection, conversation with girls revealed that very hard and time consuming activities of adolescents were like fodder collection and agricultural work. These works normally took four hour to whole day of the adolescents and doing up and down carrying heavy load is really very laborious work for such a tender age. So some adolescent girls had to devote 10 to 14 hour of her time for all these household activities tirelessly. That's why

study is always secondary activities for them, though it is pick time to give more emphasis to their study. They feel hard to manage time for study. Among school going girls, 59 percent normally manage time to study in morning and in evening both time. Some 29.8 percent study only in the evening and 11.2 percent had time to study only in the morning.

In an average 46.5 percent of study adolescents were engaged in agricultural activities beside other many household chores in study area. National average of women's contribution in agriculture estimated by National Planning Commission (Tenth plan 2059 – 2062) is 60.5 percent but when looking at the regional distribution; the contribution of central hill is very low. Viewing those data, present study undoubtedly compelled to say that Goldhunga adolescent girls are doing more labor in agriculture sectors. But it is needed to mention that the girls are doing multiple works in Goldhunga such as - the same girls cleans the house, washes cloths, cooks food, collects fodder, works in farm land as a regular responsibility.

Very interesting part of the result was - nearly three fourth of adolescents were not indulged in shopping activities for the family. Almost every household work; either hard and time consuming or mild and less time consuming, were doing by the girls but for shopping (direct economic transaction), their participation was less. It is a symbolic reflection that shows Goldhunga adolescents have less access to financial resources and they have no decision making power for it as well. It also reflects that nearly 80 percent adolescents have lower access to market and are in restriction of free mobility. Here, traditional system of gender bias playing a big role in the society and girls are both example and victim of subordination in Goldhunga.

4.5 Awareness about personal hygiene, sanitation and health facilities

Awareness about personal hygiene and sanitation is very important to live a healthy and productive life with free of illness. It is equally crucial for all ages, but more attention should be given to adolescents because of their vital physical growth and development. Awareness about healthy leaving not only beneficial for them but could have marked influence in their future life, their offspring and family as well. Personal hygiene and cleanliness are assumed to lead to lack of morbidity, diarrhea diseases and thereby contribute to better nutritional status. Therefore, some quarries about their sanitary habits and knowledge and awareness about health facilities were made during the study. Table 18 shows age wise distribution of adolescents (percent) for their personal hygiene & awareness about sanitation.

Table 4.20

Distribution of adolescents (percent) for their personal hygiene & awareness about sanitation by age

Bathing habit (day/week)	Age	
	12~14 n=105	**15~19 n=149**
daily	-	3.4 (5)
alternate day	9.5 (10)	22.8 (34)
once	20.0 (21)	5.4 (8)
twice	70.5 (74)	67.8 (101)
occasionally	-	0.7(1)
Hand washing practice after toileting		
always	92.4(97)	98.0 (146)
occasionally	3.80 (4)	2.0 (3)
no	3.80 (4)	-
Washing substance		
soap water	83.2 (84)	77.9 (116)
soil	1.0 (1)	2.7 (4)
ash	5.9(6)	1.3 (2)
water only	5.9(6)	8.0 (12)
use of all above mentioned occasionally	4 (4)	10.1 (15)
Washing hands before eating		
yes	97.1 (102)	98.7 (147)
no	2.9 (3)	1.3 (2)

The digit in parenthesis indicates n

4.5.1 Bathing habit of the respondents

Bathing is very much depending upon weather and the availability of water. Though Goldhunga VDC's have no problem with water and weather is also favorable, daily bathing practice is rarely observed among adolescents of study population. Above table (4.21) shows the sanitary practices of the studied girls. According to the study only 2 percent adolescents of age 15 - 19 have practice of daily bath but majority of them (70 percent) taking bath twice a week. Some 17 and 11 percent of adolescents took bath every alternate day and once a week respectively. The bathing trend says that adolescents of age 15 – 19 are more concerned about it and are practice of taking bath in alternate

day is widely accepted (22 percent). The observation done by Regmi and Adhikari. (1994) in their study concluded that bathing was not a very common practice among adolescents and only 44 - 51 percent of the adolescents took bath 3- 4 times a months and other even less tine than that. Looking at this observation it can be predict that the hygiene condition of the Goldhunga adolescents is relatively better but looking at the water facility, establishment of daily bathing habit was still to be achieved.

4.5.2 Hand washing practices

Hand washing especially with soap is encouraged as a single and highly effective means to avoid exposure to food and water born diseases. Present study collected data with studied adolescent girls about their hand washing habit and means for it in a week

Hand washing before eating - Eating by cleaned hand helps reducing diarrhea - a very root cause of various other illnesses and malnutrition. Nearly all adolescents (98.4 percent) agreed that they had a practice of washing hands before eating. This is very encouraging result and revealed the good sense of sanitary practice of the adolescents (table 4.21). However, little more than 2 percent of total adolescents were not practicing this habit. It is matter of concern, why 100 percent results could not be achieved even after doing so much mass campaign through electronic and other media about the cleanliness of hand?

Hand washes after defecation - This is very important personal hygiene helps people live healthy without more frequent diarrhea and intestinal parasites such as hookworm, tapeworm and other parasites. Residing in sub urban area, very near to capital city and listening radio where massage of cleanliness is free flow, still not 100 percent 1adolescents among study population were washing hand after defecation (table 4.21). According to the study, though nominal but 4.4 percent adolescents were not washing hands regularly after defecation. Among study cases 3.8 percent of age 12 – 14 said flatly that they never wash hands after defecation. High prevalence of diarrhea could be one of the reasons associated with this habit.

Ministry of Health and Population et. al, 2007 has revealed that more than 85 percent population is using soap for washing hands nationally. But unlike this NDHS result, less than 80 percent adolescents were using soap water as a cleaning substance in Goldhunga. It shows the mass negligence and ignorance about the good sanitary practices, though there are massive flows of information and massages through radio /T.V about the need of cleaning hands by soap water. Some 7 percent respondents were using soil and 3 percent ashes for washing hands. It is a matter of worry that 7.1 percent adolescents were

using only water to wash hands after defecation and nearly the same percent of adolescents were using soap water, soil water, ashes, husk and only water occasionally (table 4.21). Though the conditions of Goldhunga adolescents were better than those of western Nepal, where 61 – 85 percent adolescent girls never wash their hands after defecation (Regmi and Adhikari, 1994). These practices are extremely harmful for the health. These findings revealed still lacking of awareness about hygiene and sanitation among adolescent girls of Goldhunga village. These practices have direct impact on their diarrhea and parasite infection prevalence. Viewing these research findings it is predictable that high prevalence of these infectious diseases among adolescents is due to very poor hygiene and sanitary practices and it has negative impact in their health.

4.5.3 Attitude about the treatment during illness

The state of illness free is the best condition of body. But it is not always possible for human being. Some very common form of diseases or infectious diseases or other physical discomforts are frequently happening in the body and its prompt cure is urge need otherwise it may appears as chronic diseases and that directly effect on the morbidity, mortality and nutritional status of the person.

Table 4.21

Distribution of adolescents having practice of visit different health care provider & their preference for treatment by age

General practice of treatment	Age	
	12~14 n=105	**15~19 n=149**
dhami/jhakri/ phakphuke/ puja	2 (2)	4.0 (6)
doctor	61.0 (64)	49.7 (74)
buy medicine from medical shop	1.9 (2)	-
nutritious food consumption	1.0 (1)	1.3 (2)
*dhami jhankr*i & doctor	9.5 (10)	13.4 (20)
dhami /jhankri, phakphuke, doctor	4.8 (5)	8.1 (12)
doctor/ nutritious food/ hot water	3.8 (4)	3.4 (5)
all above mentioned	4.8 (5)	6.7 (10)
preferred treatment		
dhami/jhakri	1.0 (1)	0.7 (1)
go to doctor	72.4 (76)	71.8 (107)
buy medicine from medical shop	1.0 (1)	-
nutritious food consumption	1.0 (1)	-
dhami jhankri & doctor	6.7 (7)	7.4 (11)
doctor/ nutritious food/ hot water	15.2 (16)	12.8 (18)

The digit in parenthesis indicates n

The adolescents were quarried about the practice of health care system in case of illness. Being residing near to the capital city and little aware about the need of medical treatment at the time of sickness, research findings revealed not so encouraging result (table 4.22). Only slightly more than half of the adolescents admitted that they use to go to doctor in the case of their illnesses. It is quite positive and shows the awareness level of the adolescents about their health. Other little less than half percent of total studied adolescents admitted use of other various traditional methods of health care besides consultation with doctors and medical treatments. Among those adolescents a large portion – 28.9 percent said that they used to take help of *dhamijhakri, phakfuke and puja*, to cure their health problems. Five and half percent of adolescents were totally depended upon the *dhamijhakri* for their treatments. Most of the adolescents said that they first go to traditional *faith* healer or *puja* for the treatment. If it failed to cure than they consult doctors. This practice is very dangerous and sometime it might be fatal. Quarried about the use of health post, most of the adolescents reported that they never visit health post

even if it is near by. They said that there are no any medicine and no medical personal available. So they directly go to nearby city clinic/ hospital/ nursing home to see the doctor. Some 3.5 percent adolescents had a practice of buying medicine directly from the medical shop without consultation of the doctor and use. This is totally harmful and wrong practices.

Asked about the right type of treatment procedure nearly three fourth of the adolescents admitted the practice of directly go to doctor is right process. Other 13.8 percent adolescents had a sense of nutritious food and hot water consumption beside consultation with doctors. Some 10 percent adolescents still had a feeling that *dhami jhankri /phakfuke/ puja* are effective side by side doctors. It had been noticed, traditional norms and beliefs are very hard to eliminate. It is deep rooted in their mind that these traditional healer could cure any type of health problems and diseases.

After observing all these result about health and sanitary habit of the adolescents, it could be easy to say that the practices ware not so encouraging. Basic things for healthy living are to practice good and healthy habits. Though most of the interviewed girls are going school to gain formal education, their habit of personal hygiene is not so appreciable. This tender age is very susceptible and easily affected by even a miner infection and diseases. The effect is seen with poor appetite. In the absence of proper diet and care they loose immunity more rapidly which might be the cause of low nutritional status. Similarly, their practice of health cure system is quite dangerous. They first practiced their traditional *dhami jhankri/ phakfuke puja* and only after, if not cured, they consult doctors. Still they have a feeling that these traditional thing works properly to cure diseases. These practices worsen the condition badly. In this respect, awareness about sanitary practices and health care system is an urge need of the adolescents of Goldhunga VDC.

4.6 Exposure to developmental activities of the adolescents

Acquiring membership of different organizations, groups or clubs and participating in various developmental activities have a greater influence on the total awareness of the adolescents. This awareness helps to change the living habit or pattern of the adolescents. They can be more sensible and conscious about their health and nutrition. They can play role of change agent in family and in the society itself. Keeping in mind these versatile influences of the activities, here, it has been tried to know the situation of the adolescents in this regard and made a quarry about their engagement in these activities. Below were the findings of the results collected.

Table 4.22

Exposure to developmental activities of the adolescents (percent by age)

Exposure to developmental activities	Age	
	12~14 n=105	15~19 n=149
Membership of any club / group		
yes	1.9 (2)	28.2 (42)
no	98.1 (98)	71.8 (107)
Membership of any organization		
yes	1.9 (2)	8.7 (13)
no	98.1 (98)	91.3 (136)
Training		
sewing / knitting	-	7.4 (11)
micro credit	1.0 (1)	1.3 (2)
computer	-	1.3 (2)
sewing /computer	-	1.3 (2)
law related	-	0.7 (1)
teacher	-	0.7 (1)
adult education	-	0.7 (1)
no training	99.0 (99)	86.6 (129)
Participated in any meeting		
yes	1.9 (2)	6.0 (9)
no	98.1 (98)	94.0 (140)

The digit in parenthesis indicates n

4.6.1 Membership

The result (table 4.23) showed that 17. 3 percent adolescents were members of the group / club working in the village. These are - *Mahila samuha*, *Bal sanuha*, micro credit, *Yuba samuha* etc. Similarly, 5.9 percent adolescents were members of the organization like *REUKAI* and *Manush*i who are working in this village. These organizations give training of sewing / cutting / weaving training, body building, adult literacy, micro credit/ finance and awareness about health and sometime nutrition. The very interesting part found during interaction with adolescents was that these organizations have made members but they never knew why they were members and what they have to do. These members were never channeled by the organizations. Only micro credit / finance groups were relatively active in their activities than others.

4.6.2 Training

Training is a medium of enhance the capacity, develop skills, create awareness and make environment for people towards independency. This is an entry- point activity for social mobilization also (UNDP, 2004). In Goldhunga, only 8.3 percent of the total respondents had taken training about various skills and a large group of the adolescents (91.7 percent)

were excluded from these opportunities. Among the trained adolescents 4.3 percent had taken very traditional training on sewing / cutting / knitting and 1.2 percent had taken micro / credit / finance training. These data reveled that even the members of the organizations had not received any training for their betterment. Only two adolescents had taken computer and two had taken both sewing and computer training. Similarly, law related training; teachers' training and adult education training was taken by one for each. This type of research data is not available in national level research study but viewing those above-mentioned data it could be predictable that adolescents' participation in such training program is very low in Goldhunga. It is being expected that being very near to Kathmandu, those who were not participating in formal education, would have participated in any training courses. However, that perdition was wrong and very negligible percent of the respondents had taken training on various subjects. Study forced to conclude that Poverty and very patriarchal tradition of the village prevent them to take any movement out side the house or the village boundary.

4.6.3 Participation in meetings

Participation in meeting of any kind whether in organization or in a formal gathering can increase adolescents awareness, confidence and can enhance their capacity of expression and afterward they can develop their analytic power. So during survey, researcher tried to made quarry about it. Only 4.3 percent adolescents reported that they had attended meetings but a larger proportion of them (95.7 percent) did never have that opportunity (table 4.22). Lack of exposure of such kind of opportunity has made the adolescents of Goldhunga very shy and aloof from rest of the society and made a ground for the victim of same intra- generational cycle of poverty, malnutrition, early marriage, early and prolonged pregnancy, larger family, unlimited burden of the family so on and so forth.

4.6.4 Personal income

Table 4.21 shows the adolescent’s (percent by age) involvement in income generating activities. Though adolescents are involved in various activities - productive or non-productive, here the major concern was whether they are enjoying by having some income and how much they are privileged to use it by themselves. So some queries were made by researcher to find answer about it.

In response to the personal income of the adolescents, some 86 percent among sampled study population denied for it and only 13. 8 percent had some income of their own. As expected, majority were from the age 15 – 19. Among girls who involved in income

generating activities, 31.4 percent were engaged in some type of agricultural business activities like milk selling and vegetable selling.

Table 4. 23

Adolescents (percent by age) involved in income generating activities

Involved in income generating activities	Age	
	12~14	**15~19**
yes	4.8 (5)	20.1 (30)
no	95.2 (100)	79.9 (119)
Total (n)	***105***	***149***
Types of work		
service	20.0 (1)	16.7 (5)
business	3 (60)	24.7 (7)
vegetables selling	20.0 (1)	20.0 (6)
melapat	-	3 10.0 (3)
loader	-	3.3 (1)
daily wages	-	10.0 (3)
seasonal	-	10.0 (3)
sewing	-	3.3 (1)
Total (n)	***5***	***29***
Use of income for		
household expenses	60.0 (3)	82.8 (24)
children's education	-	3.4 (1)
self education	40.0 (2)	10.3 (3)
own self	-	3.4 (1)
Total (n)	***5***	***29***
Use of income decided by		
self	-	20.7 (6)
mother	20.0 (1)	3.4 (1)
father	20.0 (1)	10.3 (3)
Father / mother both	60.0 (3)	37.9 (11)
husband	-	3.4 (1)
husband / self both	-	20.7 (6)
all	-	3.4 (1)
Total (n)	***5***	***29***

The digit in parenthesis indicates n

Eight percent adolescent used to do seasonal work like vegetable selling and firewood selling to make some income. Some of the adolescents were doing loader work, daily wages and sewing for the income (table 4.24). More than eight percent adolescent were used to go *melapat* for earning money. Talking about their daily income it ranges from rupees 30 to 300. Most of the respondents had income Rs. 100 or less than 100 but some

business/ incomes are solely seasonal, only milk selling is permanent type of business instead. During conversation with girls, it is realized that the contributions of adolescents in household chores, agricultural activities and income from these sectors were totally ignored and no share is distributed to the girl members of the family.

Expenses of earned money

It was a curiosity to know that how the girls handle their earning? During survey, among those who were doing income, almost 80 percent adolescents reported that their incomes were spending on household expenses. Only 14 percent girls admitted of spending their earned money on their own study. Similarly 3.4 percent reported that they were spending earned money for their children's' education and the same number of respondent spent money for their own self. This expenditure pattern shows how adolescent girls are supporting their family and utilizing money for family and for the good cause of study.

Decision maker for expenses of earned money

It was important to know how much girls are free to utilize their earned money or who decides to handle the money. This type of data fairly shows the empowerment level of the adolescents and opportunity of freedom in managing their own earning. As expected, among the earning respondents, half admitted that the decision for spending their earning were taken by father and mother jointly. It is relatively good to know that those households have joint decision and female voices are also heard. Seventeen percent adolescents of age 15 – 19 age admitted that they had their own decision to spend money and the same percent of the adolescent reported that they handled their money by the joint consigns of their husband and themselves. Similarly, slightly more than 15 percent girls said that their father decides how to spend money and altogether 5.9 percent girls told mothers' decision are applied on spending their earned money. These data shows quite encouraging process of decision-making and gender balance is seen during any decision. However, result reveled that very low percent of adolescents were enjoying freedom in spending their earnings and girls aged 12 – 14 (as expected) were more dependent on their parents to spent whatever they earn (table 4.24)

4.6.5 Mobility of the girls besides schooling

Free mobility outside home and around the area is a reflection of freedom and security in the society and empowerment of the people. It is a kind of exposure to them as well which ultimately could be a positive indicator for their good health and nutrition. So query were made during study about the girls mobility and the results are shown in table 22.

Table 4.24

Mobility of the adolescent girls (percent by age)

Mobility besides schools	**Age**	
	12~14 n=105	**15~19 n=149**
yes	91.4 (97)	96.6 (144)
no	8.6 (8)	3.4 (5)
Total (n)	***105***	***149***
Place of outing		
market	43.8 (42)	47.9(69)
training	-	1.4 (2)
Roaming	17.0 (17)	8.3 (12)
movie	4.2 (4)	0.7(1)
movie /marketing/ roaming	35.4 (34)	41.7 (60)
Total (n)	***97***	***144***
Accompanied by		
alone	1.0 (1)	13.9 (20)
family member	56.3 (55)	17.4 (25)
friends	19.8 (19)	32.6 (47)
family member / friend	22.9 (22)	26.4 (38)
with all above mentioned persons	1.0 (1)	9.7(14)
Total (n)	***97***	***144***

The digit in parenthesis indicates n

Study result (table 4.25) shows that majority of the adolescents (94.5 percent) were enjoying mobility not only for the school but out of school as well. As reported by the girls 43.7 percent used to go market, 37 percent go for movie / market / roaming and 11

percent go just for roaming now and than. However, these motilities were restricted somehow. Comparing to girls (3.4 percent) of age 15 – 19 more girls (8.6 percent) of age 12 – 14 were restricted to go out from house except school. Those who go out were not allowed to go alone. Very few were going out alone; others, most of them were accompanied by other person. During study, it was reveled that nearly 37 percent girls were accompanied by family members, 26 percent by friends and 24.6 were accompanied by family members / friends. About six percent accompanied by above-mentioned all according to the convenience to go outside from the home. However, most of the girls are going school and they have to go for cutting grass and fodder collection still they are not allowed to go outside alone. Though age 15 – 19 was little bit free to go out alone or with friends, but situation is no so enthusiastic in this aspect. As a typical rural area, some type of insecurity and patriarchal structure of the society were expressed by the girls during interaction.

Asked about the cause of not going out for those 5.5 percent respondents who had no mobility, 4.3 percent said that they were not allowed to go outside home by their parents. Very unusually, one girl said that she use to felt odd to go out and one said she had no time and parents not allowed to let her go out also.

4.7 Exposure to mass media

Health education and awareness is an effective means to improve and impart suitable health knowledge, develop favorable attitude and adopt health practices for personal hygiene, environmental health, nutrition education and the control of communicable diseases. These things become even more effective and easily adoptable if it comes through print and electronic media, which are most common and popular one. Realizing these importances, not only concerned Ministries but also I/NGOs and other social sectors are using media to flow information of public interest. But access to information through the media is essential to increase people's knowledge and awareness of what is around them, which may eventually affect their perception and behavior. With the interest to know how much the girls have access in media and how much they are using these media, here an effort was made to query about it and the results are shown in table 4.25 Acquired result showed that media is all-time favorite among Nepalese - especially radio and Television.

4.7.1 Listening Radio

Radio is widely used and famous media. It is very common for Nepalese to listen radio whether they are in work or not and the same tradition is seen in the Goldhunga as well. It is commonly access instrument also.

Table 4.25

Distribution of adolescents (percent by age) for their exposure to radio

Listening radio	**Age**	
	12~14	**15~19**
yes	75.2 (79)	114 (77.2)
no	24.8 (26)	22.8 (34)
Total (n)	***105***	***149***
Frequency of listening / week		
daily	35.4(28)	47.0 (54)
2 times	6.3 (5)	3.5 (4)
3 times	3.8 (3)	3.5 (4)
4 times	-	2.0 (2)
occasionally	54.4 (43)	4.3 (5)
Total (n)	***79***	***114***
Most listened program		
sathisanga mankakura	15.2 (12)	22.1 (25)
songs/ other program	51.9 (41)	48.7 (56)
news	8.9(7)	10.0 (11)
all	12.7 (10)	10.0 (11)
sathisanga mankakura & songs / other programs	1.3 (1)	7.8 (8)
Children's program *(Balkaryakram)*	10.1 (8)	3.0 (3)
Total (n)	***79***	***114***
Reason for not listening radio		
no time	3.8 (1)	2.9 (1)
no radio	92.3 (24)	91.2 (31)
parents do not allow	-	2.9 (1)
no interest	3.8 (1)	2.9 (1)
Total (n)	***26***	***34***

The digit in parenthesis indicates n

Study reported that more than 76.4 percent of the respondents listened radio (table 4.26) as a favorite media whereas Ministry of Health and Population et. al, 2007 showed only 60.9 percent women of central hill and 72.3 percent girls of age 15- 19 years listened radio at least once a week. However, nearly 24 percent were excluded from using this facility in Goldhunga. This figure is quite better than BCHIMES (National Planning Commission and UNICEF, 2000) survey where 50 of Central hills' were not listening radio. While query made among those excluded girls of Goldhunga, 91.7 percent of them said that they had no radio. Remaining 3.3 percent said that they had no time to listen radio and the similar percent of girl told about no interest in listening radio respectively. Here, no marked differences were seen in percent of respondent among two age groups but some 2.9 percent of 15- 19 age group interestingly said that they were restricted by the parents to listen radio.

Asking about the frequencies of listening radio in a week (table 4.26), 41.2 percent said that they used to listened radio daily. Rest, 6.3 & 3.8 percent of age 12 - 14 and 3.5, 3.5 & 2 percent of age 15 - 19 adolescent girls claimed of listening radio twice, thrice and four times a week respectively. These results reflect the mass interest on electronic media - radio, but all Goldhunga adolescents have no easy access to this media. Therefore, flow of information broadcasting by the radio about health, nutrition and sanitation are not reaching among all adolescents perfectly. BCHIMES (National Planning Commission and UNICEF, 2000) survey has stated that radio listening was also associated with educational level of the respondents. According to this survey, radio listening was highest among those who have formal schooling or who were literate than among illiterate women. This study also justified the above findings, because according to the showed result, the total percent of currently schooling is 73.5 and radio listening percent is 76.4.

Asked about the most frequently listened program, most of the adolescents (42.1 percent) said songs and other programs was the most listened program broadcasted by the radio. Another very popular program is ***Sathisanga man ka kura*** (a weekly program targeted to adolescents) broadcasting every Sunday afternoon were listen by more than 22 percent. This is a very popular program among them. NDHS, 2006 study also cited this program as a most popular program. It discusses issues about health, nutrition, sex, social customs and rituals, emotional managements and other social concerning matter which are more related to their day-to-day life. They used to listen it very excitedly leaving every work on hand at that time. Other encouraging result exposed by the survey was - listening of News by 7.5 percent of the adolescents, which is a sign of their concern about the country and the rest world. Similarly, altogether 8.7 percent adolescents

showed interest on all program of radio and 4.7 percent for children's program (***balkaryakram)***.

These result reveled that if radio could give good and informative program then it can be popular among the people i.e ***Sathisanga man ka kura.*** Through this type of program lot information could be given to the people. Most of the people listened radio even during busy work. So it is suggestible that radio is effective medium to give information about nutrition and health so it circulated to the larger population.

4.7.2 Watching Television (TV)

This is equally very popular / powerful and effective media in the households. In present time, with the revolutionary development of electronic media and information technology, TV became one of the easy accesses even for relatively lower income families too.

Table 4.26

Distribution of adolescents (percent by age) for their exposure to Television

Watching Television (T.V.)	**Age**	
	12~14	**15~19**
yes	76.2 (80)	79.2 (118)
no	23.8 (25)	20.8 (31)
Total (n)	***105***	***149***
Most viewed program in TV		
serials	57.5 (46)	58.5 (69)
cartoons	3.8 (3)	0.8 (1)
news	8.8 (7)	16.1 (19)
films	8.8 (7)	3.4 (4)
songs	5.0 (4)	0.8 (1)
news and serials	11.3(9)	12.7 (15)
whatever broadcasted	5.0 (4)	7.6 (9)
Total (n)	***80***	***118***

The digit in parenthesis indicates n

Present study showed (table 4.27) that 78 percent girls' family owned television and used to watch it in Goldhunga. This percent is higher than the national figure of 63.1 percent

access of television for women in central hills shown by Ministry of Health and Population et. al, 2007. Present study shows that access to television is less by 1.6 percent comparing with radio listener among study population. According to the expressed result it is predictable that the girls of Goldhunga had relatively equal access to the both media unlike the result shown by BCHIMES (National Planning Commission and UNICEF, 2000) survey where television sets are less common than radio and only 19 percent of all women had exposure to this media. However, 22 percent were not enjoying this facility in study area.

During the query made about the most watched program in television, altogether 58 percent girls said that they prefer to watch serials. Another big group 13.1 percents preferred to watch news and 12.1 percent adolescents watched news and serials both. These interests reveled that these girls have little consciousness about what is happening around the country and the world. Remaining 4.3, 2 and 1.6 percent girls showed interest in films, songs and cartoons. More than 6 percent adolescents were quite reluctant and used to see whatever comes in the television without any particular interest. Access to media is relatively good among adolescent girls of Goldhunga. But it is essential to teach these young population to utilize the message flowed about health, nutrition and sanitation from these media in their day to day life. Both radio and television are very popular medium so strong and effective massage can be flow through these media to make people especially girls aware about health, sanitation and nutrition.

4.7.3 Reading newspaper /magazine

Print media is equally very popular now a day especially in city and its surrounding. This is also a strong medium to make people well informed and convey messages to the larger mass. Lots of information is flowing by these print media now a day and some are really very useful especially regarding health sanitation and nutrition. In this survey, girls were asked how often they read newspapers/ magazines in a week. Results are not so enthusiastic about the exposure of girls to print media and result is shown in table 4.28.

Table 4.27

Distribution of adolescents (percent by age) for their exposure to Newspaper

Habit of reading Newspaper/magazine (times/week)	Age	
	12-14 n=105	**15 – 19 n=149**
Yes	48.6 (51)	62.4 (93)
no	51.4 (54)	37.6 (56)
Frequency 0f reading newspaper / week		
daily	3.9 (4)	8.7 (13)
twice	5.8 (6)	7.4 (11)
thrice	2.0 (2)	-
four times	-	2.7 (2)
occasionally	38.1 (40)	44.6 (67)

The digit in parenthesis indicates n

According to the findings, (table 4.28), slightly over fifty percent (56.7 percent) girls read newspaper / magazine however, 44.3 percent never read these things. More or less this percent is better than the result showed by Ministry of Health and Population et. al, (2006) where 23.8 percent of women in central hill read newspaper at least once a week. Similarly, BCHIMES (National Planning Commission, 2000) survey showed 67 percent women of Kathmandu valley read newspapers at least once in a week. Compared with these data, the percent of girls reading newspaper / magazine were less by approximately 10 percent in present study. But one should keep in mind that it is incomparable between valley and rural women because valley women are more educated and have greater chances of exposure compare to the village girls. Daily buying of these papers and no availability of public reading rooms were seen as an obstacle to read newspaper/ magazine for the village girls.

Asked about the frequency of reading these print media per week, a larger portion of the girls (41.35 percent) said that they used to read only occasionally, whenever any family members bring it home from the city. Altogether 6.7 percent of the girls said they read daily and the same number read it twice a week but. Thrice and four times' reader were only 2 percent respectively. Age wise distribution shows that 15 – 19 age groups is more alert about their surroundings so more percent of girls are reading it compare to 12 – 14 age group in Goldhunga VDC.

Continuous flow of information strikes on mind and helps to change the behavior and practice of the individual, and influences to change the society largely. These media are the effective medium to bring changes in their existing heath and nutrition related knowledge, belief and practices. However, the use of these media particularly depends upon the availability of time and relaxation that is very rare to the village girls. Empowerment level and excess of the girls over resources also play crucial role to use these resources according to their wise. Besides study (those who were studying), they have to do household chores along with her mother, sister in law or alone. Therefore, they got little chances to use these media. Keeping in mind the very crucial role of media, a detail study needed on the utilization of media by the target audiences to change their existing health and health related knowledge, belief and practices.

4.8 Adolescence pregnancy / motherhood

Adolescent fertility and being a mother in this tender age is a major social and health concern. Adolescent mothers are more likely to suffer from sever complications during pregnancy and childbirth (Ministry of Health et. al, 2001 and 2007), which can be detrimental to the health and survival of both mother and child. Due to the same reason, mothers who are in the phase of ***growing*** themselves may inter into the intergenerational cycle of malnutrition for child and themselves also. This condition not only increases the fertility rate of mother but at the same time decreases the mental and physical capacity of both mother and child in a long run. This could be a great damage for the family and the nation itself.

Many studies and SCN News (2006) also acknowledged that the early marriage had negative implication for birth and pregnancy outcomes and for the mother's long term health as well. Early marriage lead to early pregnancy and an adolescents' body cannot readily cope with pregnancy as well as an adult women's body. This can weaken both the mother and child and can increase the risks for mother and child. An Indian study done in 242 adolescent pregnancies revealed that the rate of LBW and prematurely born were 67 and 33 percent respectively. This figure is even greater among the age below 17 that was 83 and 33 percent respectively (Lindsay and Gillespie, 2001). In the same context Ministry of Health and Population et. al, 2007 stated that adolescent pregnancy could cause sever health problems for both the mother and child and greatly reduces the educational and employment opportunities of women and is associated with higher levels of fertility.

Number of children, antenatal care, use of Tetanus Toxoid (TT) vaccine, iron status, problems during pregnancy, labor time duration, gestation time, place of delivery,

assistance during deliver, eating pattern (if different from discussed in 4.3) and birth weight of the baby are some of the influential factors that can effect the health and nutritional status of both mother and child. So some information were tried to collect from pregnant and lactating mother of the study area. Following paragraphs deal with those collected information.

Table 4.28

Information about delivery status and service taken

Information about delivery status	**Age**
	15-19 n=44
Birth place of child	
hospital / nursing home	47.7 (21)
home	52.3 (23)
Birth weight of the baby	
<2.5 kg	6.8 (3)
2.5 kg	9.1 (4)
>2.5 kg	4.5 (2)
not known	80 (35)
Help taken during delivery	
no one	6.8 (3)
mother - in- law / mother	11.4 (5)
traditional birth attainder (*sudini*)	13.6 (6)
neighbor / villagers	9.1 (4)
father - in - law / uncle	6.8 (3)
no response / not known	52.3 (23)
Antenatal care taken (checkup)	
yes	77.3 (34)
no	22.7 (10)
Reason for not taken antenatal care	
not aware	30.0 (13)
no money	-
advised not to go	70.0 (31)
Service taken	
tetanus toxoid	77.3 (34)
iron tablets	72.7 (32)

The digit in parenthesis indicates n

Number of children

Ministry of Health et. al, 2001 and the study made by Toru et. al. (2004) had showed that in an average 21 percent adolescents of the age 15 – 19 were already mothers in Nepal, where as Ministry of Health and Population et. al, 2007 reveled that 18.5 percent adolescents of age 15 – 19 years had begun child bearing. Justifying these survey result Goldhunga study reflected the same pattern and revealed the same result of 20 percent adolescent of age 15 -19 among study cases entered into the motherhood in which 17.7 percent were already mother and rest were pregnant of their first child (table 4.29). This study is also justified the findings of NDHS (Ministry of Health and Population et. al, 2007) that showed the figure of 17 percent adolescents of hilly area who already entered into motherhood. No one in the age group of 12- 14 were seen pregnant or already a mother in this present study.

Looking at the number of children, Goldhunga study shows that among married girls, 40 percent had one and 37 percent had already two children. This figure gives picture of quiet severity of the problem that being a mother of children in these tender ages is a serious matter from every aspect of the life. These type of activities stagnant them not only physically but also psychologically and economically as well. Window of opportunity hardly opens for them and they remains in the same traditional roles of the society and the family.

Antenatal care

The health care services that a mother receives during her pregnancy and at the time of delivery are important for the better health of the mother and her child both. It not only helps reducing mortality of both mother and child but also supports for immediate assistance on any vulnerability if seen.

Among the study population of adolescent mothers / pregnant of Goldhunga, only 79.5 percent had received antenatal care during their pregnancy. Comparing it with the NDHS (Ministry of Health et. al, 2001) which showed 82 percent urban women and 47 percent rural women, utilized antenatal care services, present finding is satisfactory one, but 20.5 percent mothers are far from being receiving from this type of life saving services yet. Being mother in such a tender age without proper health assistance really keep them in high risk. When asked about the reason for not going for checkup, about 6 percent (among those who did not receive antenatal care) expressed their ignorance about the importance of antenatal checkup. Remaining 14.3 percent said that they advised not to go for checkup by their mother-in-law (S***asu***) or other family members. It is very critical

situation. Still there are lots people who are ignoring about the vulnerability of pregnancy. Adolescent pregnancy is even more critical and easily susceptible to various complications. Here, urge need of awareness program about nutrition and reproductive health focused on family members is seen to save life of both mother and children.

Use of Tetanus Toxoid (TT) vaccine

Tetanus Toxoid vaccine is an important component of antenatal care which is given during pregnancy especially for the prevention of neonatal tetanus. Neonatal tetanus is one of the major causes of infant death in Nepal For full protection; it is recommended that a pregnant woman should receive at least two dose of TT during her first pregnancy and buster dose during each subsequent pregnancy (Ministry of Health et. al, 2001).

Present study data showed that 77.5 percent adolescents had received TT vaccine during their pregnancy but remaining 22.5 percent were excluded from receiving it. When compare with the national average this findings are satisfactory because nationwide only approximately 50 percent women has received TT in Nepal (Ministry of Health et. al, 2001). Being near to the capital city, this figure expected to be 100 percent but lack of awareness also affected the immunization status which might be a greater risk to the mother and child.

Taking of Iron tablets

Iron deficiency anemia is a major public health problem since a long. Though Government and I/NGO have taken many initiatives to reduce this problem, the severity of the problem still can be seen through various survey results. This Goldhunga study showed that nearly 80 percent adolescent pregnant / mother had taken iron tablets during their pregnancy where as NDHS (Ministry of Health et. al, 2001) had given the nationwide result of taken iron/ folic acid only by approximately 25 percent. Comparing with this national figure, Goldhunga result is encouraging. But, in spite of great effort from I/NGO and Government sector, no 100 percent results could be achieved in a way to reduce malnutrition. During the interaction some of the respondents said that they took iron tablets but stoped taking in the middle or afterward. Therefore, it is not predictable that they have received full course of iron / folic acid tablets even after claiming that they have taken it. Approximately twenty percent respondents were not talking any iron tablets though it is available freely in the near by health post. This condition is one of the responsible factors for anemia prevailing among adolescent girls in study area.

Problems during pregnancy

Normally, pregnancy period is considered as a vulnerable phase of life. Adolescence pregnancy is even more risky than other one. Early pregnancy faces many serious health and nutrition consequences; high rate of maternal mortality, higher risk of obstructed labor and pregnancy induced hypertension (SCN News, 2006). Asking about the problem they faced during pregnancy, more than 14 percent said that they had various problems such as - swelling of hands and legs, nausea, less appetite, feelings of weakness, headache, and stomach pain. Normally these symptoms related to low hemoglobin level, energy deficiency and malnutrition that were commonly faced by Goldhunga study population.

Gestation period and birth

Approximately, 95 percent births from study population were found full term during the study and remaining 5 percent were born preterm Similarly, more than 95.4 percent births were reported normal and only 4.6 percent birth were done by operation in which one case of ***ulto janmeko*** (2.3 percent) was also included. However, preterm birth and operation cases percent is low but its relation with height, weight, BMI and nutritional status of mother cannot be ignored. In the mean time, the consequences due to preterm birth are also the matter of concern.

Labor time duration

Normally, it is shown in various researches that adolescents may have prolonged labor time than adult one have. This is true in the case of Goldhunga adolescent mothers also. More than 84 percent reported that they had 12 or more hour (1-3 day) labor period but only nearly 16 percent had 3 – 5 hours labor time. This result gives only the glimpse of the severity of problems adolescents faces during or at the time of delivery. Prolonged labor is always harmful, risky and dangerous for both mother and child.

Place of delivery

Traditionally, Nepalese children are delivered at home mostly without or with the assistance of family members, relatives and traditional birth attainder (*sudini*). The national figure shows that only nine percent births are delivered in hospital or with health facilities, though region wise highest trend has been seen in central hill with nearly 20 percent (Ministry of Health et. al, 2001). Recent National survey (Ministry of Health and Population et. al, 2006) showed that one in two urban births (50 percent) and 14 percent of rural birth is assisted by Skilled Birth Attainder (SBA). This percent is pretty high in central hill (40 percent). This national figure matches the result shown by Goldhunga

study where 52.3 percent among the study cases (who were already mothered) delivered their child in hospital / nursing home with the help of SBA but remaining 47.7 percent gave birth at home.

Assistance during delivery

Accepting help from skilled personnel during delivery is considered effective to reduce risks during delivery and reduce mortality of both mother and child. Birth delivered at home is usually more likely to be delivered without assistance of health professionals, whereas delivered at health facilities are more likely to be delivered with the assistance of SBA.

Goldhunga study shows some wonderful result (table 4.30) about delivery characteristics. About fourteen percent adolescents delivered their baby by themselves without any assistance. Among the rest, 23.8 and 19 percent were assisted by mother - in - law / mother and neighbors / villagers respectively. ***Sudini*** had helped for 28.6 births and very surprisingly, 14.3 percent delivery cases were assisted by father – in - law / uncle. This is a very interesting finding that came out during study otherwise normally only female members assist in delivery cases.

Table 4.29

Delivery characteristics of the adolescent percent who were already mother

delivery status of the adolescents who are already mother	Age
	15 – 19 (n= 44)
normal	95.5 (42)
operation	2.3 (1)
other - *ulto janmeko*	2.3 (1)
Labor time	
3 hour	6.8 (3)
5 hour	9.1 (4)
one day	59.1 (26)
2 days	22.7 (10)
3 days	2.3 (1)
Breastfeeding (bf)	
yes	75.0 (33)
no	25 (11)
Nutritious food consumed (more food)	
yes	20.5 (9)
no	79.5 (35)
types of nutritious foods taken	
jwonokojhol	40.0 (18.0)
fruits	20.0 (9)
fruits & horlicks	40.0 (18)

The digit in parenthesis indicates n

Birth weight of the baby

Most of deliveries take place outside an institutional setting so children of Nepal are usually not weighted at birth. It is true in the case of Goldhunga also. Mothers of the study areas were also failed to remember the weight of their baby who was born in the hospital. Thus, it is difficult to know whether the baby was underweight at birth. Only nine mothers reported the birth weight of their babies, among them, four were normal (2.5 kg), three were below the normal (<2.5) and two were more than 2.5 kg of weight at birth.

Eating pattern during Pregnancy / Lactation (Sutkeri)

It is a well-established fact that food is a determining factor of proper growth, development and good health of the human being. Usually undernutrition may be indicated by fetal growth retardation, low body mass index (BMI), stunting, wasting,

underweight, anemia and micronutrient deficiencies. Normally very week and insufficient eating patterns of Nepalese women lead them towards undernutrition. In this context, efforts were made to quarry with pregnant / mother adolescents about their eating pattern and extra food eating habit during these stages. During quarries, 77.5 percent pregnant / mother adolescents said that they *do not eat extra food* but normal bhat, dal, tarkari during these special stages. Only 22 percent claimed of extra eating. When asked about the extra food ate, they claimed of eating *jwano ko jhol*, fruits and horlicks and one claimed of eating meat as an extra food. Adolescents in Goldhunga VDC followed normal pattern of eating either they were pregnant or lactating.

Asking about the eating of *dal* and pulses *(gedagudi)* all pregnant adolescents said that they used to ate *dal* and *gedagudi* regularly. It was also noticed that they have some knowledge and awareness about the importance and need of eating nutritious food during pregnancy. Asked whether they knew about nutrition and its functions, their responses (while grouping) were as follows:

- *makes body active*
- *pulses, vegetables, milk, ghee, meat are the nutrition*
- *vegetables, pulses, meat & fish are the nutrition*
- *makes body active & healthy, provides energy, increases immunity*
- *nutrition is needed for body*

During the study, researcher tried to ask very straight question regarding the knowledge of the risk of being pregnant below the age of 20 and knowledge about not to do heavy works during pregnancy. All the pregnant adolescents said that they know about the risk of being pregnant in the age below 20 and the risk of doing heavy work during pregnancy. Still social bond, family structure and way of living enforced them to do the same risky behaviors.

These are the major findings of study of Gildhunga. The overall picture of nutritional status of the girls gives very gloomy result that could be corrected timely. Small effort can have major impact on the awareness and practice of the girls for adopting right type of food behaviors which can have positive impact on the nutritional status of girls.

4.9 Relationship between nutritional status with social factors, health, meal, work pattern, exposure to developmental activities and media exposure

The major purpose of this analysis is to see the relation of various factors such as socio demographic, health, eating pattern and exposure to developmental activities with nutritional status of the adolescents. During analysis tried were made to see the relation of these factors with BMI of the study cases by using statistical tools - cross tabulation of the SPSS version 11.

4.9.1 Relation between BMI and social determinants (appendix D)

4.9.1.1 BMI and Caste

When checked with caste of the respondent with BMI it could be observed clearly that Newar adolescent girls are with better BMI than that of Brahman girls. This difference is seen due to their eating habit that has been practiced traditionally. Various mini researches t have already proved that Newari foods are more nutritious and healthier though no study were found about Newari food consumption and nutritional status till date. Newar family used to consume animal protein more often than Brahman family and they have no restriction on food to eat which is also proven by the conversation done with those girls during data collection. But Brahman family has restriction of consuming various foods such as chicken meat, buff meat, pork meat, eggs, onion, and garlic. This type of food behaviors are reflected in the BMI of the adolescent girls.

4.9.1.2 BMI and Family size

Girls of single family show better BMI, though sever thinness has seen less in the girls of joint family. Here the advantage of joint family has played roles in the nutritional status of the girls. Food distribution pattern among family members is also a significant influencing factor for good BMI which is proven by the cross tabulation of these two variables. More than 58 percent girls who have a system of eating together with all the family members were fall under normal BMI which is the indication of normal growth of height and weight. This advocates against the discrimination in food distribution system within family. The malnutrition rate can be reduced if intra household food distribution pattern is corrected.

4.9.1.3 BMI and Education

Relation between schooling and BMI of the adolescent girls were also a matter of concern. This study tried to analyze the relationship and found that more than 60 percent adolescent who were going school at the time of study fell under normal BMI category (Appendix D). When observing the BMI pattern of school going and not going girls, more percentage (43 in total) of school going girls are suffering from low BMI. This low BMI prevalence of school going girls could be due to low quality / less amount of tiffin eaten or no tiffin to eat. Long gap between two meals created sever deficiency of nutrients to meet the rapid development phase of the girls. Qualitative data revealed that in one side most of the girls' snacks eating pattern is poor and in other side total food pattern is poor with low quality or less nutrients. So more number of school going girls are suffering from under nutrition.

4.9.1.4 BMI and Menstruation

Timely menstruation is the indicators of normal physical growth pattern. From the findings of menstruation age and BMI, the relation shows that the girls who started late menstruation have relatively poor BMI. Various literatures have already indicated that early maturation is good for normal development and normal development is helpful for normal and healthy reproductive age. So considering menstruation age as one of the prediction factor for normal and healthy reproductive health, it could be easy to say that adolescent girls of Goldhunga are in risk of good reproductive health. More than 30 percent adolescent girls have not started menstruation yet. This might be due to poor diet and poor BMI of them.

4.9.1.5 BMI and Pregnancy / motherhood

It is a proven fact that one of the major causes of high maternal mortality is early marriage/ pregnancy. While talking about adolescent girls this issue could not be ignored. Early marriage/ pregnancy is tradition in Nepalese society so this factor is also taken as one of the social variables that influences nutritional status of the girls. Result shows more number of adolescent girls (more than 73 percent) who were not married falls in the normal category of BMI and in total of girls who fall under the normal BMI category, 26 percent was those who are already a mother. These figures also indicate that marriage and childbearing in adolescence age is not favorable for the normal growth of adolescent girls and could have negative impact on the road of good reproductive health and good nutritional status. More research/ study are needed to justify the influence of these social factors to improve reproductive health of the adolescents.

4.9.2 Relation between BMI and health factors

4.9.2.1 BMI and Anemia

Normally anemia, eye problems and iodine status is closely associated with nutritional status and are taken as an indicator while assessing it. In this study, it was tried to see whether these indicators support the prevalence of under nutrition. Here, positive link is seen while analyzing the result. Almost similar percent of girls were seen under normal category of hemoglobin (43.2) and in BMI (48). This reveled that those who have lower BMI are likely to fall under any kind of anemia or visa verse.

4.9.2.2 BMI and Morbidity **(appendix E)**

Nutritional status is directly influenced by morbidity condition of the girls. It is proven by various researches that the growth of weight and height of girls could be stagnant if she is suffering from frequent illnesses. Present research find that overall health conditions of the adolescent girls are not satisfactory. The diarrhea prevalence is very high (92 percent) and percentage of girls suffered from common cold is also noted high (98.4). High occurrences of these infections may lead poor health which could be seen in the form of poor BMI of these girls. Headache is another major problem faced by many adolescent girls of this village. Considering all the conditions in which these girls are living, it could be predictable that low hemoglobin status, poor diet and more laborious work could be the major causes of headache. Here, more clinical investigation is needed to find out the root cause of frequent headache.

Looking at the relationship of morbidity pattern with nutritional status (BMI) of the studied adolescents, it is visible that high percentage of girls (96.2) who fall under the severe thinness were suffered from diarrhea and the same percent of adolescent girls who fall under the sever thinness were suffering from common cold as well. The percent of girls who suffer from common cold is seemed to be critical and fall under mild and moderate form of thinness. Though, due to regular de-worming, intestinal parasites prevalence is relatively low than other infections, its prevalence is still seen and can be listed as another cause of low BMI of the girls. This result could be a predictor that morbidity rate has influenced negatively and has created nutrient deficiency or thinness of the girls in Goldhunga. Analysis of the result compelled to say that morbidity rate is major influencing cause of low nutritional status among girls of Goldhunga.

4.9.3 BMI and meal pattern

4.9.3.1 BMI and Frequency of eating **(appendix F)**

Frequency of eating meal is another important influencing factor when studying about nutritional status. Frequent eating is suggested to meet the need of fast cell multiplication in adolescent's body. This research shows that only little more than half the studied girls are taking 3 meals a day. Rest is taking only two meals but no snacks in between. This type of habit is a strong contributing factor for low BMI of the adolescent girls of study area. Only two meals a day could not supply sufficient food / nutrients to support the growth of adolescent period that is proven by the cross tabulation of frequency of meal eaten and BMI. Analysis shows that greater percentage of girls (66.7) fall under normal BMI who were eating 3 meals a day than their counterpart who ate only two meals a day. Furthermore, long gap between two major meals may create various health problems for the girls.

4.9.3.2 BMI and Snacks **(appendix G)**

Study analysis has shown very positive association between snacks eaten practice and BMI of the adolescent girls. It revealed that altogether more than 32 and 20 percent girls fall under the severe thinness who consumed bitten ric*e* / tea and fast foods respectively. Though, bitten ric*e* is considered as convenient but nutritious food, association with tea has degraded its bioavailability after consumption. If bitten ric*e would be consumed with milk or curd or milk or tarkari*, its nutritional benefit could be high. In the case of fast food, it is well-known that these foods are low in quality nutritionally, so it was expected that those girls who were consuming fast foods might have low BMI and study have proven it - 20 percent girls fell under sever thinness. Similarly, more percentage of girls (32.7, 18.2 &39.1 under severe, moderate & mild form of thinness respectively) fall under any type of thinness who consumed only tea and bitten rice as a snack, but, roasted maize / soybeans consuming girls are less likely to fall under any type of thinness. So, as sown in the study result, one can predict that the nutritional status of the adolescent girls could be better if right type of snacks is eaten along with major meals.

4.9.4 BMI and work pattern (appendix H)

Study result shows closer association between nature of work and nutritional status of the Goldhunga girls. Those who were doing laborious work are more likely to suffer from any kind of thinness. According to the study analysis girls who are doing work like cloth washing, cooking, water carrying, grass cutting are falling under sever thinness. Analysis also revealed that more percentage of adolescent girls are suffering from any kind of thinness who works various (above mentioned) types of household chores. During data collection, it was observed that many girls of age 12 and 13 were washing big and heavy cloths all alone. Similarly, same age girls were carrying heavy load of manure to the field and taking big bundle of fodder collected from nearby jungle to their home walking vigorously ups and downs. Many girls were found carrying load of bricks to earn money. At the mean time, most of the girls are doing multiple household works such as washing clothes, cooking, cleaning house, carrying manure very day. These heavy works with poor diet has contributed as a responsible factor for low BMI of the girls. This evidence has proved that rural girls are doing hard work unlike their age to sustain but food supply is less for them. So they are suffering from under nutrition which has reflected in the form of poor BMI. This malnutrition might effect not only to them but future generation also will be affected and fall under intergenerational cycle of malnutrition.

4.9.5 BMI and Exposure to developmental activities (appendix I)

During analysis of the result, developmental activities emerged as a strong influencing factor for nutritional status of adolescent girls. Cross tabulation of girls' BMI with exposure to developmental activities has reveled that the girls who are participating in the meeting and are members of the group / club / organization have normal BMI. The percentage of girls under sever thinness are much lower (0 – 1.9) and relatively few percentage of girls (4.3 – 16 .7) are seen under moderate and mild thinness. The result showed a strong relationship between developmental activities and BMI of the adolescent girls. So, on the basis of this result, it is predictable that the girls who are involved in developmental activities are less likely to fall under any category of thinness. It is true in a sense that the girls become more conscious and aware if they have opportunity of exposure. So it is suggestible to provide various opportunity of exposure to the girls so that they might have lesser chances of falling under malnutrition. This type of exposure is not only beneficial for the girl herself but other family members and future generations could also be benefited.

4.9.6 BMI and Exposure to mass media (appendix J)

Cross tabulation analysis of BMI with media exposure of the adolescents showed very interesting result so far. Approximately 82 percent adolescents under the normal BMI, use to listened radio. They have adopted it as their regular activities. Similarly, 80 and 65 percent adolescent girls within normal BMI category watched TV and read newspaper/ magazine respectively. Here, the adolescents who used to read newspaper / magazine were seen better nutritionally than radio listener and T.V. viewer. This result indicated that adolescents who have exposure to various media have a normal nutritional status than others who have no access to these media. This is positive result which shows that these media plays an important role for the healthy living. So, if these mass media impart right type of information and messages then its effectiveness is noteworthy.

CHAPTER 5

MULTIVARIATE ANALYSIS

Some description of factors affecting the nutritional status of adolescent girls has been discussed in the chapter 4.0 - Result and Discussion. Here, an attempt was made to calibrate past estimates and hypotheses using a rigorous procedure. That procedure involved linear regressions method which was run through separate sets of data.

Regression analysis is a statistical technique for analyzing the relationship between two or more variables, and which may be used to predict the value of one variable from the other or is a technique used for the modeling and analysis of numerical data consisting of values of a dependent variable (response variable) and of one or more independent variables (explanatory variables). The dependent variable in the *regression equation* is modeled as a function of the independent variables.

In this study regression is used for prediction hypothesis testing. These uses of regression rely heavily on the underlying assumptions being satisfied. Here, significant level of 0.05 has been taken as a determinant level in analysis to see the influencing independent variables. Three major indicators were chosen to represent nutritional status, each depicting a form of the dependent variable of the regression model. They were;

- Height
- Weight
- Body Mass Index (BMI) and
- Menstruation status

5.1 Determinants of Height (appendix K)

Here an attempt had been made to find out if there were any specific variables affecting height of adolescents which were pre assumed as hypothesis. For this, height was taken as a dependent variable and marital status, family size, age, schooling, food distribution pattern, meal, diarrhea, common cold, tap worm infestation, total working hours, sanitary practices (hand washing practice before eating and after toileting), training, anemia and menstruation status were taken as predictors (independent variables). The regression analysis has shown that there is positive relation of height with age where significant p-

value is <0.001. Similarly, family size, schooling, diarrhea, tapeworm, other health problems, meal, BMI, menstruation status and hand washing practices (after toileting and before eating) working hour, marital status and weight of the adolescents shows significant (sig. p <0.001) relationship with the dependent variable. This analysis clears that these variables are positively associate with height and are determinants of height. Training taken by the respondents also shows significant influences in the height (significant p<0.05) of the respondents. The two variables - common cold and food distribution pattern in the family, are found insignificance (sig. p> 0.05) under the same analysis. Here, it can be predict that food distribution in the family is not affecting the height of the studied girls but meal pattern is an influential factor to height. Moreover the pre assumed hypotheses were proved to be consistent with the result of the data obtained by the multiple regression analysis procedure because there were no statistical evidences to reject the null hypotheses of this study.

5.2 Determinants of Weight (appendix L)

In this study, the original hypothesis presumed that various social factors such as age, family members, marital status, schooling, food distribution pattern, morbidity pattern, sanitary habit, total working hour and food intake pattern of the respondent's effects weight of the adolescents. This hypothesis has been proved by the regression analysis of the data. Analysis showed significant relationship (sig. p<0.05) of the age, marital status, family size, schooling, diarrhea, tap worm, other health problems, meal, and hand washing practices after toileting, total working hour and BMI in the weight of adolescents. Unlike height, regression analysis shows that weight is not influenced by training taken by the adolescents (sig. p>0.05). Hand washing practices before eating did not show any positive influence in weight (sig. p>0.05) of the adolescent girls at 5% alpha considered for testing hypotheses. Similarly, the result showed that food distribution pattern of the family have no influence (sig. p-value 0.145) in determining the weight of respondents. Goldhunga families have very less varieties of food to eat and respondent also agreed of less percent of discrimination in food distribution. So this type of result could be justifiable. But meal pattern is seen significant for the weight of the girls. This analysis therefore revealed that training, hand washing practice before eating, health problems and food distribution pattern in the family are insignificant to influence the weight of the girls because the sig. p value if > 0.05. The detail of this linear regression analysis has been provided in the appendix 8. 8.2 of this thesis.

5.3 Determinants of the BMI of Adolescent girls (appendix M)

Body mass Index is the ratio of individuals' weight (kg) / height $(mt)^2$. It is used more as a measure of nutritional status when assessing of mature person. Here, regression analysis of determinants of BMI has been administered with the same independent variables which have been used in previous (above mentioned) analysis. The analysis result showed a strong positive relationship of BMI with age (sig. $p<0.05$), menstruation status (sig. $p<0.001$) and sanitary practices (sig. $p<0.05$) of the adolescents. Here, other determinants could not appear strongly as influencing factors because of short stature of the girls in an average.

5.4 Determinants of menstruation status (appendix N)

Menstruation is one of the milestones of adolescent girls that indicate – they are inhering into the reproductive phase of the life. Timely menstruation not only is a symbol of normal physical growth with normal nutritional status but also an indication of normal growth and maturation of the reproductive organs. Regression analysis of determinants of menstruation status has been administered with the same independent variables which have been used in analyzing the height and the weight. This analysis has also supported the pre-assumed determinants of menstruation age in the study. In the analysis, this has indicated that the variables like - age, family numbers, meal, common cold and working hour are seen as determinant factors (sig. $p<0.001$) of menstruation age. Similarly, weight and height of the girls is seen significantly with sig. $p<0.001$. Here, morbidity like tapeworm and other health problems is seen as an influencing factor for menstruation age with sig. $p<0.01$. In this analysis food distribution pattern is also emerged as an influencing factor with significance $p<0.05$ for menstruation age in this study. In addition to that, diarrhea infection and meal pattern are not found significance by the same analysis in determining the age of menstruation of adolescent girls because the significance p-level of the result exceeds 0.05.

CHAPTER 6
CONCLUSION AND RECOMMENDATION

6.1 Major findings of the study

Social determinants

- The predominant caste of the study village is Brahmin with 76.8 percent.
- Most of the families have similar type of economic condition – low cash money with some agriculture production to sustain life.
- Nuclear setting of family is found more common where 61 percent of studied girls were living. Rests are living in joint family
- In total 73.6 percent adolescents were found going school currently. Remaining 26.4 percent were taking no formal education though it is high time to have formal education.
- Mean age of starting menstruation is 13.7 among the study cases.
- Mean age of marriage is 15.7 years among studied girls
- In the issue, study showed that in total, 22.4 percent (38.3 percent among the age 15 – 19 years) were already married. Among them 30 percent were mother and rest were pregnant of their first child. entered into the motherhood. Study shows that among the married population 52.3 percent are mother of one child, where as 47.7 percent has 2 children.
- There is no significant discrimination between boys and girls were found in food distribution but 10 percent girls admitted that there is discrimination while distributing food in amount and type such as ghee, meat, milk.

Nutritional status

- Stunted growth is seen common in the study. The mean height all the respondents fall below -2 SD of height- for- age (NCHS standard) and are categorized as high risk of malnutrition even for the reproductive / obstetric health as well

- Weight of the studied adolescents is also not so satisfactory. But weight seems better in comparison of height. Mean weight of all the respondents fall between -1SD and – 2 SD of NCHS reference weight for age standard.

- The prevalence of any kind of thinness (sever, moderate and mild) was also found high (48.5 percent). BMI seems better due to short stature of the girls.

- Similarly, the study showed the possibility of nearly 50 percent adolescents of Goldhunga suffering from anemia.

- Micronutrient deficiency is also seems high where 20 percent adolescents complained about the photophobia (difficult to see in bright light) and 1.2 percent had complain about inability to see in dark.

- About iodine consumption the findings is quite encouraging which showed 95 percent household are using iodized salt.

Morbidity pattern

- Morbidity is one of the determinant factors of nutritional status. Study found that 92 percent of respondents had reported the episode of diarrhea one or more time a year.

- Sixty six percent adolescents had experience one or more times of worm prevalence in a year.

- Majority of adolescents (98.4 percent) were victim of common cold one or more times a year.

- More than half (55 percent) respondents were suffering from one or more type of problems related to menstruation. More than one fourth of adolescents (28 percent) were suffering from the combined problem of no timely menstruation, heavy menstruation and pain in uterus.

- Most of the girls were complained about the problem of sever headache. Beside, stomach / gastric pain, nausea and back pain problems were also complained by the girls.

Meal pattern

- Among study population only 65 percent adolescents of Goldhunga were eating three meals a day including snacks in between.

- Thirty two percent girls were taking two times meal but no snacks in between.

- Only 4.3 percent girls were taking foods 4 times a day.

- About the snacks - approximately 31 percent girls were taking tea or *tarkari* and *chiura* (beaten rice) as snacks. Nearly one fourth of the adolescents were taking 'ready to eat food' like biscuits, *chauchau*, *pauroti*, puffs, *dalmoth*. But 6.6 percent adolescent among study cases were deprived from taking any snacks.

- Looking at the pattern of eating some nutrient rich food, study showed that 15.4 percent adolescents were eating GLV, 1.6 percent consuming meat, 3.5 seasonal fruits and 48.4 percent eating milk/ curd daily. Though 47.2, 33.5 and 64.6 percent girls used to take meat, fruits and milk / curd respectively but occasionally so its impact on nutritional status might be very nominal.

The frequency and quality of food eaten are not so satisfactory which has been reflected in the low nutritional status and high morbidity of the study adolescents. Goldhunga girls lack good quality and quantity of food which has direct impact on their nutritional status. Even the family who have sufficient amount of agriculture production, use to consume very limited variety of food to eat and no balance diet were seen while doing observation. They hardly buy vegetables from nearby market. They use to eat whatever they have. This practice has deprived girls from taking variety of foods which could supply nutrients/ micronutrients they need.

Sanitary practices or personal hygiene

Bathing habit is not seen very common among adolescents in Goldhunga, only 44 - 51 percent of girls took bath 3- 4 times a week but other even less frequently than that. Two percent adolescents have practice of daily bath. Nearly all adolescents (98.4 percent) agreed that they had a practice of washing hands before eating. But 4.4 percent adolescents were not washing hands regularly and 1.6 percent never washes hands after defecation. Only less than one fifth of the adolescents were using soap water as a cleaning substance. Viewing these research findings, it is predictable that high prevalence of these infectious diseases among adolescents might be the reason of very poor hygiene and sanitary practices.

Health care practices

- little more than half (54.3) percent adolescents admitted that they use to go to doctor for their illness

- Almost 29 percent girls used to take help of traditional healing practices (*dhamijhakri, puja, fukfak*) to cure their health problems.

- It is nice to hear that nearly three fourth of the adolescents had knowledge to go to the doctor for treatment during illness but practice of this habit is quite poor.

Work pattern

Most of the respondents in survey area were doing household chores like cloth washing (94 percent), cooking (97 percent), water carry (86.2 percent), housecleaning (53 percent) and fodder collection (45 percent) as major activities. Nearly 47 percent of study adolescents were engaged in agricultural activities. A girl has to do multiple work with great effort and strength. All these activities demand good quality and quantity of food. But good food or balanced food is not made available to these girls, so poor nutritional status is inevitable. There is no balance between work done and consumption of daily required nutrients. These imbalances are reflected in the study results in the form of poor height, weight, BMI and high anemia prevalence among the girls. These all combinely contribute to have undernutrition among these girls.

Exposure to development activities

- Present study found that very low percentage (17. 3) of adolescent girls were members of the group / club like women's group, children's group, micro credit, youth group working in the village.

- Six percent adolescents were members of the organization like *REUKAI* and *Manushi* who are working in this village.

- Only 8.3 percent of the total respondents had taken training about various skills of sewing, computer, teacher's training where as a large group of the adolescents (91.7 percent).were excluded from these opportunities.

- Four percent adolescents reported that they had attended meetings but a larger proportion of them (95.7 percent) never had that opportunity.

- Nearly 80 percent girls have no excess to market. It is a symbolic reflection that shows majority of Goldhunga adolescents have less access

to financial resources and they have almost negligible decision making power for it as well.

The civil societies working in the village are not utilizing the strength of adolescent girls in the development work of the community. Wastage of this strength has made adolescent girls more reluctant to the environment in one side and is falling under the same traditional cycle of early marriage, reproduction, work burden, malnutrition and increased morbidity.

Mass media exposure

- Access to media is essential to increase knowledge and awareness about what is going around them which may effects their level of perception, awareness and knowledge. Result showed that 76.4 percent of the respondents used to listened radio as a favorite media. *Sathisanga man ka kura* is one of the very popular programs. Listening of NEWS by 7.5 percent showed the trend of interest shown by girls about the country and the world as well.
- Almost 78 percent girls' family owned television in Goldhunga.
- Fifty five percent girls read newspaper / magazine however, 43.3 percent never read these things. Certainly, these are effective channel and have helped to create awareness among girls to some extend.

Though radio and television is very popular media among the girls of study area, more numbers of girls are deprived of utilizing these media properly because of scarcity of time. Their continuous work since morning to late night hardly gives them time to listen radio or watching T.V. Similarly, lack of money to buy news papers/ magazines and unavailability of these things in schools or other public places also limited the numbers of girls who read it.

Adolescence pregnancy and motherhood

- Among those who were already mothering, 79.5 percent had received antenatal care and 77.5 percent adolescents had received TT vaccine.
- Twenty percent respondents were not taking any iron tablets though it is available freely in the near by health post.
- Adolescent girl may face longer time of labor during child birth that is proven by this study result which shows that 84 percent girls had prolonged (12 or more hour) labor period.

- 52.3 percent girls delivered their child in hospital / nursing home with the help of SBA but 47.7 percent gave birth at home with the help of mother – in - law / mother, neighbors / villagers, traditional birth attainders, and father- in -law / uncle**.** Five percent babies were born preterm.

- It is noticeable that 77.5 percent pregnant / mother adolescents did not eat extra food when they were pregnant or lactating though lot message regarding the need of extra food during pregnancy is flowing from radio.

Based on these observations the study has made some recommendation as well. One among the various recommendations – a wide rang of dissemination of this research is suggested to draw attention about the issue of adolescent which are mostly rested in the shadow. Consultation with the local community is also important to make realization about the situation of their grown – up child and their requirements.

6.2 Conclusion

Though childhood nutritional status is very important for the wellbeing of the person, adolescent phase is also an important period to correct nutritional status of individual especially girls and their future generations. Adolescents have typically and traditionally been considered a low risk group for poor health, and often receive few healthcare resources and scant attention. However, this approach ignores the fact that many health problems later in life can be improved or avoided by adopting healthy lifestyle habits in adolescence. This period is considered as a unique intervention point in the life cycle which offers a chance to acquire knowledge about optimal nutrition during young adulthood. This learning gives them immense opportunity that could prevent or delay adult-onset diet-related illnesses later on. It is a stage of receptivity to new ideas and a point at which lifestyle choices may determine an individual's life course.

Present study tried to look nutritional status of adolescent girls between the ages 12 – 19 year of Goldhunga VDC. The predominant caste of the study village is Brahmin Most of the families have similar type of economic condition – low cash money with some agriculture production to sustain life. Nuclear setting of family is found more common where 61 percent of studied girls were living. Though the number of school going adolescent girls was found satisfactory, the percent of non school going girls are also high. Study has found that the menstruation starting age is still high which has direct impact on the BMI of girls. Overall nutritional conditions of the respondents were not so encouraging. Though situated very near to capital city Kathmandu, the young girls of

Goldhunga are deprived of education and other various opportunities that are enjoying by city girls.

Stunted growth is common pattern that is reflected in the study. These girls are categorized as high risk of malnutrition and for the reproductive / obstetric health as well. The prevalence of severe, moderate and mild thinness among adolescent girls was also found high in Goldhunga village. This high prevalence of malnutrition is associated with poor eating habit, low eating of nutrient dense food with very limited variety of food. Low body mass could be a influencing factor for low birth weight of the offsprings if not corrected timely. The frequency and quality of food eaten are not so satisfactory which has been reflected in the low nutritional status and high morbidity of the study adolescents. Goldhunga girls lack good quality and quantity of food which has direct impact on their nutritional status. Even the families, who have sufficient amount of agriculture production along with cash income, have very limited variety of food to eat and no balance diet is seen while doing observation. They hardly buy vegetables from nearby market. They use to eat whatever they have. This practice has deprived girls from taking variety of foods which could supply nutrients/ micronutrients they need. The summary findings of nutritional status of Goldhunga girls comparing with girls of SARCC region is show in table 4.10.

Normal health condition of a person is a key factor for healthy living and in wider prospect is a way to achieving good nutritional status also. Prevalence of infectious diseases may cause poor health and lead to malnutrition. High episode of diarrhea, intestinal worm and common cold are seen as contributing factors for poor nutritional status of the adolescent girls in study area. Prevalence of infectious diseases are depends upon the sanitary practices or personal hygiene of the girls. This is one of the major issues for good health which also ensure nutritional status of the person as well. Habits of personal cleanliness are not seen very common among girls of Goldhunga. The findings of less than one fifth of the adolescents using soap water as a cleaning substance can predictable the scenario. High prevalence of infectious diseases among adolescents might be the reason of very poor hygiene and sanitary practices. High dependency on traditional healer for health care practices is also seen as an influencing factor for poor health and malnutrition.

Work pattern / working hour have direct relationship with energy requirement and its expenditure in the body. Normally heavy works like cloth washing, household cleaning, water carrying, cooking, fodder collection, agricultural work, carrying of manure to agriculture field are daily activities of the adolescents of study area. Nearly 50 percent of

study adolescents are engaged in agricultural activities besides other above mentioned work. All these activities demand good quality and quantity of food. But sufficient amount of good food or balanced food are not made available to these girls, so poor nutritional status is inevitable. There is no balance between work done and consumption of daily required nutrients. These imbalances are reflected in the form of stunted growth, thin body, low BMI and high anemia prevalence among the girls.

Exposure to development activities also helps to maintain good nutritional status and health. Present study found that very low percentage of adolescent girls were members of the group / club like women's group, children's group, micro credit, Yuba group working in the village. A large group of the girls were excluded from these opportunities. The civil societies working in the village are not utilizing the strength of adolescent girls in the development work of the community. Wastage of this strength has made adolescent girls more reluctant and shay to the environment in one side and is falling under the same traditional cycle of early marriage, reproduction, work burden, malnutrition and increased morbidity.

Nearly four fifth percent girls have no excess to market. It is a symbolic reflection that shows majority of Goldhunga adolescents have less access to financial resources and they have almost negligible decision making power for it as well. These results are comfortable enough to say that the adolescents of Goldhunga have very limited opportunities of exposure to development works and are bounded by traditional pattern of living.

Today's world is the world of mass media. It is quick and strong medium to influence and communicate larger mass at a time. Most of the messages are flowing from these media which could change the life of the people in positive way. Access to media is essential to increase knowledge and awareness about what is going around them which may effects their level of perception and awareness and knowledge. Goldhunga girls may have access to media such as radio, T.V and Newspaper/ magazine but heavy work burden and lack of money has deprived the girls to use these media.

In the crucial issue of adolescent pregnancy and motherhood, study result matches the result showed in various national research of Nepal. Although girls are near to the capital city where every opportunity and exposure is available, girls of Goldhunga are surrounded by unseen wall of the tradition and are falling into the same cycle of reproduction, malnutrition and poor status following footstep of their mother or grand mother. Traditional family pattern with patriarchal setting has given girls very little

chance to escape from the same traditional role that are performing by the women since decades.

Information related to health and nutrition status of adolescents and the contributing factors to under-nutrition is extremely important not only to improve the quality of the adolescents' life but also because it provides valuable insights into the issues that have profound impact on future generations. At the same time there currently exists a void in systematic research and empirical studies on the adolescent population of Nepal. So, researcher hopes that this type of research study may provide the basis for effective public dialogues and discussions on the formulation of health and gender programs / policies for the adolescent population who are extremely vulnerable but strong pillar for the prosperous Nepal.

6.3 General Recommendation

Adolescence period is considered as a special period and is taken as a window of opportunity, though cared less. If this phase of life is healthy and well- nourished then the risk of malnutrition and its consequences could be minimized for both mother and children. Present study has found that adolescents girls' nutritional status is highly affected by the factors like -social, morbidity, sanitary habit, eating pattern, media exposure and exposure to development activities. These girls need special support to uplift their nutritional status because they are still unaware about the nutritional demand of the body and consequences if not fulfilled timely. Though childhood nutritional status is more important, correction of eating habit during adolescent could minimize the maternal morbidity and mortality along with intra-generational cycle of malnutrition.

Based on the study, here, very few but precise recommendation are listed to improve the nutritional status of the adolescents girls which might be useful to the program planner and policy makers as well.

Increase Education level

- Improve awareness about the **importance of education.** Education is one of the strong means that can minimize the nutritional problems. Still parents are reluctant to send their children school. They never force children to go school if they dropped out or leave school with no reason. So it is necessary to make aware both parents and girls about the importance of education.
- Provision of higher education should be made available in the village so that girls get chance to study. This might increases marriage and childbearing age of the girls.
- Educational materials related to food habit and healthy leaving should be develop and disseminate through different channels especially targeted to the adolescents. It is important to discuss these matters with girls and the local people for their acceptance and practice otherwise only dissemination of the message may not apply.
- Early marriage contributes to early child bearing. VDC should be very strong and supportive to address this issue. There need to be some incentive and encouragement for young girls to postpone marriage and continue study. In this regard health workers need to publicize and counsel the harmful effect of early child bearing and closely spaces pregnancies through various means of communication.
- Educational message regarding the nature of the growth of adolescent girls be developed and disseminated to the community through formal and informal discussion. The aim of this dissemination should be to delay marriage.
- Increase **male support** to take responsibility for the effect of their behaviors and eliminating harmful practices such as discriminatory access to food and health care and gender biasness because most of the families still follow strictly the decision of men on health related concerns.

Increase height and weight

- Stunting is partly due to under nutrition during early childhood. So more effective and focused program to improve nutritional status of infant and young children is urge need. However the chances of catch-up growth could be possible in adolescence period, program to improve nutritional status is also necessary such as:
    - Poverty alleviation program through income generating activities in the community. In this respect, easy availability of credit for

community women and girls and training for tactful handling of those credits is more helpful.

- Reducing morbidity prevalence – low prevalence of infections like acute respiratory infection (ARI), diarrhea, influenza and intestinal parasite through clean water supply, sanitation, de-worming and environmental hygiene.
- Improving access to health facilities so that early detection of illness could be possible and there by preventing chronic illness and under nutrition.
- Continuous awareness about physical growth, nutrition, food and malnutrition could help to improve eating habit through which growth could be accelerate
- Weight or BMI status of the adolescent girls could be improve through
- Beside all above mentioned measures (for height), reducing the work burden of the adolescent girls is advisable to increase their weight / BMI. This could be possible through motivating male members of the family to share the work burden equally.
- Make girls and parents aware about the need of energy store in the body of adolescent girls.
- Girls need to understand the importance and role of the adequacy of food. Skipping food is a common behavior of girls due to influence of media where heroines with slim body are shown as a symbol of beauty. So eating pattern should be observed closely. For it mother or caregiver or girls herself need to be alert.
- Continuous checking of height and weight could be helpful to maintain weight and normal BMI.

Improve intake of nutrient rich food

- High priority should be given to improve nutritional intake of adolescent girls to prevent various health problems in later life. Here government and Civil Societies should have a policy and program to motivate adolescents to use locally available cheep but highly nutritious foods. Local health workers also need to make extra effort to aware parents, caregiver and adolescents about the various food and its long term consequences.
- Nutrition education should be emphasized more, especially from secondary level because they can influence their parents and kitchen. Above all, health of girls and their future generation matter is an

important thing. If adolescents perceive this thing then they could be alert nutritionally. Here, nutritionist and dietician need to take some steps and effort to conduct classes on nutrition related topics in schools.

- Another major area of focus should be given to nutrition adequacy. Low consumption of food is one of the strong contributing factors of malnutrition among adolescents. At the same time frequency of eating is also seen low. So awareness about consumption of sufficient food and frequent eating should be given to the adolescents and parents equally.
- Nutrition supplement program such as Mid Day Meal program at school targeted to school going adolescents and increase their energy intake.
- Agricultural project with focus on vegetables and fruits which can supplement micronutrient intake need to be implement.
- Improve intake by increasing the availability of iron rich food. Promotion of cooking in iron vessels also supports to maintain iron requirement in the body.
- Nutrition supplementation program during adolescence period could be a good help for the nutrition condition of the girls
- Effective awareness campaign is needed to
- Alert adolescents about advantages and disadvantages of various ready to eat foods that are easily available to their door-step.
- Make familiar about the importance of eating more green vegetables and fruits in all seasons
- Aware girls about the importance and need of protein (animal or vegetable) in the body
- Make a practice to relate food they ate with their work pattern
- Inform adolescents about the importance of snacks
- Choose right type of snacks which can support their health
- Practice healthy sanitary habit such as – washing hands thoroughly before eating and after defecation.
- Create healthy environment of their household surroundings
- Utilize available health facilities

More exposure to developmental activities

- Adolescent girls should allow participating in all developmental activities in the community. All the training program and local development

activities should try to include adolescent girls for field work and other activities.

- Some active form of club should be established with the initiation of local civil society where adolescent girls can go and participate in various activities and express themselves without any hesitation and restriction. This type of activities and interaction enhances their capacity and could be supportive for their overall development.
- Awareness program for parents is also essential to allow girls to go out from home and take participation in club/ organization or community development activities.

The adolescent girls as a group need special support programs. Therefore **in the community level** it is recommended that

a. The information gathered in the present study be disseminate to the concerned Governmental and civil society organization to motivate them about the issue and develop relevant policies.

b. Information gathered from the present study be taken to the community group and discussed so that people could aware about the situation and adopt approprtate nutrition and sanitation practices.

c. The positive aspect of education, training and sanitary living conditions as well as the fact of prolonged growth even after menarche among the adolescent girls be stressed and incorporated in any policy decision.

For further Research

The present study cannot claim to answer all the issue related to adolescent girls. The research in future should address some of the following issues that are equally important.

a. impact of nutrition supplementation after the onset of puberty

b. estimation of physical activities and nutritional need during adolescence

c. work pattern and energy expenditure of adolescents – especially those village girls who carry loads and do movements in sloppy / hilly land.

d. impact of pregnancy in physical growth of the adolescents.

e. micronutrient deficiencies in adolescents

f. in-depth study on eating pattern and its impact on nutritional status.

g. more precise study on nutritional assessment of adolescent (both sex) including fat fold test, pelvic bone test.

h. adolescence pregnancy and growth of the child.

Finally, there is an urgent need for preventive and rehabilitative intervention package to address and realize for the reduction of adolescents nutritional deficiency diseases and the related physical and mental problems. The community people, government and I/NGO's need to participate in this intervention and make it sustainable. The this type of intervention can be duplicated by other VDCs as well. This is an essential steps to solve the adolescents health conditions (nutritional) which can be targeted to community, national and global.

Glossary

Achar – a variety of food made up with adding souring substance
Bal samuha – children's group

Chauchau – ready to eat noodles made up with refined wheat flour

Dal – soup of lentils or pulses cooked – up with single types of lentils / pulses or mixed.
Dakarmi - mason
Dalmoth – mixture of deep fried pulses, nuts and flour
*Dhamijakr*i –traditional healer

Fakfuke – traditional healer

Mas - blackgram
Musuro - redgram

Pauroti – loaf bread
Phoda salt - crystal salt
Puffs – very light fast food made up with refined flour
Puja – worship of God

Mahila samuha – women' group
Melapat –
Mohi – the watery liquid that separates from the solid part of milk when it turns sour or when enzymes are added in curd making

Ringata lagne - dizziness
Rayo ko sag – GLV of rapeseeds

Sudeni – traitional birth attainder

Tori ko sag – GLV of mustard seed
Tarkari – cooked vegetables

Yuba samuha – youth group

प्रश्नावलि
(१२ देखि १९ वर्षका केटिहरुलाइ सोधने)

क्रम संख्या.....

वाड नं..... नाम

व्यक्तिको नामः'..... उमेरः ..... जात । थर .....

खण्ड क शिक्षा (Education):

क. १ स्कूल जाने गरेको छ ? १. छैन २. छोडेको ३.छ

क.१. १. छ भने कति सम्म पढेको छ ?

१. प्राथमिक तह
२. निम्न माद्यमिक तह
३. माद्यमिक तह
४. सो भन्दा माथि

परिबारको आम्दानि :
श्रोत : कृषि
नोकरी
दुबै
ज्यालादारी
ब्यापार

जम्मा मासिक आम्दानि :.....

क..१. २. पढन छोढेको भए कति पढेर छोडेको ? १. १.क्लास २. ३. २ क्लास ४. ३ क्लास.
क..१. ३. छोडनाको कारण १. पैसा नभएर २. पढन नपठाएर ३. मन नलागेर
४.अन्य

क..२. **परिबारको किसिम** : १. एकल
२. संयुक्त

क.२. १. **परिबार संख्या** :.....

क. ३. . **पर सरेको छ ?** १ छ २. छैन
क. ३. १ छ भने कति बर्ष को उमेर देखि सुरु भयो : १. १०, २. ११ ३. १२ ४. १३, ५. १४ ६. १५

क. ४. **बिबाह भएको छ ?** १. छ २. छैन
क. ४. १. बिबाहित भए कति बर्षमा बिबाह भएको ? .....

क. ५. **बिबाहित भए बच्चा छ ?** १. **छ** (छ भने पाना नं **८** सबिस्तार भर्ने)
२. **छेन**

क. ६ **हाल गर्भबति** (गर्भबति भए पाना नं **९ र १०** सबिस्तार भर्ने)

क. ७ **घरमा खाना पहिला कसले खान्छ ?**
१. बुवाले
२.. पुरुष सदस्यहरुले
३. छोराछोरीहरुले

४. सबै एकैसाथ

क. ८. **अन्तिममा खाना कसले खान्छ ?**

1 आमाले

2 महिला सदस्यहरुले

क. ९. **खाना बाढदा छोरा र छोरीमा भेदभाव गर्ने गरेको छ?** १. छ २. छैन

क. ९.१. छ भने कसरी?

१. मिठो खाना छोरालाइ मात्र दिने

२. छोरालाइ धेरै खाना दिने

क. १०. **घरको काम छोरीमान्छेले मात्र गर्छन** ? १. हो २. होइन

शाररिक नाप (anthropometric measurements.)

क. ११ उचाइ : मिटर.....से.मि.....

क. १२. तौल : .....के. जि. क. १३. BMI=

क. १४. **HBL :**

खण्ड ख स्वास्थ्य (health) :

रक्तअल्पता

ख.१.	थोरै काम गर्दा पनि थकाइ लाग्ने गर्दछ ?	१. लाग्छ	२. लाग्दैन
ख.२.	टाउको दुखिरहन्छ?	१. दुख्छ	२. दुख्दैन
ख.३.	शास फेर्न गाह्रो हुन्छ?	१ हुन्छ	२. हुदैन
ख.४.	माटो खान मन लाग्छ ?	१. लाग्छ	२. लाग्दैन
ख.५	केहि गर्न मन नलागी सुतिरहन मन लाग्छ ?	१. लाग्छ	२. लाग्दैन
ख.६.	अन्य.कुनै समस्या **(उल्लेख गर्ने)**.....		

(**निरिक्षण गर्ने**)

ख.७. ओठमा कलेटि परेको छ? १. छ २. छैन

ख.८. आँखाको रंग कस्तो छ?

१. पहेंलो

२. सेतो

३. रातो

ख.९. जिब्रोको रंग कस्तो छ ?

१. पहेंलो

२. सेतो

३. रातो

ख.१०. **आँखा सम्बन्धि** : **(सोधने)**

आँखा सम्बन्धि तल उल्लेख कुनै समस्या छ?

१. उज्यालोमा हेर्न गाह्रो हुने

२. राती नदेख्ने

३. अन्य.....

ख. ११. **आयोडिनको कमि सम्बन्धि** :**(निरिक्षण गर्ने)**

१. देखिने गलगाँड,

२. सुस्त मनस्थिति,

३. अन्य कुनै लक्षण वा

४. ज्यादै पुडको भए उल्लेख गर्ने।

(सोधने)

ख. १२. आयोडिन खानु पर्छ भन्ने कुरा थाहा छ? १. छ २. छैन

ख. १३. **यो के मा पाइन्छ** ?

१. नुन

२. हरियो तरकारी

३. गेडागुडी

४. सागपात

५. माछा मासु

ख. १४ **कुन नुन खाने गरेको छ** ? १. ढिके २. प्याकेटको

ख. १५ तपाइलाइ दिसा पखाला लागिरहन्छ ? १. लागिरहन्छ २. लाग्दैन

ख. १६ लाग्छ भने वर्षमा कति पटक ?

१. १.पटक २. २ पटक ३. ३ पटक ४. ४पटक, ५. ५ पटक ६. घेरै पटक

ख. १७. तपाइलाइ जुका , चुर्ना परिरहन्छ ? १. परिरहन्छ २. पर्दैन

ख. १८. पर्छ भने वर्षमा कति पटक ?

१. १.पटक २. २ पटक ३. ३ पटक ४. ४पटक, ५. ५ पटक ६. घेरै पटक

ख. १९. तपाइलाइ रुघा खोकि । ज्वरो आइरहन्छ ? १. आइरहन्छ २. आँउदैन

ख. २०. आउछ र भने वर्षमा कति पटक ?

१. १.पटक २. २ पटक ३. ३ पटक ४. ४पटक, ५. ५ पटक ६. घेरै पटक

ख. २१. तपाइलाइ टाउको दुख्ने गर्दछ? १. दुख्छ २. दुख्दैन

ख. २२. दुख्छ भने वर्षमा कति पटक ?

१. ३ पटक २. ४ पटक, ३. ५ पटक ४. घेरै पटक

ख. २३. अन्य केहि समस्या भए उल्लेख गर्ने.....

ख. २४. **तल** उल्लेख कनै **समस्याहरु** छन् ?:

१. महिनावारी समयमा नहुने
२. रगत धेरै हुने
३. कम हुनु
४. तल्लो पेट (पाठेघर) दुख्ने
५. अन्य.....

ख. २५. **<u>खाना को बिबरण</u>** :

ख. २६. दिनमा कति पटक खाना खाने गरेको छ ?

१. २ पटक २. ३ पटक ३. ४ पटक, ४. ५ पटक ५. घेरै पटक

ख. २७. दैनिक खानाको विबरण : (√) टिक लगाउने)

समय	खाना	परिमाण
ख. २८. बिहान	१. चिया । दुध २. अन्य ३. भात ४. दाल ५. तरकारी ६. अचार ७. अन्य	
ख. २९ दिउसो		
ख.३० बेलुका	१. भात २. दाल ३. तरकारी ४. अचार ५. अन्य	
ख. ३१ अन्य		

ख. ३२ साग खाने गरेको छ ? १. छ २. छैन

ख. ३२ .१. छ भने हप्ताको कति पटक ?

१. १ पटक २. २ पटक ३. ३ पटक ४. दैनिक

ख. ३३ माछा, मासु, अण्डा खाने गरेको छ? १. छ २. छैन

ख. ३३. १. छ भने हप्ताको कति पटक ?

१. १ पटक २. २ पटक ३. ३ पटक ४. पटक ५. दैनिक ६. कहिलेकाँहि

ख. ३४. मौसम अनुसारको फलफुल खाने गरेको छ ? १. छ २. छैन

ख. ३४.१. छ भने हप्ताको कति पटक

१. १ पटक २. २ पटक ३. ३ पटक ४. पटक ५. दैनिक ६. कहिलेकाँहि

ख. ३५. दहि दुध खाने गरेको छ ? १. छ २. छैन

ख. ३५ १. छ भने हप्ताको कति पटक

१. १ पटक २. २ पटक ३. ३ पटक ४. पटक ५. दैनिक ६. कहिलेकाँहि

दैनिक कार्य विवरण :

ख. ३६. **पढाइको साथै** के के काम गर्ने गरेको छ?

काम	**समय (घण्टा)मा**	**काम**	**समय (घण्टा)मा**
१. लुगा धुने		६. पानी ल्याउने	
२. भात पकाउने		७. घाँस काटने	
३. घर लिपपोत गर्ने		८. दाउरा लिन जाने	
४. बच्चा हेर्ने		९. खेतबारीमा काम गर्ने	
५. गाइबस्तु हेर्ने		१०. किनमेल गर्न जाने	

ख. ३७. **(यो नभर्ने)** जम्मा काम गरेको घण्टा .....)

ख. ३८. कुन समयमा पढने गरेको छ ? .. १. बिहान, २. बेलुका

खण्ड ग चेतनाको स्तर (Level of Awarness)

सरसफाइ । स्वास्थ्य सम्बन्धि

ग. १. **हप्तामा कति पटक नुहाउने गरेको छ** ?

१ . दैनिक २. दिनबिराएर ३. १ पटक ४. २ पटक ५. हप्तै पिच्छे नुहाउने गरिन्न

ग. २. **सधै खाना खानु अधि हात धुने गरेको छ** ? १. छ २. छैन

ग. ३. **चर्पि गएपछि हात धुने** गरेको छ? १. छ २. छैन

ग. ३.१ .. छ भने कहिले ? १. सधै २. कहिलेकाँहि

ग. ३.२. धुने साधनके हो?
१. साबन पानी
२. माटो
३. भूस
४ खरानी
५ पानी मात्र

ग. ४. **रोग लागेमा के गर्ने गरेको छ?**
१. थाहा छैन
२. धामि । झाक्रि
३. फाकफूके
४. पुजा

५. डाक्टर कँहा गै जँचाएर औषधि खाने
६. औषधि पसलबाट औषधि किनि खाने
७. पोषिलो खाना खाने
८. तातो पानी खाने

ग. ५. **के गर्दा राम्रो हुन्छ?**

१..थाहा छैन
२. धामि । झाक्रि।
३. फाकफूके
४. पुजा
५. डाक्टर कँहा गै जँचाएर औषधि खाने
६. औषधि पसलबाट औषधि किनि खाने
७. पोषिलो खाना खाने
८. तातो पानी खाने

खण्ड घ बिकाश कार्यक्रम प्रति (Exposure to devt. work)

घ. १. **कुनै समुह । क्लबमा जाने गरेको छ ?** १. छ २. छैन

घ. १. १. छ भने कुनमा.....

घ. २. **कुनै संध संस्था को सदस्यता लिएको छ ?** १. छ २. छैन

घ. २. १. छ भने कुनमा.....

घ. ३. **कुनै तालिम लिएको छ ?** १. छ २. छैन

घ. ३. १. छ भने केमा....

१. सिलाइ । बुनाइ
२. लधु श्रृण तथा बचत
३. अन्य.....

घ. ४. **कुनै मिटिङ.मा भाग लिएको छ ?** १. छ २. छैन

घ. ५. **आफूलाइ आयआर्जन हुने कुनै काम गरेको छ** ? १. छ २. छैन

घ. ५ १. छ भने के काम .....

घ. ५ २. कति आर्जन हृन्छ.....

घ. ६. **आफनो आय के मा खर्च हुन्छ** :

१. घर खर्चमा ३. आफनो पढाइमा
२. केटाकेटीको पढाइमा ३. आफुलाइ मनपर्ने कृरा किन्न
५. अन्य.....

घ. ७. **आफनो आय खर्च गर्दा कसले निर्णय गर्छ ?**

१. आफ" ४. आमा बुवा मिलेर
२. आमा, ५. (**बिबाहित भए**) श्रीमान
३. बुबा ६. श्रीमान र आफू मिलेर

घ. ८. **घर देखि बाहिर जाने गरेको छ ?** १. छ २. छैन

घ. ८.१. छ भने कहाँ ?

१. वजार,
२. मिटिड
३. ट्रेनिडमा,
४. घुम्न,
५. फिल्म हेर्न

घ. ९. घर बाहिर जाँदा कोसंग जाने ? १. एकलै २. घरको मान्छेसंग ३. साथिसंग

घ. ६. . छैन भने किन नजाने?.....

खण्ड ड संचार (Media exposure)

ड. १. **रेडियो सुन्ने गरेको छ ?** १. छ २. छैन

ड. १. १. छ भने कहिले ?

१. दैनिक
२. हप्ताको २ पटक
३. हप्ताको ३ पटक
४. हप्ताको ४ पटक
५ कहिले काँहि

ड. १. २. छैन भने किन?

१. समय नभएर
२. रेडियो नभएर
३.अभिभावकले नदिएर

ड. २. **कुन कार्यकम रेडियोमा धेरै सुन्ने गरेको छ** .....

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ड. ३. **घरमा टि. भि. छ ?** १. छ २. छैन

ड. ३.१. छ भने के कार्यकम धेरै हेर्ने गरेको छ ?.....

ड. ४. **पत्र पत्रीका हेर्ने गरेको छ ?** १. छ २. छैन

ड. ४.१. छ भने कति पटक ?

१. दैनिक
२. हप्ताको २ पटक
३. हप्ताको ३ पटक
४. हप्ताको ४ पटक
५. कहिले काँहि

खण्ड च (बच्चा पाएको महिलासंग सबिस्तार सोधने)

च. १. तपाइको बच्चा कतिबटा छन् ? १. एउटा २. दुइटा

च. २.. बच्चा कति उमेरको भयोः ? १.. .....महिना ..... बर्ष

२. .....महिना ..... बर्ष

च. ३. बच्चा कँहा जन्मेको ? १. अस्पताल, २. घर,

च. ४. घरमा भए बच्चा जन्माउदा कसले सहयोग गरेको थियो? .....

च. ५. बच्चा जन्मनु अघाडि जचाएको थियो ? १. थियो २. थिएन

च. ५.१. थियो भने कति चोटि .....

च. ५.२. थिएन भने नजचाउनाको कारण?

१. थाहा नपाएर

२. पैसा नभएर

३. जानुपर्दैन भन्ने सल्लाह पाएकाले

च. ६. टिटानस खोप लगाएको थियो ? १. थियो २. थिएन

च. ७. आइरन चक्कि खाएको थियो १. थियो २. थिएन

च. ८. अन्य.कुनै समस्या थियो ?.. १. थियो २. थिएन

च. ८.१ थियो भने के समस्या ? .....

च. ९. बच्चा कती महिनामा जन्मीयो ? १. ७ महिनामा २. ९ महिनामा

च. १०. बच्चा जन्माउदा कति ब्यथा लाग्यो ?

१. ३ घण्टा ४. २ दिन

२. ५ घण्टा ५. ३ दिन

३. १ दिन

च. ११. बच्चा कसरी जन्मीयो ?

१. सामान्य तरिकाबाट

२. अपरेसनबाट

३. अन्य **(उल्लेख गर्ने)** .....

च. १२. बच्चा जन्मदाको तौल..... k.g. **उचाइ**'.....(थाहा छ भने उल्लेख गर्ने)

च. १३. परिवार नियोजन का साधन प्रयोग गर्ने गरेको छ ? १. छ २. छैन

च. १३. १. छ भने किन ?

१. जन्मान्तरको लागि

२. अन्य कारण**(उल्लेख गर्ने)**.....

च. १४. बच्चालाइ आफनो दुध खुवाउने गरेको छ ? १. छ २. छैन

च. १४. १. छ भने आफुले साबिक बाहेक थप खाना खाने गरेको छ? १. छ २. छैन

च. १४. २. छ भने के खाने गरेको छ.? .....

गर्भबतिसंग सबिस्तार सोधने प्रश्नहरु

च. १५. गर्भबति पहिलो पटक भएको हो ? **१. हो** **२. होइन**

च. १५.१. होइन भने कुन हो ? १. पहिलो २. दोश्रो

च. १६ गर्भ रहेको कति महिना भयो ? .....

च. १७ जचाउने गरेको छ ? १. छ २. छैन?

च. १७. १. छैन भने किन?

१. थाहा नपाएर
२. पैस। नभएर
३. जानुपर्दैन भन्ने सल्लाह पाएकाले
४. अन्य.(उल्लेख गर्ने).....

च. १७. २. छ भने कहाँ ?

१. अस्पताल
२. स्वास्थ चौकि
३. अन्य.(उल्लेख गर्ने).....

.

च. १८ हालसम्म कति पटक जचाएको.

१ पटक २. २ पटक ३. ३ पटक ४. पटक ५. **धेरै पटक**

च. १९ निम्न बस्तू हाल प्रयोग गरेको छ ?

१. टिटानस खोप
२. आइरन चक्कि
३. जुका चुर्नाको औषधि
४. अन्य.....

च. २० खाना साबिकै जति खाने गरेको छ वा बढि ? १. साबिकनै २. बढि

च. २१. साबिक खाना बाहेक अरु के खाने गरेको छ ? .....

च. २२. दाल खाने गरेको छ ? १. छ २. छैन?

च. २२.१ छ भने कहिले १. दैनिक २. कहिलेकाँहि

च. २३. गेडागुडी खाने गरेको छ ? १. छ २. छैन?

च. २२. १. छ भने कहिले १. दैनिक २. कहिलेकाँहि

च. २४. गर्भावस्थामा पोषिलो खाना धेरै खानु पर्छ भन्ने थाहा छ ? . १. छ २. छैन?

च. २५. पोषिलो खाना भनेको के हो थाहा छ ? १. छ २. छैन?

च. २५.१ छ भने के हो .....

च. २६. गर्भावस्थामा कडा परिश्रम गर्न हुदैन भन्ने थाहा छ ? १. छ २. छैन?

च. २७ .२० बर्ष भन्दा कम उमेरमा गर्भबतिहृदा जोखिमपूर्ण हृन्छ भन्ने थाहा छ ?

१. छ २. छैन?

च. २८. स्वास्थ्य सम्बन्धि कुनै अन्य समस्या छ ? १. छ २. छैन?

च. २८.१ छ भने कस्तो.....

धन्यबाद

APPENDIX S
INTERVIEW QUESTIONNAIRE

(for the girls of age 12 – 19 years**)**

Serial no……

Ward no. ……. **wards' name .....……....**

Name of the girl ……..... Age …..... cast ……

Section A

Education

A 1. **Do you go school**? 1. no 2. left 3. yes

A.1.1 If yes, in which class do you study ?

1 primary level

2 lower secondary level

3. secondary level

4. above than secondary

family income

source: agriculture

service

both

daily wages

business

total monthly income…….

A 1.2. if left study, in which class : 1 class 2 class 3 class. Or……

A 1.3 cause to leave study

1. no money 2. not allowed by the family
3. no desire 4. other

A.2. **family types** 1. single 2. joint

A.2.1. no of the family members……

A.3. started menstruation < 1. yes 2. no

A.3.1 if yes, in which age it started

1. 10 2. 11 3. 12
4. 13 5. 14 6. 15.

A.4. are you married < 1 yes 2 no

A.4.1 if yes, in which age did you get married …….

A.5. **if married, do you have baby :** 1. yes **(**if yes, than fill page no. 8 in detail)

2. no

A.6. **now pregnant? 1. yes 2. no.** (if pregnant, fill page no 8 & 9 in detail])

A.7. **who eats food first in the family**

1. father 2. male members
3. children 4. all together

A.8. **who eats in the last**

1. mother 2. female members

A.9. **is there any discrimination among son & daughter while distributing food<**

1. yes 2. no

A.9.1 if yes, how

1. by providing good food to the son only
2. by giving more food to the son

A.10. **household chores are done only by female members in family**

1. yes 2. no

Anthropometric measurements

A.11. height : ...… mt ……..cm

A.12. weight …….kg

A.13. BMI =

A.14. HBL :

Section B

Anemia

B.1. feel of fatigueness even after few works< 1.yes 2. no

B.2. headache 1. yes 2. no

B.3. difficulties in breathing 1. yes 2. no

B.4. willing to eat soil 1.yes 2. no

B.5. want to sleep without doing anything 1.yes 2 no

B.6. any other problem (state)…….

(observe only)

B.7. Pallor in lips 1.yes 2.no

B.8. colour of the eyes?

1. yellow
2. pinkish red
3. white

B.9. **colour of the tongue**:

1. yellow 2. white
3. pinkish red

B.10 related to eyes (ask to the case)

1. do you have following any problems related to eyes<
2. difficulty to see in light
3. night blindness
4. others

B.11 iodine deficiency (observation)

1. visible goiter, 2. mentally retarded
3. other sign & symptoms 4. dwarf

(ask to the case)

B.12. do you know that we need to eat iodine: 1. yes 2. no

B. 13. it is available in which following items

1.	salt	2.	green vegetables
3.	beens & legumes	4.	leafy vegetables
5.	meat & fish		

B.14. **which salt do you use**:

1.	dhike	2.	packet

B.15. do you have an episode of diarrhea 1. yes 2. no

B.16. if yes, how many times in a year

1.	once	2.	twice
3.	thrice	4.	four times,
5.	five times	6.	many times

B.17. tapeworms episodes: 1. yes 2. no

B.18. if yes, then how many time a year

1.	once	2.	twice
3.	thrice	4.	four times
5.	five times	6.	many times

B.19. episode of common cold 1.yes 2. no

B.20. if yes, then how many time a year?

1.	once	2.	twice
3.	thrice	4.	four times
5.	five times	6.	many times

B.21. headach? 1 yes 2 no

B.22. if yes, then how many time a year?

1.	once	2.	twice
3.	thrice	4.	four times
5.	five times	6.	many times

B.23. any other problem related to health …….

B.24**. do you have any following problems** <M

1. no regular menstruation]
2. excess bleeding]
3. less bleeding
4. pain in lower abdomen (uterus)
5. others (if any) ……

B. 25. **<u>diet details</u>**

B. 26. how many times you eat food in a day

1.	once	2.	twice
3.	thrice	4.	four times
5.	five times	6.	many times

B.27. description of daily food consumed (√ mark it)

time	**food**	**amount**
B. 28. morning	1 tea / milk 2. others…. 3. rice 4. dal 5. tarkari 6. achar 7. other……	
B. 29. day		
B. 30. evening	1. rice 2. dal 3. tarkari 4. achar 5. others	
B. 31.others (if any)		

B.32. do you eat leafy vegetables 1. yes 2. no

B.32.1 if yes, how many times a week?

1.	once	2.	twice
3.	thrice	4.	four times
5.	daily		

B.33. do you eat meat / fish 1. yes 2. no

B.33.1 if yes, how many times a week?

1.	once	2.	twice
3.	thrice	4.	four times
5.	daily	6.	occasionally

B.34. do you eat seasonal fruits 1. yes 2. no

B.34.1. if yes, how many times a week?

1.	once	2.	twice
3.	thrice	4.	four times
5.	daily	6.	occasionally

B.35. do you eat curd / milk 1. yes 2. no

B.35.1. if yes, how many times a week?

1.	once	2.	twice
3.	thrice	4.	four times
5.	daily	6.	occasionally

daily work schadule

B.36. **what work you normally do besides study**<

work	**time in hr.**	**work**	**time in hr.**
1. washing cloths		6. water fetching	
2. cooking		7. grass cutting	
3. cleaning of house		8. fodder collection	
4. caring & raring of child		9. agricultural work	
5. cattle grazing		10. shopping	

B.37. **Total working hour……**

B.38. which time do you study

1. morning 2. evening

Section C

Level of Awarness

Personal hygiene -

C.1. **how many times you take bath in a week** <

1. daily 2. alternate day
3. once 4. two times
5. not necessarily in a week

C.2 **do you wash hands daily before eating** < 1. yes 2. no

C.3. **do you wash hand after toilet**< 1. yes 2. no

C.3.1 if yes, when?

1. daily 2. sometime

C.3.2. by which?

1. soap water 2. soil
3 rice flack 4. ash
5. water

C.4. **what you do if you have any illness?**

1. don't know 2. dhami / jankri
3. traditional healer 4. worship god
5. go to see doctor 6. buy medicine from medical shop
7. eat nutritious diet 8. drinking hot water

C.5. **which is the right way**

1. don't know 2. dhami / jankri
3. faith healer 4. worship to god
5. go to see doctor 6. buy medicine from medical shop
7. eat nutritious diet 8. drinking hot water

Section D

Exposure to devt. work

D.1. **do you use to go to any club or group?** 1. **yes** 2. **no**

D.1.1. if yes, in which…….

D.2. **are you a member of any organization?** 1. **yes** 2. **no**

D.2.1. if yes in which……..

D.3. **do you have taken any training -** 1. **yes** 2. **no**

D.3.1. if yes, which training

1. sewing / weaving 2. micro finance
3. others

D.4. **have you attained any meetings?** 1. yes 2. no

D.5. **have you done any work for your personal earning** 1. yes 2. no

D.5.1 if yes, what work you do …….

D.5.2. how much you earn……..

D.6. **where you spend your income**?

1. for household 2. education of the children
3. for own study 4. buy whatever she likes
5. others

D.7. **who decide to spend your earning?**

1. self 2. mother
3. father 4. mother/ father both
5. (if married) husband 6. herself / husband both

D.8. **do you use to go other places for outing:** 1. yes 2. no

D.8.1. if yes, where?

1. market 2. meeting
3. training 4. for roaming
5. to see film

D.8.2**.** with whom you use to go?

1. alone 2. family people 3. friends

D.8.3. if not, why?.....

Section E

Media exposure

E.1. **do you use hear radio?** 1. **yes** 2. **no**

E.1.1. if yes, when?

1. daily 2. twice in a week

3. alternate day 4. occasional

E.1.2 if not why?

1. no time 2. no radio 3. no permission of parent

E.2. **which program you normally hear in radio .....**

E.3. **do you have T.V. ?** 1. **yes** 2. **no**

E.3.1. which program you normally see in the T.V.?.....

E.4. **do you read newspaper ?** 1. **yes** 2. **no**

E.4.1. if yes, how many times a week -

1. daily 2. twice in a week

3. alternate day 4. occasional

Section F

(details of girl who is already a mother)

F.1. **how many children do you have?** 1. **one** 2. **two**

F.2. **what is the age of child?** 1. **…… month …… year**

2. **…….. month …… year**

F.3. **where the baby born?** 1. hospital 2. home

F.4. **if born in home, who helped you at the time of delivery……**

F.5. **did you go for checkup during pregnancy?** 1. yes 2. no

F.5.1 if yes then how many times?

1. one 2. two
3. three 4. four times
5. more than four times ……

F.5.2. if not than why?

1. did not know 2. no money 3. advise for not to go

F.6. **did you immunized with tetanus vaccine?** 1. **yes** 2. **no**

F.7. **did you take iron tab. regularly?** 1. **yes** 2. **no**

F.8. **did you face any problem during that period?** 1. **yes** 2. **no**

F.8.1 if yes, than what problem? .....

F.9. i**n which month of pregnancy you give birth of baby**?

1. 7 months 2. 9 months

F.10. **how long the pain was?**

1. 3 hr. 2. 5 hr
3. one day 4. two days
5. three days

F.11. **how the bay born?**

1. normal 2. operation
3. other (state)……

F.12. **birth wt. of the baby**…….k.g…… **ht…….(if known)**

F.13. **do you use any family planning methods?** 1. **yes** 2. **no**

F.13.1. if yes why?

1. for birth spacing 2. other reasons (state)

F.14. **do you breastfeed your baby**? 1. yes 2. no

F.14.1 if yes, than do you eat extra more food 1. yes 2. no

F.14.2. if yes, which food……..

Details of pregnant girls

F.15. **is it your first pregnancy?** 1. **yes** 2. **no**

F.15.1 if no than which? 1. second 2. third

F.16. **how old your pregnancy is?.....**

F.17. **do you go for checkup** 1. **yes** 2. **no**

F.17.1 **if no why** 1. don't know 2. no money 3. advised not to go

F.17.2 **if yes where** < 1 hospital 2. health post 3.others……

F.18. **how many times did you check up till now**?

1. once 2. two times 3. three times

4. 4 times 5. more than 4 times

F.19. **do you use following things?**

1. tetanus vaccine 2. iron tab

3. medicine for parasites 4. others

F.20. **how much do you use to eat** 1. as regular 2. more than regular

F.20. **which food you eat besides regular diet** ?.....

F.21. **do you eat dal** 1. yes 2. no

F.21.1. if yes when 1. daily 2. occasionally

F.22. **do you eat legumes and beans** 1. yes 2 no

F.22.1 if yes when 1. daily 2. occasionally

F.23. **do you have knowledge that you need to eat more during pregnancy** .?

1. yes 2. no

F.24. **do you know about nutritious food** 1. yes 2. no

F.24.1. if yes, than what is it?.....

F.25. **do you know that you should not do hard work during pregnancy**

1. yes 2. no

F.26. **do you know that pregnancy before 20 years of age is dangerous?**

1. yes 2. no

F.27. **do you have any health problem?** 1. yes 2. no

F.27.1 if yes, what type of problem do you have?.....

Questions For focus group discussion:

- Availability of different food items in the households.
- Food usually taken by adolescent girls.
- Why you need to eat *posilo khana*?
- Awareness of balanced diet among adolescents.
- Who gets to eat first in the family, if the food is inadequate who suffers the most? How distribution is made.
- Any positive and negative restrictions on food intake i.e. what sort of foods are usually avoided and what sort of food is usually taken without any restrictions.
- Discussions on specific food items such as proteins, carbohydrates rich foods
- Improve the eating habit of the adolescent girls

Thank you !!!

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APPENDIX A

Study area: Goldhunga

There are fifty-seven village development committees and two municipalities in Kathmandu district and Goldhunga is one of the VDC. It is an important VDC from an economic, political, social, cultural as well as historical aspect. It lies in the Central Development Region of Bagmati Zone of Nepal. This VDC is located in the northwest part of the district between 27° 44' 15" north to 27° 46' 56" and 85° 15' 22" east to 85° 18' 4" east longitude.

Kathmandu metropolis and Manamaiju VDC are located to the east of the VDC, Dharmasthali in northern part of goldhunga VDC. Similarly Jitpur Phedi lies in the western part and Nagarjune forest is located in the southern part of this VDC. It is bounded by the Kamere khola in the north and Ghatte Khola in the east part of the VDC. South and west part is bounded by the hilly range. It takes nearly one hour to reach Balaju By-pass from Goldhunga VDC's office by foot. Kathmandu and Trishuli high way is run through the edge of this VDC which helped this village to link with capital city and other parts of the country.

Physical feature:

According to the census mapping project of 2001, Goldhunga VDC has 22 hector land covered by forest which is used for fuel wood and fodder. This is the special forest area protected by the Military and the King's palace is in this general area. It is narrow in the east and elongated in a east to west direction. It is flat on the west and north. The Nagarjun range lies to the south of this VDC; Most parts of this VDC lies in the low areas of Kathmandu. Some part lies in the hilly areas. The low section of the VDC is made of reverine deposits deposited by Naginp Khola, Rudramati Khola, Kamero Khola and Ghatte Khola.

Climate

Altitudinal variation and mountain location has brought the spatial climatic variation in different part of the VDC. Cool type of climate prevails in the northern bottom of the Nagarjun hill and other parts if the VDC. Farmers mainly depend upon Monsoon for farming. The summer temperature ranges from 27° to 30°and that of winter is from 5° to

21°. Summer monsoon gives 90 percent of the total rainfall. The remaining rain fall occurs during winter season (Statistical Year Book of Nepal, 2001).

Population

According to the census 2001 the total population of the VDC is 7051. The average arithmetic density of the VDC is 1497.0 people per square kilometer. It is lower than the district average of 2768.1 and higher than national average of 157.73 people per square kilometer (CBS 2001 population census). Out of the total population 3549 are male and 3507 are female. The male population is little higher than the female population. According to the very recent data updated by the VDC, the total population is 8005 of which 4026 (50.29 percent) are male and 3973 (49.70 percent) are female. The total households are 1530, thus forming an average household family size of 6.8. Majorities of the inhabitants of this village are Hindus, few Buddhists and very few Christians. The major caste groups who are living in Goldhunga are Brahmin, Newar ethnicity, Tamang and low caste (*damai*) people.

Occupation

Out of total economically active population 42.2 percent is engaged in agricultural activities and remaining 57.9 percent is engaged in non- agricultural activities i.e. 11.5 percent in service, 2.7 percent on trade and commerce and remaining 43 percent is dependent population. Although it is situated very near to the Kathmandu Municipality, but the fruitfulness of the development is tested least by the population. Politically Goldhunga VDC is divided into nine wards out of which 1, 2, 4 and 5 are relatively underprivileged.

In agriculture activities, most of the families who have land grow rice, maize and wheat cereals for their own consumption. Similarly they use to grow seasonal vegetables like *rayo ko sag, toriko sag, mula, kaulii, bandakopi in winter and simi, bodi, pharsi, ramtoria in summer*. Some families raise livestock as well.

Health care facilities

There is one primary health care centre (PHC) in Goldhunga where one district level health worker and two other *Gramin Swasth karyakarta* (village health workers) are looking after this centre. There is no any medical doctor deputed so people have no any charm to visit health post. There are 20 Female Community Health Workers in the village who are ready to serve people whenever needed. From the record of PHC it was observed that the people of this VDC mostly suffer from cold, flue, fever. According to

the health worker of the PHC girls of this VDC mostly suffer from anemia and various menstruation related problems. Due to lack of facilities delivery is not done in this PHC. They normally refer to other public hospital of Kathmandu for more complicated cases which they are not able to solve.

Goldhunga people have no any recreation center in thee village. They have to come Balaju to fulfill their every need of shopping to other requirements.

Appendix B

Synopsis of the focus group discussion

Which kind of food items usually available in the household?

All the groups unanimously said the availability of limit verity of food in their households. Rice, maize, wheat flour pulses (blackgram, soybeans), bitten rice and seasonal vegetables are commonly available food items in the households. Some of the girls who have land of their family said about the availability of seasonal fruits also. Besides these, very limited types of foods are used to purchase from the market. When asking about the name of food items that are purchased from the market, they mentioned - *chauchau, biscuts, puffes.* These mentioned fast-foods are used to eat as snacks. Some seasonal vegetables and fruits are also purchased from the market but they are very optional. This findings support the result obtained from the individual interview which have showed that more girls were consuming fast- food as a snacks. During individual conversation it was identified that the family had rare habit of purchasing seasonal fruits and vegetables. This version is also supported by group discussions. The Goldhunga girls have very limited number of food choices to eat which is proved by the focus group discussion also.

What type of food you usually eat?

Response to this question all the groups' girl had similar type of answers saying *bhat, dal, tarkari, achar, roti* and tea are their normal foods consuming daily. Some of them said that they used to take curd and milk as well. For snacks- tea, bitten rice, roasted maize / soybeans, *roti* (maize or wheat), *bhat, chauchau,* bread, *puffs* are the most common items. One thing is quite interesting that no girls mentioned about animal product and fruits as their regular foods. Same types of results were also collected during individual conversation. Percent of girls who consumes meat and vegetables were very few. So this focus group meeting has also given the similar result and shows that Goldhunga girls are deprived from animal protein and vitamin / mineral. Poor nutritional status of the girls is the consequences of this lower consumption of crucial nutrients that are sufficiently required in this stage of life.

What do you know about nutritious food (posilo khana)?

All the girls mentioned following foods as nutritious food.

- Yellow fruits
- Beans and pulses
- Fish
- Meat

It is quite amazing that no girls mentioned about rice, maize, wheat and green vegetables as nutritious food. After listening the answers, researcher felt that there is a big gap in the knowledge and awareness of girls about nutritious foods and bodily growth and development. This lacking has done great damage to their nutritional status. These girls of age 12 – 19 can easily understand the information if given correctly.

Why essential to eat nutritious food (posilo khana)?

During discussions most of the girls mentioned that *posilo khana* is needed for:

- Healthiness of the body
- Keeping body free from diseases
- Activeness
- Work more
- To be good

By this answers it is noticed that the girls have little knowledge about the functions of nutritious food in the body but they have no idea that the nutritious food supports their growth as well which is more important. If they would have knowledge that the good height and weight could be achieved during adolescent period by eating nutritious food than they would be motivated to eat such type of food. Here lacking of information is seen among the girls.

Who gets to eat first in the family? If the food is inadequate who suffers the most?

Most of the girls told that for morning food, who has to go earlier from the home eats first. Some of the girls said that normally they have a practice of serving male members first and last eater is always the mother. Very few girls admitted that they eat together with all family members.

These answers are couragind as the level of discrimination is lowering. But intra-household food distribution is still a matter of concern. Mother is the last one to eat and if food is insufficient then she is one who suffers the most. This system supports the prevalence of maternal malnutrition which could be the cause of intra-generational cycle

of malnutrition among Nepali women. This type of malnutrition, ultimately effects the growth of adolescents as well.

Any positive and negative restrictions on food intake i.e. what sort of foods are usually avoided and what sort of food is usually taken without any restrictions?

For the response of this query all the girls unanimously said that they don't have any restriction about the intake of any food. But as a tradition / custom some girls are prohibited to eat buff meat especially Brahmin girls.

Knowledge about proteins and carbohydrates rich foods

During discussion it is found that girls have very limited knowledge about protein and carbohydrate rich foods. Only few girls tried to locate rice and meat/ fish as carbohydrate and protein rich food but those girls also failed to point out more variety of foods on above mentioned nutrient group. Most of the girls repeated the same version what radio use to say – GLVs, yellow fruits, pulses / beans and meat /fish are carbohydrate and protein rich foods. Beside this, they have no other knowledge about nutrients and nutrition.

How to improve the eating habit of adolescent girls?

In this point, girls could not explore any idea and vision to improve their dietary pattern. Only thing they repeatedly said that they have to eat yellow fruits, GLVs and meat /fish to improve their eating habit. Here, this type of answer is inevitable because the girls have no proper knowledge about nutrition, nutrient contains of food, growth pattern of the body and daily requirements of nutrients.

Though matches to the result obtained from individual interview and observation, the result of focus group discussion revealed mass ignorance about nutritious food and bodily requirements of these nutrients. In the absence of this knowledge girls failed to judge what they are eating, how they are eating and what they need to eat? This ignorance has literally affected their eating pattern and nutritional status as well.

Appendix C
Case study

Case study 1

Bimala Maharjan is a 16 years old girl. Among six children (three sisters and two brothers) of the family she was the youngest one. She started her menstruation at the age of fourteen. Her father had no land for agriculture farming so he used to do daily wages work to make survive of the family. Bimala left her study 4 years back, when she was studying in class four. Last year she got married with her near by neighbor boy without permission of her parents. So she was prohibited go to her maternal house. Now she is pregnant of 5 months. She is 136 cm. tall (NCHS reference is 162 cm. and -2 SD is 149 cm.) and has 40 kg of weight even in five months of pregnancy.

Bimala is now living in her husbands' joint family having consists of 13 members. They don't have land, but male members do daily wages job of ***Dakarmi*** and females look after the cattle – buffalo, cow, pigs and goats raised by themselves. As a family member and daughter – in - law she needs to do whole work of the house untiringly since morning to night. Normally, Bimala's work schedule is - sweeping the house, carrying water, washing cloths, cooking food in the morning and night, washing dishes, collect grasses and fodders, cleaning cow shades. All these works take her almost 12- 13 hours time. So she does not have any time to see television or even hear radio programs.

Though, she has some information about the ill effect of early pregnancy and it is very risky to do heavy works during pregnancy, with rural residing and traditional system of living it is really hard for Bimala to avoid labor induced work. When talking about the diet, Bimala said that she uses to take very ordinary foods as: morning – tea, then two times meal containing *Dal, bhat, tarkari.* In day time she drinks tea only but no other snacks. There are no chances of taking extra food and nourishing food at all. During conversation Bimala said that she has now increased the volume of food but observing herself and her family condition it seems very hard. During conversation it is found that she has very nominal chances of consuming green vegetables, animal food / meat product and fruits. Looking at her work pattern and pregnancy condition, she needs more than 3000 kcal. (2500 + 500 kcal) per day, but her consumption is only between 1700 – 1800 kcal. and very low protein consumption- less than 20 gm. per day. According to her mother-in - law she refuses to go nearby health post for regular examination and even refuses taking iron capsule provided by the health post. Asking about the refusal of checkupBimala simply said – ***apthero lagchha (feels odd to go their and ask for checkup).***

Case study 2

Binita Dhital is a cute girl of very tender age 13. She is a single daughter of Navaraj and Sabitry Dital residing in Dital Thok, Goldhunga, They have very small farmland which is not sufficient to support their family so daily wages is another source of income of the family. They have 5 members family including one son and one grandmother. Though thin with short stature, physically Binita is very normal. Her height is 141 cm., weight is 34.3 kg. and BMI is 17.3. Still she is in growing age so her physical state could be grownup as normal in her maturity.

Very unfortunate part of the Binita's life is, she is mentally challenged. Since the very early of her birth, family member discovered her as mentally slow, so they did not allow her to go school till date. Very recently she admitted to the school. But family member is not very willing to send her to the school.

While taking with Binita, firstly she hesitated to respond but when insisted, she answered very sharply but correctly. According to her grandmother she is almost always very gentle and use to eat food very perfectly. The sad thing is, some time she uses to show unusual activities such as laughing unusually, throwing goods to other, beating others and damage plants. So they never send her outside alone and give protection every time.

Observing her, and doing conversation with her it is clearly seen that Binita is sharp enough and if she got chances of study, food, rehabilitation and training, she might improve her mental status and could be grown up as a perfect normal girl. But being a member of very poor family she has no chance to find a good and healthy environment. She is leaving in very unhygienic condition - her body was very dirty and her cloths were also very dirty. When asked whether she washes her hand after toilet? She said yes, but she told us that she uses to wash hands by water only.

Binita is never being treated by anything – doctors or by any other medicines till now and her family has no program / intention to do so. The only thing Binita's grandmother told the researcher that "*if any family agrees to take care of her, they are ready to give Binitar to that family*."

Case Study 3

Deepa Pariyar is a residing of ward no. 9, Bhanjyang, Goldhunga. She is now 17 years old. She started her menstruation at the age of 13. Her parents were not willing to send her school, so when Deepa was 15 years old her parents arranged her marriage with the

village boy who is painter by profession. After that she left school when studying at 5 class. Now she has a baby boy of 10 months' old.

After marriage they separated from the family. They owned a small house with no extra land. She has to survive with whatever her husband earns. They have approximately Nrs. 2000 to 2500 earning per month Deepa is very small and thin physically. Her height is 133 cm and weight. is 36.3 kg. According to NCHS/WHO reference standard, height and weight she should be 163 cm. and 56.7 kg. respectively, at her age. According to NCHS/WHO reference, even -2 SD (which is considered as normal for developing countries) weight. and height should be 41.3 kg. and 150.4cm. respectively. Her BMI is 20.5 - shows that her condition is normal but considering her age, low weight for age and short stature for age is quite noticeable. She has just started her reproductive age but already became mother of a baby. Physically she is thin with pale face and malnourished body and no store of vital nutrition. The baby was also very small and thin to his age.

Deepa is still practicing exclusive breastfeeding to her child but she never use to take extra diet to support her body system. She took regular two times meal having *bhat, tarkari* and sometime *dal*. In day time, she sometime takes only tea and sometime *bhat* or *makai* or *roti* or *cheura* if available. Beside raring and caring of her small baby, she normally does other household chores for about 6 hrs/ day. Her calorie consumption is about 1700 – 1800 kcal, but requirement is above 2500 kcal. So the deficit of ~ approximately 700 kcal is the cause of her very thin body. Besides, her protein consumption is also very poor. According to Deepa, only occasionally she eats meat, eggs and fruits. So considering the demand of protein requirement of about 63 grams / day, she hardly takes 10 grams / day. Looking at her daily food consumption pattern it is predictable that she is leading her baby towards intra- generational cycle of malnutrition.

Case Study 4

Sabina Phuyal is 17 years old girl residing in ward no. 8 of *Phuyalthok,* Goldhunga. She lives in single family with 5 members. Her family's economic condition is very week. As a source of income they have very small piece of land which is not sufficient for their livelihood. She has passed secondary level education and studying at I. A. level. Sarita has not started her menstruation till the date of survey even at the age of 17.

Sarita is 1.37 cm tall and her weight was 33 kg. According to NCHS / WHO reference standard, height and weight should be 163 and 56.7 kg respectively at the age of 17. According to this reference, even in -2 SD (which considered as normal for developing countries) weight and height should be 41.3 kg. and 150.4 cm. respectively. But Sarita's

both height and weight is very poor. Her BMI calculation is just 17.6 which indicate that she is suffering from malnutrition. Her weight is very low but due to short stature BMI seems better in comparison of height and weight.

Though Sarita did not complained about any health problem but during observation she looks anemic with pale inner eyelid, tongue and body. She has problem to see in bright light. She also complained about the prevalence of diarrhea and intestinal parasite more than two times a year. Frequent occurrence of common cold and headache is problematic for her. May be these problems are causes of her low anthropometric status.

She has general practice of taking three meals a day. Ordinary Nepali food of rice, dal, *tarkai* and *achar* is her regular diet but her portion of eating is very small. She uses to take very little food. Fast food is her preferred snack and normally eats *chauchau.* Sarita has a habit of taking nutrient rich food such as – GLVs, fruits, fresh vegetables and animal product only occasionally so this could be a reason of her frequent illness. Here, low diet in both - quality and quantity is seen as a contributing factor for her poor nutritional status.

Normally, besides schooling, Sarita use to do household chores like – cloth washing, cooking, cleaning and collection of fodder as a regular basis. She spends nearly 7 hours a day for household activities. Being an educated person she has good sense of personal hygiene and sanitation. But she is been deprived from any exposure to developmental activities, training and income generating activities. This is the major setback of the adolescent girls where their potential is not been utilized. Sarita has interest to listen radio, watching television and reading Newspaper. But lack of time is a major obstacle to do so, only occasionally she utilizes these media.

Not starting of menstruation even at the age of 17 is one of the major concerns about Sarita. More clinical investigation is needed to identify the root cause of delay menstruation.

Case Study 5

Twelve years old Sunita Phuyal is residing in ward no. 8 *Phunyalthoke* of Goldhunga. She is living in joint family of 7 members. She is studying in lower secondary level and has not started menstruation Sunita's family owned little land and her father does job in the city as well. Here, Sunita has admitted that there is discrimination while distributing foods in the family. Male members are the one who eats first and mother is the last person to eat. Normally male members are provided good foods such as meat, milk, curd, ghee etc

Sunita is 1.24 cm. tall with 16.2 kg. weight where as NCHS reference is 151.2 and 41.5. respectively. Her BMI calculation is 15.8. This anthropometric data shows very poor nutritional status of the girl. She is severely malnourished and suffering from sever type of thinness. During conversation she complained about the frequent dizziness, nausea and headache. This might be due to anemic condition of her body. Her face was very pale with pale inner eye lid and tongue. She usually suffers from various infectious diseases many times a year. While taking about sanitary practices she revealed that she usually does not wash hands before eating and wash only occasionally after defecation. This habit could be a contributing factor of her high morbidity.

Her diet pattern shows very poor habit of eating. In total, 150 grams rice (raw) is included in her two times meal with very nominal portion of *dal* and t*arkari.* Milk and whey *(mahi)* is optional. Sarita normally prefer to eat *chauchau* in the snack if she got the chance to eat. Looking at this eating pattern, it is comfortable enough to say that she extremely lacks calorie along with other essential nutrients like protein, fat, vitamin and minerals. This could be a reason for her very poor anthropometric measurements. In one side her diet is lacking sufficient quality and quantity of food and other side she needs to do various households chores including very strenuous – fodder collection, grass cutting and clothes washing which demands high quality of food with sufficient quantity to meet the daily requirement of calorie and other nutrients. But lacking of these has done severe effect on nutritional status of Sarita which is well reflected in her anthropometric measurements and body posture.

Sarita is typical village girl grown up with traditional pattern of the society. She has not got any chances of affiliation with any groups of the village and participates in developmental activities / meetings. Just go to school and do strenuous house hold work is her daily activities. Surviving with little diet she has a greater chance falling into the cycle of malnutrition and high morbidity. Most important thing is, if Sarita's diet could not be corrected timely and if full attention is not given to the diet then her condition will become worse and healthy living will be limited only in the dream of her.

During conversation investigator identified that Sarita has good sense to go to the doctor for treatment. But practice is quite different. Even in her case, whenever she fells ill *dhami* (traditional healer is used for treatment. This practice has made the condition of Sarita more vulnerable.

Appendix E

Respondent's morbidity pattern under following BMI

Type of Morbidity		BMI of respondent					
		Severe Thinness (< 16) n=52	**Moderate Thinness (16.0 -1 6.99) n=23**	**Mild Thinness (17.0-18.49) n=48**	**Normal (18.5) n=123**	**25 & Above n=8**	**Total n= 254**
Diarrhea	% within BMI of respondent	96.2 (50)	95.7 (22)	93.8 (45)	89.4 (110)	87.5 (7)	92.1 (234)
Intestinal parasites	% within BMI of respondent	63.5 (33)	73.9 (17)	66.7 (32)	65.9 (81)	50.0 (4)	65.7 (176)
Common cold	% within BMI of respondent	96.2 (50)	100.0 (23)	97.9 (47)	99.2 (122)	100.0 (8)	98.4 (250)
Headache	% within BMI of respondent	78.8 (41)	91.3 (21)	87.5 (42)	87.0 (107)	87.5 (7)	85.8 (218)

Appendix F

Adolescents' frequency of eating meal under following BMI

Frequency of meal		**BMI of respondent**					
		Severe Thinness (< 16) n=52	**Moderate Thinness (16.0-16.99) n=23**	**Mild Thinness (17.0-18.49) n=48**	**Normal (18.5) n=123**	**25 & above n=8**	**Total n=254**
two times	% within BMI of respondent	38.5 (20)	17.4 (4)	29.2 (14)	30.1 (37)	37.5 (3)	30.7 (78)
three times	% within BMI of respondent	57.7 (30)	78.3 (18)	62.5 (30)	66.7 (82)	62.5 (5)	65.0 (165)
four times	% within BMI of respondent	3.8 (2)	4.3 (1)	8.3 (4)	3.2 (4)	00	4.33 (11)

Appendix G

Snacks eating pattern of Adolescents under following BMI

Day snacks		BMI of respondent					
		Severe Thinness (< 16) n=52	**Moderate Thinness (16.0 -1 6.99) n=23**	**Mild Thinness (17.0-18.49) n=48**	**Normal (18.5) n=123**	**25 & Above n=8**	**Total n= 254**
chiura & tea	% within BMI of respondent	32.7 (16)	18.2 (4)	39.1 (18)	31.4 (38)	50.0 (4)	32.5 (80)
roti & tea	% within BMI of respondent	12.2 (6)	9.1(2)	15.2 (7)	18.2 (22)	25.0 (2)	15.9 (39)
chauchau	% within BMI of respondent	10.2 (5)	4.5 (1)	8.7 (4)	5.0 (6)	0.0	6.5 (16)
makai / bhatmas & tea	% within BMI of respondent	12.2 (6)	22.7 (5)	10.9 (5)	18.2 (22)	12.5 (1)	15.9 (39)
bhat	% within BMI of respondent	10.2 (5)	4.5 (1)	0.0	6.6 (8)	0.0	5.7 (14)
biscuit/ dalmoth / pauroti / puffs	% within BMI of respondent	20.4 (10)	31.8 (7)	19.6 (9)	19.0 (23)	0.0	19.9 (49)
tea only	% within BMI of respondent	2.0 (1)	9.1(2)	6.5 (3)	1.7 (2)	12.5 (1)	3.7 (9)

Appendix H

Household activities pattern of the adolescent under following BMI

Household activities		BMI of respondent					
		Severe Thinness (< 16) n=52	Moderate Thinness (16.0 -1 6.99) n=23	Mild Thinness (17.0-18.49) n=48	Normal (18.5) n=123	25 & Above n=8	Total n= 254
cloth washing	% within BMI of respondent	88.5 (46)	91.3 (21)	91.7 (44)	98.4 (121)	100.0(8)	94.5 (240)
cooking	% within BMI of respondent	80.8 (42)	69.6 (16)	83.3 (40)	95.1 (117)	87.5 (7)	87.4 (222)
housecleaning	% within BMI of respondent	30.8 (16)	30.4 (7)	45.8 (22)	68.3 (84)	75.0 (6)	53.1 (135)
child raring & caring	% within BMI of respondent	30.8 (16)	26.1 (6)	25.0 (12)	49.6 (61)	75.0 (6)	39.8 (101)
cattle grazing	% within BMI of respondent	46.2 (24)	34.8 (8)	50.0 (24)	53.7 (66)	50.0 (4)	49.6 (126)
water carry	% within BMI of respondent	76.9 (40)	78.3 (18)	85.4 (41)	92.7 (114)	75.0 (6)	86.2 (219)
grass cutting	% within BMI of respondent	53.8 (28)	43.5 (10)	47.9 (23)	53.7 (66)	50.0 (4)	51.6 (131)
fodder collection	% within BMI of respondent	30.8 (16)	8.7 (2)	33.3 (16)	61.8 (76)	37.5 (3)	44.5 (113)
agriculture field work	% within BMI of respondent	23.1(12)	34.8 (8)	43.8 (21)	57.7 (71)	75.0 (6)	46.5 (118)
shopping	% within BMI of respondent	3.8 (2)	8.7 (2)	14.6 (7)	34.1 (42)	37.5 (3)	22.0 (56)

Appendix I

Adolescent who were involved in the developmental activities under following BMI

Adolescent's involvement			Severe Thinness (< 16) n=52	Moderate Thinness (16.0 -1 6.99) n=23	Mild Thinness (17.0-18.49) n=48	Normal (18.5) n=123	25 & Above n=8	Total n= 254
club/group member	yes	% within BMI of respondent	1.9 (1)	4.3 (1)	16.7 (8)	22.8 (28)	75.0 (6)	17.3 (44)
	no	% within BMI of respondent	98.1 (51)	95.7 (22)	83.3 (40)	77.2 (95)	25.0 (2)	82.7 (210)
Member of any organiza -tion	yes	% within BMI of respondent	0	4.3 (1)	6.3 (3)	8.1 (10)	12.5 (1)	5.9 (15)
	no	% within BMI of respondent	100(52)	95.7 (22)	93.8 (45)	91.9(113)	87.5 (7)	94.1 (239)
training	yes	% within BMI of respondent	1.9 (1)	0.0	6.3 (3)	12.2 (15)	25.0 (2)	8.3 (21)
	no	% within BMI of respondent	98.1 (51)	100.0 (23)	93.8 (45)	87.8 (108)	75.0 (6)	91.7 (233)
attended meeting	yes	% within BMI of respondent	0	0	6.25 (3)	6.50 (8)	0.00	4.33 (11)
	no	% within BMI of respondent	100 (52)	100 (23)	93.8 (45)	93.5 (115)	100.0 (8)	95.7 (243)
personal earning	yes	% within BMI of respondent	3.8 (2)	13.0 (3)	8.3 (4)	19.5 (24)	25.0 (2)	13.8 (35)
	no	% within BMI of respondent	96.2 (50)	87.0 (20)	91.7 (44)	80.5 (99)	75.0 (6)	86.2 (219)

Appendix J

Adolescents who have exposure to media under following BMI

Types of Media		BMI of respondent					
		Severe Thinness (< 16) n=52	Moderate Thinness (16.0 -1 6.99) n=23	Mild Thinness (17.0-18.49) n=48	Normal (18.5) n=123	25 & Above n=8	Total
listening radio	% within BMI of respondent	69.2 (36)	78.2 (18)	75 (36)	82 (101)	37.5 (3)	76.3(197)
watching T.V.	% within BMI of respondent	71.1 (37)	69.5 (16)	81.2 (39)	80.4 (99)	87.5 (7)	77.9(198)
reading newspaper	% within BMI of respondent	40.3 (21)	52.1 (12)	60.4 (29)	65.0 (80)	25 (2)	56.6(144)

/ magazine							

Appendix K

Determinants of Height of the adolescent girls

Independent variables	Unstandardized Coefficients		Standardized Coefficients	t
	B	Std. Error	Beta	
(Constant)	1.015	.017		60.027*
marital status	.025	.003	.121	8.963*
family number	-.002	.000	-.048	-5.422*
age of the respondents	.006	.001	.163	10.722*
continuation of schooling	.013	.002	.089	7.464*
menstruation status	-.437	.010	-656	-13.779
food distribution pattern in the family	.000	.001	-.003	-.353
diarrhea	.012	.003	.035	3.731*
tapeworm	-.012	.002	-.062	-6.770*
common cold	.006	.007	.008	.821
health problem	-.012	.002	-.073	-8.126*
meal	.004	.002	.025	2.737**
hand washing practice before eating	-.016	.006	-.023	-2.567***
hand washing practice after toileting	-.057	.008	-.068	-7.187*
training	.007	.003	.022	2.439***
total working hour	.001	.000	.030	3.319**

Note:

a. Dependent Variable: height of the respondent

b. * Sig. p <0.001, ** Sig. p< 0.01, *** Sig. p<0.05

c. t- value without asterisk/s indicate the variables are insignificance in analysis i.e. sig. p> 0.05.

Appendix L

Determinants of Weight of the Adolescent girls

Independent variables	Unstandardized Coefficients		Standardized Coefficients	t
	B	Std. Error	Beta	
(Constant)	-42.084	1.334		-31.539*
marital status	-.408	.182	-.019	-2.245***
family number	.106	.024	.025	4.483*
age of the respondents	.409	.034	.117	12.137*
continuation of schooling	-.594	.111	-.041	-5.359*
Menstruation status	-15.260	.889	-734	-17.116
food distribution pattern in the family	.061	.042	.008	1.459
diarrhea	-.557	.198	-.017	-2.811**
tapeworm	.526	.114	.027	4.609*
common cold	-.593	.471	-.007	-1.260
health problems	.427	.097	.025	4.384*
meal	-.394	.102	-.022	-3.858*
hand washing practice before eating	-.312	.403	-.004	-.774
hand washing practice after toileting	1.962	.511	.023	3.840*
training	-.095	.185	-.003	-.512
total working hour	-.150	.020	-.043	-7.517*

Note:

a. Dependent Variable: weight of the respondent

b. * Sig. p<0.001, ** Sig. p<0.01, *** Sig. p<0.05

c. T-value without asterisk/s indicate the variables are insignificance in analysis i.e. sig. p> 0.05.

Appendix M

Determinants of BMI of adolescent girls

Independent variables	Unstandardized Coefficients		Standardized Coefficients	t
	B	Std. Error	Beta	
(Constant)	3.576	1.522		2.349
age of the respondents	.102	.046	.233	2.241***
continuation of schooling	.146	.141	.106	1.032
family type	.057	.142	.032	.402
menstruation status	-1.646	.130	-.623	-12.639*
marital status	-.389	.213	-.205	-1.827
food distribution pattern in the family	.064	.053	.092	1.211
diarrhea	.273	.252	.086	1.081
tapeworm	-.072	.147	-.038	-.490
common cold	.008	.881	.001	.009
other health problems	.143	.147	.074	.975
meal	-.177	.128	-.107	-1.385
hand washing practice before eating	-1.032	.621	-.124	-1.662
hand washing practice after toileting	-1.572	.615	-.159	-2.555 ***
training	-.152	.211	-.056	-.723
Total working hour	-.019	.025	-.059	-.769

Note:

a. Dependent Variable: BMI of the respondent

b. * Sig. p<0.001, ** Sig. p<0.01, *** Sig. p<0.05

c. t-value without asterisk/s indicate the variables are insignificance in analysis i.e. sig. p> 0.05.

Appendix N

Determinants of the Menstruation Status of Adolescent girls

Independent variables	Unstandardized Coefficients		Standardized Coefficients	t
	B	Std. Error	Beta	
(Constant)	-.722	.577		-1.250
family number	.046	.007	.107	6.123*
age of the respondents	.229	.012	.424	18.790*
food distribution pattern in the family	-.034	.014	-.042	-2.400***
diarrhea	-.111	.064	-.031	-1.742
tapeworm	-.116	.039	-.053	-2.958**
common cold	.917	.246	.063	3.732*
health problems	-.120	.038	-.054	-3.115**
meal	-.024	.034	-.012	-.697
hand washing practice before eating	.558	.163	.060	3.424*
total working hour	-.039	.007	-.100	-5.586*
BMI of respondent	.074	.031	.063	2.355***
height of the respondent	1.749	.355	.114	4.929*
weight of the respondent	-.006	.005	-.196	-6.061*

Note:

a. Dependent Variable: menstruation status

b. * Sig. p<0.001, ** Sig. p<0.01, *** Sig. p<0.05

c. t-value without asterisk/s indicate the variables are insignificance in analysis i.e. sig. p> 0.05.

Appendix O

Major Physical Changes during Adolescence

Time and speed of weight, height and BMI changes during adolescence may vary greatly between and among adolescent, but following are the changes expected in the adolescence:

Height

- 15 to 20 percent adult height is gained during adolescence
- Growth spurt starts: boys start later than girls but have higher peak velocity than in girls.

Weight

- 25 – 50 percent of final adult ideal weight gained during adolescence
- The timing and amount of weight gain can be greatly affected by energy intake and energy expenditure

Changes in body composition and skeletal mass

- Growing boys gain proportionately more muscle mass than fat and leaner
  body mass as compared to girls.
- As adult the normal percentage of body fat is about 23 percent for women
  and 15 percent for men.
- Approximately 45 percent of skeletal mass is added during adolescence.
  By the end of the second decade of life 90 percent of total bone mass is gained.
- Female with delayed puberty fail to gain bone mass at a normal rate and show lower mineral density as adults.

Source- *adolescent Nutrition: A Review the Situation in South –East Asian Countries, WHO*

Appendix P

Recommended Dietary Allowances (RDAs) for Adolescent girl

The Recommended Dietary Allowances (RDAs) for adolescents is a set of nutrients recommended by the Board of nutritionists and medical doctors of the country. These recommendations are based on weight, gender and their work pattern. The RDAs offer a reasonable goal for nutrients to help ensure optimal nutrition to support growth during this time. Nutrition is so important during this period of life because the changes in body composition that occur during adolescence have a significant impact on how the structure of the body will hold up throughout adulthood.

Nepal has not yet developed own RDA for its population. Ministry of Health has adopted the RDA of Indian Council for Medical research (ICMR, 1992) as a reference. So the researcher also followed the same references to describe the nutritional need of Nepali adolescent girl population. The following RDA of nutrients is recommended for the normal but healthy growth of the adolescent girls.

Calorie

Calorie should be sufficient to meet energy and nutrient demand and to spare protein for tissue building. Normally, RDAs for calorie are based on height during the teen years (as opposed to body weight as they are for adults) because adolescent girls and boys may vary so dramatically even at the same age. Because boys generally start puberty later and continue to grow in height for a longer period of time, their increased caloric needs start later and extend longer than girls. Also, since boys tend to increase more in lean muscle that requires more calories to maintain, their caloric requirement is generally higher overall.

According to ICMR calorie need of normal adolescent girl is ranges from 1970 – 2060 (according to range) (Ministry of Health et .al, 2001). Physical activity also factors into the daily energy requirement and should be considered when determining adequate calories to support growth. Calorie needs can increase dramatically above the average recommendations if a teenager is involved in heavy work, regular sports or other exercise programs. Pregnancy / lactation stage also demands high calorie

(500 or more) to fulfill the requirement of both mother and fetus. Cereals such as rise, wheat, maize are the good source of calorie.

Protein

Protein needs are generally higher during adolescence because the body is building muscle tissue in response to hormonal changes. The RDA for protein ranges from 57 – 63 grams (ICMR) per day, and should make up approximately 30 percent of the total calories consumed daily. While there is evidence that the adolescent body needs higher protein intake than at other times in life, this is a major problem for average Nepali whose diet contains very low protein. The major reason for high prevalence of malnutrition among Nepali people is due to low protein consumption regularly. Adolescents who restrict their intake due to image problem or follow a vegetarian diet, however, may need to be more careful to assure adequate protein intake. Animal protein is the best protein that supplies all the essential amino acids to the body. Pulses and legumes are considered as fair sources of it.

Fat

Fat is also an essential nutrient that needs to take in a regular manner but not exceeding the recommended amount. ICMR has recommended 22 gram of fat for a day. But one should be conscious that it is better to take unsaturated fat (vegetable fat such as *toriko tel / rayo ko tel*) rather than saturated or animal fat.

Vitamins

Vitamin requirements can be met through a diet rich in whole grains, vegetables, and fruits, but many adolescents may actually have limited intake of some of these food groups. Encouraging consumption of fruits and vegetables along with meals and as snacks, in addition to consuming some vitamin- and mineral-fortified foods such as breakfast cereals can help assure adequate intake.

Vitamin A- Vitamins of particular interest during periods of growth and development of adolescence are: vitamin A, required for growth, vision and proper cell division. ICMR has recommended 600 RE (retinol equivalent) vitamin A for adolescents. Beside other activities it plays vital role to reduce morbidity.

Vitamin C – this vitamin is essential in the production of collagen tissue during growth and acts as a powerful antioxidant. Forty mg. of vitamin C is recommended for daily consumption.

Assuring adequate levels of certain B vitamins is also important including: folate (helps in cell division and reduces the risk of birth defects in infants); vitamin B12 (especially for cell growth); and vitamin B6, riboflavin, niacin, and thiamin (for metabolism of nutrients for energy). Nutrient needs should be obtained primarily through food sources and the assistance of a qualified health care provider should be sought if supplements are considered. Some supplements have not been shown to be effective, and some (such as vitamin A) can even be dangerous at high levels

Minerals:

Some minerals, especially calcium, iron, and zinc have higher recommendations during adolescence because of their roles in the body related to growth and because there are chances (some evidences showed), teens could reduce intake of these nutrients.

Iron – Adolescent girls need higher levels of iron to assist with their rapid growth and cop with blood loss due to menstruation. The RDA for girls ages 10 -13 years is 19 milligrams, 28 milligrams for the age 13 – 16 and 30 milligram for 16 – 18 years of age. This high dosage of iron recommendation is to reduce prevalence of anemia which is a public health problem of Nepal.

A deficiency of iron causes anemia, which leads to fatigue, confusion, and weakness Iron can be found in meat, fish, poultry, and eggs, which have a readily absorbable form of iron. Plant sources of iron are a less-absorbable form, but consuming foods high in vitamin C like orange juice at the same time can increase absorption of iron absorption in the body. Cooking food in iron pots may reduce the risk of iron deficiency.

Calcium - The increased recommendation for calcium is 600 milligrams per day for adolescents between 10–19 years. Increasing calcium intake is critical to this period of dramatic bone growth. Scientists have estimated that nearly 45 percent of the adult skeleton is formed during adolescence. Human have a limited period of time to make significant increases in bone mass. So the need of calcium during this period is crucial.

Bone mass is built up in the body like a savings account at a bank; the more bone mass you build in the teen years, the more it will benefit you later on, reducing the risk of osteoporosis and other conditions. The calcium recommendation can be met with four servings each day of dairy products such as milk, cheese, and yogurt, or with calcium-fortified cereals or orange juice. Public health professionals are concerned about reduced intake of calcium by teenagers especially in city area who often replace milk with soda or other similar artificial drinks advertised attractively. Parents and adolescents both can ensure adequate calcium intake while working to limit their intake of empty sugar calories from sodas.

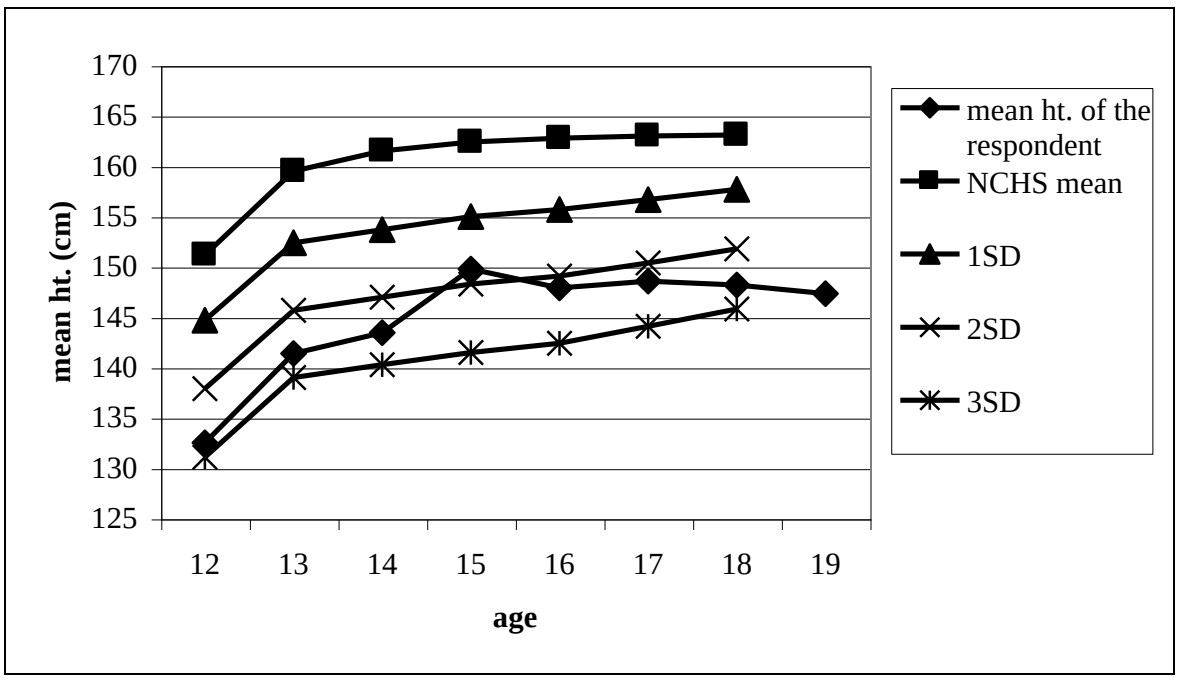
Iodine - To prevent adolescents from being many defaults like mental and physical retardation, slow and tendency of memory loss they need to consume adequate amount of iodine that is 150 micron gram a day(iodized salt is enough).

Zinc – It is also important for growth and protein synthesis of tissue in the body. This mineral is equally essential for sexual maturation. The daily recommendation between ages 9-13 year girl is 8 milligrams, 14 -18 is 9 milligrams and 8 milligrams for 18 years and over. Girls should be encouraged to include foods high in zinc such as poultry, meat, low-fat dairy products, whole grains, and beans.

These are the main nutrients recommended for the daily intake. During adolescence there is a high incidence of nutritional deficiencies and poor eating habits. This may lead to consequences in later years including osteoporosis, obesity, hyperlipedemia, sexual maturation delays, and gain final adult height. In addition, the development of eating disorders is very prominent during this period. Many nutritional surveys have indicated that the highest prevalence of nutritional deficiencies occur during adolescence. So it is highly recommended to eat good quality and quantity of food with sufficient amount of required nutrients.

Appendix Q

Graphic view of mean height of the adolescents (by age) comparing with NCHS Reference Standard



Appendix R

Graphic view of mean weight of the adolescents (by age) comparing with NCHS Reference Standard