NUTRITIONAL STATUS OF 6 – 59 MONTHS CHILDREN OF TAJPURIYA COMMUNITY OF GAURADAHA MUNICIPALITY, JHAPA

by

Sushila Upreti

Department of Nutrition and Dietetics

Central Campus of Technology

Institute of Science and Technology

Tribhuvan University, Nepal

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Nutritional Status of 6 - 59 Months Children of Tajpuriya Community of Gauradaha Municipality, Jhapa

A dissertation submitted to the department of Nutrition and Dietetics, Central Campus of Technology, Tribhuvan University, in the partial fulfillment of the requirements for the degree of B.Sc. Nutrition & Dietetics.

by
Sushila Upreti

Department of Nutrition and Dietetics
Central Campus of Technology
Institute of Science and Technology
Tribhuvan University, Nepal
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Tribhuvan University

Institute of Science and Technology

Department of Nutrition and Dietetics

Central Campus of Technology, Dharan

Approval letter

This *dissertation* entitled *Nutrition status of 6 - 59 months children of Tajpuriya community of Gauradaha Municipality, Jhapa* presented by Sushila Upreti has been accepted as the partial fulfillment of the requirements for the B.Sc. degree in Nutrition and Dietetics.

Dissertation Committee

1. **Head of Department** **.....……..**
   (Mr. Dambar B. Khadka, Teaching Asst.)

2. **External Examiner** **..…...……..**
   (Mr. Birendra K. Yadav, Asst. Prof.)

3. **Supervisor** **..…….**
   (Mrs. Richa Bhattarai, Teaching Asst.)

4. **Internal Examiner** **……**
   (Mr. Man K. Tamang, Teaching Asst.)

Date: January 4, 2017

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(Sushila Upreti)

Abstract

Child malnutrition in the form of stunting, wasting, underweight and clinical malnutrition has significant implications for healthy human development. Despite the various efforts, malnutrition among children is remaining as a major public health problem in Nepal. This study was undertaken with the objectives to assess the nutritional status of under-five year children and to find out the factors associated with it. A community based cross sectional study was conducted on 165 children aged 6-59 months using anthropometric measurement and structured questionnaires for assessing the nutritional status of under-five children of Tajpuriya community of Gauradaha municipality and factors associated with it respectively. Children were selected by purposive sampling method. Collected data were analyzed using SPSS version 20 and WHO Anthro 3.2.2 version. Chi-square test was used to identify the associated factors of malnutrition.

The analysis of this study revealed that, 36.4%, 24.8% and 16.4% of children were stunted, underweight and wasted, respectively. The main associated factors of stunting were found to be maternal age at first pregnancy (P=0.027). Underweight was found to be associated with age of child (P=0.005) and current breastfeeding status (P=0.003). Wasting was found to be associated with family size (P=0.050), mother education (P=0.05), and number of under five children (P=0.017). From the findings of this study, it is concluded that malnutrition is still an important problem among Tajpuriya children aged 6-59 months. Therefore, special attention should be given on intervention program on malnutrition.

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List of abbreviations

Abbreviation	Fullform
BW	Body weight
HAZ	Height for Age Z Score
IDA	Iron Deficiency Anaemia
IDD	Iodine Deficiency Disorder
INGO	International Non – Governmental Organization
LBW	Low Birth Weight
MDG	Millennium Development Goal
MoHP	Ministry of Health and Population
MUAC	Mid – Upper Arm Circumference
NDHS	Nepal Demographic Health Survey
NEFIN	Nepal Federation of Indigenous Nationalities
NGO	Non – Governmental Organization
NMICS	Nepal Multiple Indicator Cluster Survey
PEM	Protein Energy Malnutrition
PHC	Primary Health Care
RDA	Recommended Daily Allowance
SAM	Severe Acute Malnutrition
SAARC	South Asian Association For Regional Corporation
SCN	Standing Committee on Nutrition
TFH	Traditional Faith Healer
UN	United Nations
UNICEF	United Nations International Child Emergency Fund
VDC	Village Development Committee
WAZ	Weight for Age Z Score
WFP	World Food Program
WHO	World Health Organization
WHZ	Weight for Height

Part-I

Introduction

1.1 Background of the study

Nutrition is the science of foods, the nutrients and the substances therein, their action, interaction and balance in relation to health and diseases (Council on Foods and Nutrition, 1963). Nutrition is the cornerstone of socioeconomic development of a country. It is an essential component of Millennium Development Goals (MDGs) and Primary Health Care (PHC). Better nutrition means stronger immune systems, less illness, better health and a productive community. Freedom from hunger and malnutrition is a basic human right and their alleviation is a fundamental prerequisite for human and national development (WHO, 2016c).

Nutritional status is defined as the condition of the body resulting from the intake, absorption and utilization of food. It is determined by a complex interaction between internal/constitutional factors and external environmental factors: Internal or constitutional factors like: age, sex, nutrition, behavior, physical activity and diseases. External environmental factors like: food safety, cultural, social and economic circumstances (Joshi, 2012). The term malnutrition comprises of both over-nutrition as well as under-nutrition. Under-nutrition or poor nutrition is cited as the major factor in more than half of all child deaths in Nepal, a significantly higher proportion than those claimed by other infectious diseases. Malnutrition is not just a stark manifestation of poverty, it is also the non-income face of poverty and it helps perpetuate poverty (World Bank, 2012b).

Nepal is one of the least developed nations which ranks 157th out of 187 countries in terms of its Human Development Index (UNDP, 2012). According to 2011 census, the total population of Nepal is 26.6 million. It is indicated that the 0-4 year children population is 13% of the total population. The population growth rate in 2011 is 1.41 % (MoHP, 2011). In Nepal, the nutritional status of mothers and children under five is extremely poor. According to UNICEF, malnutrition plays a role in 60 % of child deaths in Nepal. Although the number of under-five deaths has dropped to 54 per 1,000 live births in 2012 from 162 per 1,000 in 1990, malnutrition rates in Nepal are among the highest in the

world. It has been found that 46 % of under-five children in Nepal are anemic, and 144,000 newborns are at risk of iodine deficiency disorders (MoHP, 2011).

Protein-energy malnutrition (PEM) and micronutrient deficiency are most common types of malnutrition. According to NDHS 2011, 11 percent of children are wasted and 3 percent are severely wasted. Nearly three in ten children (29 percent) are underweight and 8 percent are severely underweight (MoHP, 2011). According to Nepal multiple indicator cluster survey 2011, 48.5% of women were married before the age of 18 and 24.2% child were born as low birth weight i.e. less than 2.5kg. Similarly 56.1% of children were exclusively breastfed their child for six months. Among the South Asian Association for Regional Cooperation (SAARC) countries according to UNICEF, prevalence of under-weight among children in Bangladesh, India and Nepal was found to be 32.6, 29.4% and 29% respectively. The prevalence of stunting in Nepal 41%, India 38.7% and Bangladesh 32.6%. The prevalence of wasting in India 15.1%, Bangladesh 14.3% and Nepal 11% (UNICEF, 2016).

According to the census of 2011, the total population of Nepal is 26,494,504, indigenous peoples comprise 35.81% of the total population. Tajpuriyas are one of the Terai indigenous people living mostly in Jhapa and Morang and according to census 2011, total population of Tajpuriya is 18,811 (IWGIA, 2016). According to Jhapa district profile 2071, total population of Tajpuriya residing in Gauradaha is 5051 but population of under-five Tajpuriya children was not found. There is no written history about the Tajpuriya tribes. According to Joshua Project 2016, ancestor of this tribe came from Tejpur in north India. Most of the people in this tribe were poor and practice farming in borrowed land. Most of their houses are made up of mud, bamboo etc and are built in close proximity as a community.

1.1 Problem statement and justification

Children‘s nutritional status is a reflection of their overall health. When children have access to an adequate food supply, are not exposed to repeated illness, and are well cared for, they reach their growth potential and are considered well nourished. Malnutrition is associated with more than half of all child deaths worldwide. Three quarters of the children who die from causes related to malnutrition are only mildly or moderately malnourished showing no outward sign of their vulnerability. One of the MDGs is to halve the proportion

of people who suffer from hunger between 1990 and 2015. A reduction in the prevalence of malnutrition will also assist the MDG on reducing child mortality (NMICS, 2012).

Malnutrition during childhood can lead to a risk of life-style diseases in the future as well as immediate risks of morbidity/mortality. The World Health Report 2002 clearly describes how childhood and maternal underweight are the greatest risk factor among several main factors that affect people's health and disease status in the world, particularly in Asia (WHO, 2002). Child malnutrition is the single biggest contributor to under-five morbidity and mortality. Thus, being nutritionally vulnerable, under-five children's nutritional status is generally accepted as an indicator of the nutritional status of any particular community. This is due to their easy susceptibility to malnutrition and infection (Akinlosotu and Hussain, 1985). Children in this age group require a high supply of nutrients since they are usually very active and their growth is rapid. Also during this period, under nutrition in the form of kwashiorker, marasmus, anaemia and xeropthalmia are not uncommon (Obong, 2001).

In any community, under-five children are one of the most vulnerable groups for nutritional deficiencies, owing to many factors ranging from low birth weight to maternal ill health to socio- economic and environmental factor. For overall improvement, every marginalized and vulnerable group of people should be made aware about nutrition and health. Along with others Tajpuriya community is also one of the marginalized and socially backward ethnic groups. Their economic condition is still very poor so that there is lack of food accessibility and health facilities. Many of them are illiterate and uneducated so, they are not much aware of food habits and the nutrition. As their hygiene and sanitation behavior are still not improved, their children are more susceptible to the various communicable diseases leading to malnutrition. Till date no research to access the nutrition status done is found in this tribe. Study exploring understanding and awareness of heavy burden of malnutrition and its influencing factors among these children is necessary to recommend intervention for corrective measures. Hence, this study assesed the prevalence and types of malnutrition in 6 to 59 months Tajpuriya children which can be used as a reference in priority setting and designing effective nutritional programs.

1.3 Objective of the study

1.3.1 General objective

To assess the nutritional status of children between 6-59 months of Tajpuriya children in Gauradaha Municipality.

1.3.2 Specific objective

a) To assess the prevalence of stunting, wasting and underweight in 6-59 months Tajpuriya childrern.
b) To find out socioeconomic, demographic, health and feeding practices related with the nutritional status of 6-59 months Tajpuriya children through household survey.

1.4 Research question

The purpose of this study was to determine the nutritional status and factors that influences the nutritional status of 6 -59 months Tajpuriya children in Gauradaha Municipality, Jhapa. This thesis addresses the following question.

a) What is the nutritional status of children between 6-59 months of Tajpuriya children in Gauradaha Municipality?

1.5 Significance of the study

Tajpuriya is one of the marginalized indegenous group of Nepal. Earlier no any research conducted in this tribe have been found. Thus, this reseearch would be helpful to provide information about the nutrition status of under-five children of Tajpuriya community. The research would discover the problems related to nutrition, care practices , hygiene and sanitation, and feeding behaviours of this community. This would aware people about malnutrition and encourage responsible personalities for the improvement of nutrition status of children by improving their child feeding, child caring and hygienic practices.

The findings of this study would contribute to identify individual or group of people who are at risk of being malnourished and who need special care and attention which further can be used as as a guide for development of nutritional programmes. The findings of this study can be used to compare the nutrition status with other marginalized community.

1.6 Limitation of the study

a) As the study is cross-sectional in design, it did not represent seasonal variation and temporal cause and effect relationship of predictors and outcomes variable.
b) Though the biochemical parameters can also be used to study the nutrition status but it will be quite expensive as it is self-funded research and necessary equipment and chemicals are not available.
c) Actual information about age, family's income, and their food intake might not be given properly.

Part-II

Literature review

2.1 Nutritional status

Nutritional status is the condition of health of the individual as influenced by the utilization of the nutrients. It can be determined only by the correlation of information obtained through a careful medical and dietary history, through physical examination and appropriate laboratory investigation (Srilakshmi, 2002). The nutrition status of any person is his/her health as dictated by the quality of nutrients consumed, and the body's ability to utilize them for its metabolic needs. A balanced diet is required for the proper growth and development and to remain active throughout the life (Krishnaswami and Sesikiran, 2011).

The major type of nutritional problem in developing countries is under-nutrition and malnutrition which results from inadequate food intake both in quality and quantity, particularly calories and protein, specific nutrients (e.g., Vitamin A, Iron, and Iodine) and parasitic infectious diseases (Burk, 1984). The prevalence of poor nutrition status on developing country is mainly due to the low income, low production of food, low productivity of crops and livestock, unequal distribution of food, low literacy, socio-culture and poor environmental sanitation (Nabarro, 1984).

Malnutrition commonly affects all groups in a community, but infants and young children are the most vulnerable of under-nutrition because of their high nutritional requirements for growth and development. Under-nutrition in school going children may lead to the consequences like, falling to grow (underweight, stunted and wasted), reduced learning ability, reduced resistance and immunity against infection and reduced productivity in future (Schmitt, 1979). Mortality and morbidity associated with malnutrition represent a direct loss in human capital and productivity for the economy. Malnutrition also slows economic growth and perpetuates poverty (World Bank, 2012).

The principal aim of assessing the nutritional status of a community is to map out the magnitude and geographical distribution of malnutrition as a public health problem, to discover and analyze the ecological factors that are directly or indirectly responsible, and, where possible to suggest appropriate corrective measures, preferably capable of being

applied with continuing community participation (WHO, 1966).

2.1.1 Factor affecting the nutritional status

The causes of malnutrition are rooted into societies, into socioeconomic and political structure, both nationally and internationally. Poor nutrition status is the result of combined effect of poverty and uneven distribution of wealth and access to food among countries and within countries, ignorance, inadequate education and knowledge regarding local available nutritive food, poor sanitary environment, large family size etc. These factors affect the quality of life and are the real determinants of nutritional status (Pradhan, 2012).

The factors affecting nutritional status of infants and child are mother‘s food security, breast feeding practices, types of food given to young children, feeding frequency, status of women and child nutrition and last but not the least who feeds the child and how the child eats (Tette *et al.*, 2015). Similarly infectious diseases, water and sanitation facilities affects nutrition status, particularly in small children (Park, 2011). Poor maternal nutrition impairs foetal development and contributes to low birth weight, subsequent stunting and other forms of under-nutrition (UNICEF, 2013). Maternal malnutrition during pregnancy and appropriate lactation practices are very important for postnatal growth in breastfeed infants (Delgado *et al.*, 1986). Some studies have shown that children of working mother have lower nutrition status than those whose mother remain at home (Gopaldas *et al.*, 1991).

2.1.2 Food availability and nutritional status

Food plays a primary role in nutritional status. People eat food, not nutrients; however, it is the combination and amounts of nutrients in consumed foods that determine health. The food sources of the nutrient, including food composition, the way in which foods are grown, harvested, stored, processed and prepared has effects on nutrient composition and nutritional value (Gibney *et al.*, 2009).

Seasonal variation in food availability has long been recognized as a contribution to nutrition and health problems in many third world countries. The extent and duration of the seasonal hardships has been related to a number of climatic characteristics, such as rainfall modality, the distinctness of the season and length of period (Margareta and Gerd, 1992).

For the achievement of nutrition adequacy, increased production of food groups making

the national diet balance is one of the most important measures. Adverse consequences are manifested themselves if the national diets are deficient in nutrients. A study conducted in Hispanic children has shown that food security is significantly associated with nutrition status of the children (Matheson *et al.*, 2001).

2.2 Nutritional requirements

Nutritional requirement refers to the amount of food energy and nutrient needed on an average per day by specific age and sex categories to meet the need of individuals for normal functioning of the body for work and growth. The requirement varies with sex, age, activity, physiological state (pregnancy, lactation and old age) and environmental condition (Burk, 1984)

Factors that Affect Nutrient Requirements: (Margo and Woods)

a. Increased needs which occur during growth, pregnancy, lactation, disease, fever, recovery from illness, stress, trauma, smoking, alcohol, and aging.
b. Change in absorption of the nutrients (i.e., GI illness, drug-nutrient or nutrient-nutrient interactions).
c. Change in transport of the nutrient (pH changes, nutrient interactions, protein carrier availability).
d. Change in the excretion of the nutrient (GI motility issues, dietary intake, fiber intake.

The recommended daily allowance of nutrients for pre-school children (1-6 years) is shown in the table below:

Table 2.1 ICMR Recommended Dietary Allowance for infants and pre-school children-2010.

Nutrients		6-12	Months 12-36	48-72
Body weight	kg	8.4	12.9	18
Energy	kcl	80/kgBW	1060	1350
Protein	g	1.69/kgBW	16.7	20.1
Visible Fat	g	19	27	25
Calcium	mg	500	600	600
Iron	mg	05	9	13
Retinol	μg	350	400	400
β - Carotene	μg	2800	3200	3200
Thiamine	mg	0.3	0.5	0.7
Riboflavin	mg	0.4	0.6	0.8
Pyridoxine	mg	0.4	0.9	0.9
Ascrobic acid	mg	25	40	40
Dietary folate	μg	25	80	100
Vitamin B_{12}	μg	0.2	0.2- 1	0.2-1
Magnesiun	mg	45	50	70
Zinc	mg	-	5	7

(Srilakshmi, 2014)

The energy supplies are of utmost important that seems to occur in those developing countries‘ where the staple commodities are either very low in protein content or the protein is very low in quality. Most of the people in developing country depends on the starchy food and derived their 80% if the total calories from them. The people of those countries are able to obtain about 87% of their calories and 8.9% of their protein from the consumption of all meat, eggs, milk and milk fats combined (Schmitt, 1979).

2.3 Malnutrition

Olusanya (2000) defined malnutrition as a diseased condition that results when the nutrients are not consumed in correct proportion as required by the body. Whaley and

Wong (1979) described malnutrition to be a general term used to refer to poor or inadequate nutrition (Ogurinade, 2014). Similarly, malnutrition has also been defined as a pathological state resulting from a relative or absolute deficiencies or excess of one or more essentials nutrients (Park, 2011).

There are two main forms of malnutrition, namely under-nutrition and over-nutrition. Malnutrition is a general term that encompasses under-nutrition, over-nutrition and micronutrient deficiency diseases, such as vitamin A deficiency, iron deficiency anemia, iodine deficiency disorders, and vitamin C deficiency or scurvy (Young and Jasper, 2006).

Disease and malnutrition are closely linked. Sometime disease is the result of malnutrition, Sometime it is the contributing cause. In fact, malnutrition is the single largest contributor to disease in the world, according to United Nation‘s Standing Committee on Nutrition (WFP, 2016). Adequate maternal nutrition, health and physical status are crucial to prevent child under-nutrition. Pregnancy increases nutrient needs, and protein, energy, vitamin and mineral, deficiencies are common during pregnancy. Deficiencies are not solely the result of inadequate dietary intake: Disease can impair absorption of nutrients and reduce appetite, and environmental and psychosocial stress affecting the mother can contribute to child under-nutrition Malnutrition is the direct or indirect cause for 50% of the total deaths among children (Srilakshmi, 2014).

Under-nutrition’s most damaging effect occurs during pregnancy and in the first two years of life, and the effects of this early damage on health, brain development, intelligence, educability, and productivity are largely irreversible (World Bank, 2006). Under-nutrition has serious effect on the child, the family and the development of the country. An undernourished child is more likely to be sick and die. Further, under-nutrition can lead to stunted growth, impaired cognitive and behavior development, poor school performance and lower working capacity and lower income (UNICEF, 2013). Under-nutrition slows economic growth and leads to higher levels of poverty.

Globally, the prevalence of stunting, wasting and underweight of under-five children in the year 2011 was found to be 26%, 8%, 16% respectively. High prevalence of stunting was found in Africa (36%) and Asia (27%). Seventy percent of the world’s wasted children were found in Asia, most in south center Asia (UNICEF, 2012).

2.3.1 Forms of malnutrition

According to WHO there are four forms of malnutrition (WHO, 1966). They are as follows:-

2.3.1.1 Under nutrition

This is the condition which results when insufficient food is eaten over an extended period of time. In extreme cases, it is called starvation (WHO, 1966).

2.3.1.2 Over nutrition

This is the pathological state resulting from the consumption of excessive quantity of food over an extended period of time. The high incidence of obesity and obesity related diseases stated as diabetes, hypertension, hypercholesteremia etc. in western societies is attributed to over nutrition (WHO, 1966).

2.3.1.3 Specific deficiency

It is the pathological state resulting from a relative or absolute lack of an individual nutrient such as vit-A deficiency diseases, iron deficiency diseases, iodine deficiency disorder etc (WHO, 1966).

2.3.1.4 Imbalance

It is the pathological state resulting from a disproportion among essential nutrient with or without the absolute deficiency of any nutrient **(**WHO, 1966).

2.3.2 Causes of malnutrition

Malnutrition in children is the consequence of much food insecurity, which stems from poor food quality and quantity, severe repeated infections or combinations of all three. These conditions are linked to the standard of living (WHO, 2001). A lack of knowledge on the nutritional needs of children and the benefits of breastfeeding contributes to childhood malnutrition (UNICEF, 2013).

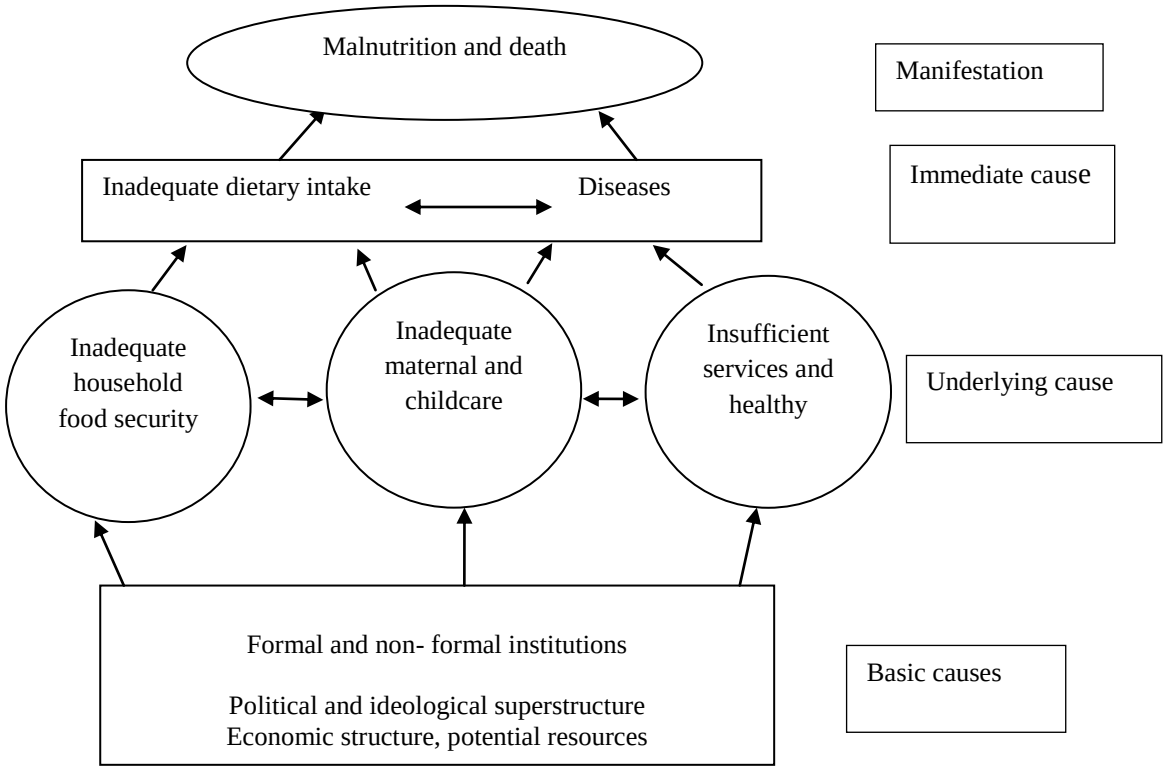

Fig: 2.1 Conceptual framework on causes of malnutrition (source: UNICEF, 1990)

Fig: 2.1 shows the conceptual framework on causes of malnutrition which reveal that malnutrition is an outcome of causes at different levels: immediate, underlying and basic causes in a hierarchical manner. Factors at one level affect the factors at other levels. According to Urban Jonsson, strategies to prevent and control malnutrition should aim to attach all causes simultaneously. The causes of malnutrition can be analyzed according to the different levels such as the international level, the national level, the local and the household level.

Food intake might be inadequate and put the individual in higher risk of getting ill. However, frequent illness episodes also affect the appetite and the ability to absorb nutrients. Access to food, adequate care of children and women, and access to basic health services together with a healthy environment, are necessary conditions to obtain nutritional well-being. Education influences the effectiveness of resources employed to achieve ideal nutrition. These resources include the availability, control, and management of resources that might have an effect on economic, social, political, technological and cultural factors. Other causes might be lack of tools or technology and limited knowledge and skills and inability to use the resources available (Jonsson, 1995).

2.3.3 Major nutritional problems

The World Food Program, a United Nations agency, has identified five main types of malnutrition as the most deadly forms: protein energy malnutrition, in which the body lacks sufficient quantities of all major macronutrients, and deficiencies in iron, vit-A, iodine and zinc (WFP, 2011).

2.3.3.1 PEM (Protein Energy Malnutrition)

The term protein–energy malnutrition describes the cause (i.e., the imbalance between nutrient supplies and requirements) more than the pathogenesis of starvation. It is a nutritional deficiency resulting from either inadequate energy (calorie) or protein intake and manifesting in either marasmus or kwashiorkor. Marasmus is characterized by wasting of body tissues, particularly muscles and subcutaneous fat, and is usually a result of severe restrictions in energy intake. Kwashiorkor affects mainly children, is characterized by edema (particularly ascites), and is usually the result of severe restrictions in protein intake. However, both types can be present simultaneously (Marasmic Kwashiorkor) and mask malnutrition due to the presence of edema (FAO, 2016).

Nepal multiple indicator cluster survey shows that 37% of under-five children are stunted, 11% are wasted and 30% are underweight (NMICS, 2014).

2.3.3.2 Vitamin-A deficiency

Vitamin A deficiency is one of the most common vitamin deficiencies in children throughout the developing world (Mason et.al.2001). Vitamin A deficiency (VAD) is the leading cause of preventable blindness in children and increases the risk of disease and death from severe infections. In pregnant women VAD causes night blindness and may increase the risk of maternal mortality (WHO, 2016a). Deficiency of vitamin A can lead to blindness (Xerophthalmia), disease mobilization of iron from stores and impair the immune system (Ramakrishnan, 2002).

Sixty-nine percentages of children in Southeast Asia have vitamin A deficiency (Ramakrishnan, 2002). Nepal is one of 60 countries in which this deficiency constitutes a significant public health problem (Fielder, 2000). Each year vitamin A deficiency (VAD) claims the lives of almost 670,000 children under five in the world and precipitates the deaths of approximately 6,900 children in Nepal (World Bank, 2012a). Globally, an

estimated 250,000 to 500,000 vitamin A-deficient children become blind every year, half of them dying within 12 months of losing their sight (WHO, 2016a).

Vitamin A supplementation is most effective when received twice a year and it administered in bi-annual dose to children under the age of five in many developing countries (Bhaskaram, 2002). Forty percent of Nepalese women receive a vitamin A dose during the postpartum. A slight difference can be seen among women who receive postpartum vitamin A by urban (46%) and rural residence (40%). The 2011 NDHS collected data on vitamin A supplements for children under age 5 shows that 90 percent of children age 6-59 months were given vitamin A supplements in the six months before the survey. The proportion of children receiving a vitamin A supplement increases with age from 70 percent at 6-8 months to 93 percent at 24-35 months before declining to 91 percent at 48-59 months. Children in rural areas are more likely to receive vitamin A supplements (91 percent) than those in urban areas (86 percent). There is only a slight difference in the proportion of children receiving vitamin A supplements by ecological zone and sub region (MoHP, 2011).

2.3.2.3 Iron Deficiency Anemia

The most common cause of anemia is inadequate dietary intake of nutrients necessary for synthesis of hemoglobin, such as iron, folic acid, and vitamin $B_{12.}$ Anaemia resulting from iron deficiency adversely affects cognitive and motor development, causes fatigue and low productivity and, when it occurs in pregnancy, may be associated with low birth weight and increased risk of maternal and perinatal mortality (WHO, 2011).

For the year 2011, it is estimated that roughly 43% of children, 38% of pregnant women, and 29% of non-pregnant women and 29% of all women of reproductive age have anaemia globally (WHO, 2015). Forty six percent of children in Nepal are anemic; 27 percent are mildly anemic, 18 percent are moderately anemic, and less than 1 percent is severely anemic. The prevalence of anemia among children under age 5 has declined by only 2 percentage points in the past five years (MoHP, 2011).

National strategy like supplementation of iron and folic acid for pregnant women from the beginning of the second trimester till 45 days of postpartum and deworming programme for pregnant women after the first trimester to enhance the impact of

supplement, biannual deworming program for preschool children, fortification etc were implemented to reduce prevalence of IDA (MoH, 2002).

2.3.2.4 Iodine Deficiency Disorder

Iodine is an element that is needed for the production of thyroid hormone. The body does not make iodine, so it is an essential part of our diet. Iodine deficiency can lead to enlargement of the thyroid (goiter), hypothyroidism and to mental retardation in infants and children whose mothers were iodine deficient during pregnancy. IDD also increase the risks of stillbirth and miscarriage in pregnant women (Benoist *et al.*, 2007).

According to NDHS 2011, 80% of household use iodized salt, with more children in urban area (91%) than rural (71%) areas living in such household. It shows that very small proportion of households (0.2 percent) in the MFWR had no salt available. In most of interviewed households (81%), salt was found to be adequately iodized, i.e., containing 15 ppm or more of iodine. The primary intervention implemented in Nepal to control IDD is the universal iodization of all edible salts. Other strategies include advocacy at national and district levels, mass media campaigns to promote the use of packet iodized salt with the two-child logo (NMICS, 2014).

2.3.2.5 Zinc Deficiency

Zinc is ubiquitous within the body and is vital to protein synthesis, cellular growth, and cellular differentiation. Studies in children have demonstrated important roles for zinc in relation to immune function, growth, and development (Shankar and Prasad, 1998).

Zinc deficiency results from inadequate intakes and, to some extent, increased losses. Only animal flesh, particularly oysters and shellfish, is a good source of zinc, and fiber and phytates inhibit absorption. Thus, as with iron deficiency, populations consuming a primarily plant-based diet are susceptible. Deficiency can also result from losses during diarrheal illness (Caulfield *et al.*, 2006).

The health consequences of severe zinc deficiency have been elucidated over the past 40 years, whereas the health risks of mild to moderate deficiency have been described only recently. Clinical presentations of severe deficiency include growth retardation, impaired immune function, skin disorders, hypogonadism, anorexia, and cognitive dysfunction. Mild

to moderate deficiency increases susceptibility to infection, and the benefits of zinc supplementation on the immune system are well documented (Shankar and Prasad, 1998).

2.4 Nutritional situation in Nepal

2.4.1 Infant mortality, life expectancy, and birth-weight

Infant mortality, Life expectancy and birth-weight are commonly used indicator to reflect malnutrition. The process of stunting begins right from conception and leads to inadequate foetal as well as infant and young child growth. Twelve percent of babies are born with low birth weight and after two years of age, four out of ten children are stunted (MoHP, 2011).

According to Nepal Demographic Health Survey 2011 Infant and under-five mortality rates in the past five years (2006-2007 to 2011-2012) are 46 and 54 deaths per 1,000 live births, respectively. At these mortality levels, one in every 22 Nepalese children dies before reaching age 1, and one in every 19 does not survive to his or her fifth birthday. Infant mortality has declined by 42 percent over the last 15 years, while under-five mortality has declined by 54 percent over the same period. Childhood mortality is relatively higher in the mountain ecological zone than in the terai and hill zone and is highest in the Far-western region. The neonatal mortality rate in the past five years is 33 deaths per 1,000 live births, which is two and a half times the post neonatal rate. The perinatal mortality rate is 37 per 1,000 pregnancies. The average life expectance of Nepalese men and women is around 60.1 and 60.7 respectively (MoHP, 2011).

2.4.2 Nutritional status of under-five children

Malnutrition remains a serious obstacle to child survival, growth and development in Nepal. As of the Nepal Demographic and Health Survey 2006, 49% of under-five children are stunted and 20% are severely stunted. The survey also showed that 13% of the children are wasted and 3% are severely wasted and 39% of the children are under-weight and 11% are severely underweight. While Fig 2.4 shows the percentage prevalence of malnutrition of under-five children according to NDHS 2011.

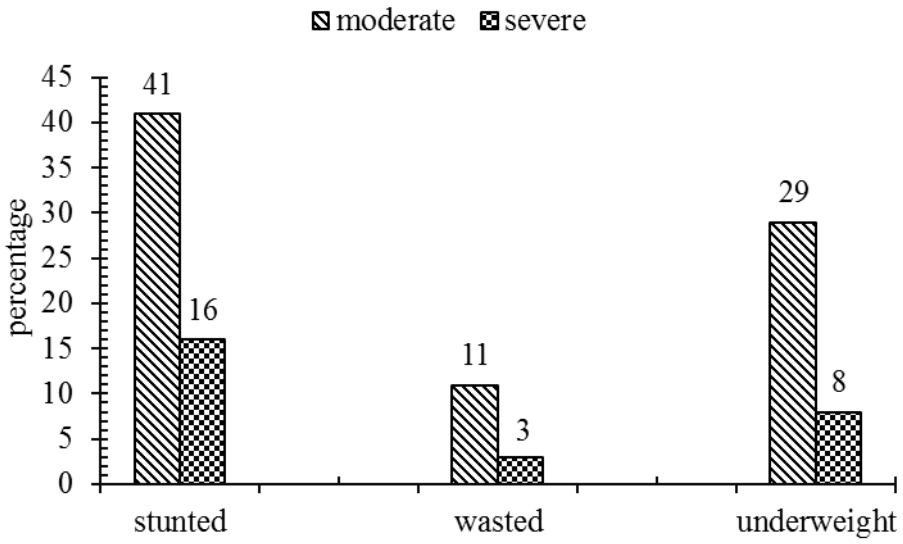

Figure 2.2 Prevalence of different forms malnutrition in Nepal (MoHP, 2011)

Analysis of NDHS data by age shows that stunting is highest (53%) in children age 36-47 months and lowest (14%) in 9-11 months, wasting is found to be highest (25%) in children age 9-11 months and lowest (7%) in children age 36-47 months and proportion of underweight children is highest (37%) among age 18-23 months and lowest (18%) among under 6 months children. Male children are more likely to be stunted, wasted and underweight as compared to female children (MoHP, 2011).

The nutritional status of children in Nepal has improved over the past 15 years and is close to achieving the Millennium Development Goal (MDG) target of reducing the percentage of underweight children age 6-59 months to 29% by 2015 (Nepal Planning Commission (NPC), 2010). The percentage of stunted children declined from 57% in 2001 to 41% in 2011. A similar pattern is observed for the percentage of underweight children from 43% in 2001 to 29% in 2011. While the percentage of wasting remains same i.e. 11% in 2011 (MoHP, 2011).

A cross-sectional study conducted among fifty-four 24-59 months children of Danuwar community in Sarlahi, shows that 20.37% were stunted, 14.82% were underweight and 12.96% were wasted based on WHO classification (Karki, 2015). Similar study on marginalized community of Katahari revealed that out of 102 children, 54.9% were stunted, 33.3% were underweight and 13.7% were wasted (Jha, 2015).

A study conducted in Jirel children, according to the MUAC measurement among 309 children, 51.13% were found to be normal and 12.62% were severely malnourished, according to Gomez classification, 37% children were normal but no one was found to be severely malnourished. 64% were found to be having mild to moderate malnutrition. According to Water low's classification 71% were found to be normal and 29% were stunted while no one was found to be wasted (Chapagain *et al.*, 2005).

Study conducted among 280 Former-Kamaiyas residing in Banke district shows that 55.7% of under-five children were stunted, 41.4% were underweight and 18.6% were wasted. Gender of child, mothers age and regular bathing of child was found to be significantly associated with nutrition status of children (Khatri *et al.*, 2015).

Cross-sectional study conducted in Rajbanshi community of Biratnagar sub-metropolitan city shows that 13.86% of under-five children were stunted, 10.21% were underweight and 12.87% were wasted (Bhagat, 2015).

Cross-sectional study conducted in Kunchha VDC, Lamjung among 50 children shows that 82% was satisfactory and only 18% followed by mild moderate nutritional status and there was no severe malnutrition by MUAC. According to Gomez classification the nutritional status of children was 60% normal followed by 32% mild and 4% moderate and severe malnutrition (Dhungana, 2013).

According to a survey conducted by Shrestha in Western Nepal, 20% of under-five children were underweight, 34% were stunted and 15% were wasted. Significant association of underweight and stunting was found among different ethnic group while the association of wasting with sex, ethnicity and age groups were not found to be statically significant (Shrestha, 2014).

Study conducted in Humla and Mugu district showed that among 575 under-15 children 28.2% children were undernourished, 8.8% wasted and 22.4% stunted was found in children less than five years in Humla district. In the same age group, 31.7% children were undernourished, 9.4% wasted and 29.4% stunted in Mugu district. Similarly in the age group five to 15 years, thinness was seen in 22.4% and 29.4% children in Humla and Mugu respectively (Thapa *et al.*, 2013).Thus, the national level data and various regional studies shows that malnutrition still exist as a serious problem in Nepal.

2.4.3 Nutritional status of women in Nepal

Maternal malnutrition remains an important challenge for Nepal, as many women continue to suffer from chronic energy as well as micronutrient deficiencies. The consequences of chronic energy deficiency are low BMI, short stature and poor birth outcomes including low birth weight, leading to an intergenerational cycle of malnutrition. Anaemia and micronutrient deficiencies among women have also been associated with poor maternal and perinatal outcomes. According to the Nepal Demographic and Health Survey 2011, 18.2 percent of non-pregnant women have a BMI of less than 18.5kg/m2; while 12 percent are short (less than 145cm), a sign of chronic under-nutrition. Additionally, one in three women of reproductive age (35%) suffer from anaemia, which has declined only by 1 percent since 2006. Despite continued efforts on iron supplementation during pregnancy, the anaemia rates among pregnant women increased from 42.4% in 2006 to 46.6% in 2011 (MoHP, 2011).

The Lancet 2008 analysis framework that identified inadequate dietary intake, inadequate care, unhealthy household environment and poor health care as the underlying causes for under-nutrition of women. These were adapted to reflect the realities during different life stages of Nepali women. Other contributing factors include lack of awareness about dietary requirements, especially during adolescence and pregnancy, poor dietary diversity and inequitable household food distribution. Behaviours such as smoking, alcohol and drug use, heavy work load, and poor birth spacing were also considered (DHS, 2011).

A study conducted in dietary intake and nutrition status of women of reproductive age in Nepal revealed that more than quarters of the women in Terai were malnourished indicated by low BMI (< 18.5 kg/m^2) and the dietary intake pattern was not adequate. The majority of women consume starchy staple food while less attention has been given to the consumption of vegetables, meat, fruits and dairy products (Sayami *et al.*, 2016). Some findings on the relationship between maternal and child nutrition showed that a high proportion of low-birth-weight and stunted children were observed among malnourished mothers (Loazia, 1997).

2.5 Breastfeeding practices in Nepal

Appropriate breastfeeding and complementary feeding practices are fundamental to infant's

nutrition, health, and survival during the first two years of life. Infant feeding in the early years of life influences an individual‘s whole life. A longer duration of breastfeeding has been linked to reduced risk of childhood chronic illnesses and obesity, and to improved cognitive outcomes (Butte, 2001; Reynolds, 2001). Therefore, the nutritional adequacy of complementary foods is essential for the prevention of infant morbidity and mortality, including malnutrition and overweight (Woldemariam and Timotiows, 2002).

WHO/UNICEF provide the following feeding recommendations (NMICS, 2012).

a) Exclusive breastfeeding for first six months of life
b) Continued breastfeeding for two years or more Safe, appropriate and adequate complementary foods beginning at six months of age
c) Frequency of complementary feeding: two times per day for 6–8-month-olds; three times per day for 9–11-month-olds
d) It is also recommended that breastfeeding be initiated within one hour of birth.

Breastfeeding is very common in Nepal, with 98 % of children ever breastfed, with 4.2 months the median duration of exclusive breast feeding. The most recent NDHS reported 69.6 % prevalence of exclusive breastfeeding in Nepal. Lack of knowledge on breast feeding practices and proper infant feeding practices among women in Nepal is identified as a major problem (Subba et.al, 2007). In most communities, a mother begins feeding their infants almost immediately, but in some parts of the country feeding doesn‘t begin for a two days or after the colostrum has been discarded (UNICEF, 1987). Such practice means some new infants are deprived of the immunological qualities of colostrum (Swaminathan, 1988).

According to multiple indicator survey, 48.7% of women initiate breastfeeding their child within 1 hour of birth and 56.9% of children under age 6 months are exclusively breastfed. The median duration of breastfeeding is 36 months. The percentage bottle-feeding of children of age 0-23 months is 11.5% (NMICS, 2014).

Four out of five Nepalese children ages 0-23 months are breastfed appropriately according to their age. This includes exclusive breastfeeding for children age 0-5 months and continued breastfeeding along with complementary foods for children age 6-23 months. Four-fifths of children under 6 months are predominantly breastfed. This

percentage includes children who are exclusively breastfed and those who receive breast milk and only plain water or non-milk liquids such as juice (MoHP, 2011).

2.6 Weaning practices in Nepal

The word weaning comes from the word "wemian" which means to accustom. Weaning begins from the moment supplementary food is started and continues till the child is taken off the breast milk completely (Srilakshmi, 2002). Weaning is the process of providing other nutritive food to the child besides mother's milk. If the baby is to maintain the expected rate of growth, remain healthy and well nourished, supplementary feeding has to be restored to a round 6^{th} months (Srilakshmi, 2014).

Both early and late supplementation is harmful for child health. Weaning that began too early involves the risk of infection, weaning that too late leaves the infants with an inadequate intake of nutrients and, thus is harmful to the growth and development of child (Abote & Yahannes, 1987). Around the age of 6 months, an infant's need for energy and nutrients starts to exceed what is provided by breast milk, and complementary foods are necessary to meet those needs. An infant of this age is also developmentally ready for other foods. If complementary foods are not introduced around the age of 6 months, or if they are given inappropriately, an infant's growth may falter. Guiding principles for appropriate complementary feeding are listed below (WHO, 2016b).

a) Continue frequent, on demand breastfeeding until two years old or beyond.
b) Practice responsive feeding (e.g. feed infants directly and assist older children feed slowly and patiently, encourage them to eat but do not force them, talk to the child and maintain eye contact).
c) Practice good hygiene and proper food handling.
d) Start at six months with small amounts of foods and increase gradually as the child gets older.
e) Gradually increase food consistency and variety.
f) Increase the number of times that the child is fed, 2-3 meals per day for infants 6-8 months of age, and 3-4 meals per day for infants 9-23 months of age, with 1-2 additional snacks as required.
g) Feed a variety of nutrient rich foods.

Among many ceremony in Nepal, the fifth or sixth months of the life are marked by the rice feeding ceremony i.e. *Pasni* in which the baby is offered rice or *Kheer* according to the economic condition of the family for the first time. After this ceremony the baby can take supplementary foods. But the mother will continue to give breast milk beyond and the first year. This late introduce serious under nutrition at this age (NFHS, 1996). After *pasni* the child can take supplementary food and the infants are fed with *Litto. Litto* is a traditional blend rice porridge made with green vegetables is also given to infants, but it is specially given to convalescing young children. *Sattu*' an infant food particularly made from roasted maize is used especially in the Terai (Vaidya, 1987)

The 2006 Nepal Demographic and Health Survey (NDHS) illustrated that 21% of infants 6-8 months of age, 35% of those 9-11 months of age and 55% of those 12-23 months of age ate sugary snack foods (defined as biscuits, sweets, candies, chocolates, pastries or cakes) in the previous day (MoHP, 2006). Multiple indicator survey shows that 73.5% of children 6-8 months (breastfed and non-breastfed) are introduced to complementary foods at an appropriate time. Boys were more likely than girls to receive solid, semi-solid or soft foods (83 percent compared to 65 percent) (NMICS, 2014).

2.7 Assessment of nutritional status

Nutritional assessment can be defined as the interpretation of information obtained from dietary, biochemical, anthropometric and clinical studies. Nutritional status can be defined as the interpretation of information obtained from the methods of nutritional assessment. The information obtained is used to determine the health status of individuals or population groups as influenced by their intake and utilization of nutrients by the body (Gibson, 1990).

Assessment of nutritional status of community is one of the first steps in the formulation of any public health strategy to combat malnutrition. The principle aim of such an assessment is to determine the type, magnitude and distribution if malnutrition in different geographic areas to identify at risk groups and to determine the contributory factors. In addition fractural evidence of the exact magnitude of malnutrition is essential to sensitize administrators and politicians to obtain allocation of materials and human resources and to plan appropriately (Srilakshmi, 2002).

The assessment of nutritional status can be done using the following information (WHO, 1996).

a) Direct method:- Deals with the individual and measures objective criteria. eg. Anthropometric, Clinical examination, Biochemical and Bio- physical parameters.
b) Indirect method:- Use community indices that reflect the community nutritional status or need. eg. Dietary intake, morbidity and mortality rates, as specific mortality and vital statistics.
c) Ecological factors:- eg. Socio-economic status, housing and environmental hygiene, health and education services, conditioning infection.

2.8 Indicator in nutritional status

A variety of indicators, which can be used for the purpose of assessing nutritional status, are currently available. Of the many possible indicators of nutritional status only few are suitable for the evaluation of field program. The only indicator of nutritional status that are applicable in a large scale and for which a suitable experience if available are those based on anthropometric indicators are best applicable in the evaluation of nutritional status (Keller, 1982).

A report by WHO in 1976 listed the lowering nutritional status indicators based on body dimensions, birth weight, weight for height, height for age , weight for age, arm circumference. The measurement of weight and height is relatively simple and reliable and their changes and distribution over ages are well documented for healthy well-nourished reference populations. The simplest of these indicators is weight –for age. It is widely used for both the assessment of child population and the monitoring of individual development. (Keller, 1982).

Weight is the measure of total body mass but gives no indication of its structure; a tall thin child may have same mass as a short, well-proportioned one, a fact that introduces a considerable error in to the classification of malnutrition by weight for age particularly in the categories of mild and moderate malnutrition. Therefore, a refinement that has long been used by anthropologist was introduced into the nutritional anthropometry of children (Scoane and Lathan, 1971). By relating the weight to the attained height a distinction was made between chronic and acute malnutrition or between; stunting and wasting (Waterlow *et al.,* 1977). The three indicators weight-for-age, height-for-age, and weight-for-height have since found wide acceptance and application and probably more is known today about

these indicators in different population and different health situations than any of other indicators that have been prepared in the past (Keller, 1982).

Indicators are used to measure nutritional imbalance resulting in under-nutrition (assessed from underweight, wasting and stunting) and overweight. Child growth is internationally recognized as an important indicator of nutritional status and health in populations. These indicators are defined as follows (NLIS, WHO);

a) Underweight: weight for age < –2 standard deviations (SD) of the WHO Child Growth Standards median
b) Stunting: height for age < –2 SD of the WHO Child Growth Standards median
c) Wasting: weight for height < –2 SD of the WHO Child Growth Standards median
d) Overweight: weight for height > +2 SD of the WHO Child Growth Standards median

2.9 Anthropometric measurement

Anthropometry is concerned with the measurement of the variation in the physical dimensions and the gross composition of the human body at different age levels and degree of nutrition (WHO, 1966).

The advantage of anthropometry is that body measurements are sensitive over the full spectrum of malnutrition, whereas biochemical and clinical indicators are useful only when a child is at least moderately malnourished. Common anthropometric indicators of child malnutrition are combinations of body measurements and age, because the short-term response of a child's body to inadequate food intake is to slow or stop growth. This results in low height-for-age (stunting) and low weight-for-height (wasting). The indicators recommended for international use are: stunting, wasting and underweight (a measure of both stunting and wasting). To assess the level of malnutrition, a child's height and weight are compared with the NCHS/WHO reference curves of height-for-age, weight-for-age and weight-for-height (WHO, 2005).

Advantages of anthropometry (Jellife and Jellife, 1989)

a) Simple, non-invasive,
b) Some equipment's are inexpensive, portable,
c) Relatively unskilled personnel can perform measurements,
d) Methods are reproducible,
e) Measures with long term nutritional history,

f) Quickly identifies mild to moderate malnutrition,
g) Measure many variable of nutritional significance like height, weight, skin fold thickness, head circumference waist-hip ratio and BMI,

Limitations of Anthropometry

a) Relative insensitive to short term nutritional status,
b) Cannot identifies specific nutrient deficiencies,
c) Measurements like skin-fold are difficult to carry out in obese people,
d) There may be ethnic differences in fat deposition.

The commonly used anthropometric measurements are briefly discussed below. These are the most common indicators to detect the problem of malnutrition.

2.9.1 Weight for Age

Weight is the anthropometric measurement most in use. Its potential value, especially for children, is appreciated not only by health personnel, but often by less educated parents, for whom it is useful as a source of health education (WHO, 1996). Weight-for-age is a composite index of height-for-age and weight-for-height. It takes into account both chronic and acute malnutrition (MoHP, 2011).

W/A is used to identify the nutritional condition underweight, which is a composite measure of stunting and wasting. Children whose W/A z-score is below minus two standard deviations (-2SD) from the median of the WHO reference population are considered as underweight. Children who are below minus three standard deviations (-3SD) are considered severely underweight (Klaver, 2010).

2.9.2 Height for age

The height of an individual is made up of the sum of four components; leg, pelvis, spine and skull. While, for detailed studies of body proportions, all of these measurements are required, in field nutritional anthropometry usually only the total height is measured (WHO, 1996).

Children whose height for age z–score is below minus two standard deviations (-2SD) from the median of the WHO reference population are considered short for age (stunted), or chronically malnourished. Children who are below minus three standard deviations (-

3SD) are considered severely stunted (WHO, 2015). Stunting reflects failure to receive adequate nutrition over a long period of time and is affected by recurrent and chronic illness. Height-for-age, therefore, represents the long-term effects of malnutrition in a population and is not sensitive to recent, short-term changes in dietary intake (MoHP, 2011)

2.9.3 Weight for height

It is an indicator of leanness or thinness of the body and therefore of the present state of nutrition. An age effect of the relationship between weight and height becomes apparent only at the extremes of the range in children who are very tall or very short for their age. Thus, standards of expected weight at a given height, constructed from presumable well-nourished populations, are essentially age independent. Weight-for-height is an index of current nutritional status (Scoane and Lathan, 1971).

Children whose weight for height z–score is below minus two standard deviations (-2SD) from the median of the WHO reference population are considered as thin (wasted) and Children who are below minus three standard deviations (-3SD) are considered severely wasted (WHO, 2015). Wasting represents the failure to receive adequate nutrition in the period immediately preceding the survey and may be the result of inadequate food intake or a recent episode of illness causing loss of weight and the onset of malnutrition (MoHP, 2011).

2.9.4 Mid - Upper-Arm Circumference

Measurement of the mid-upper arm appears to be most useful in practice. This reason is easily accessible, even with a young child sitting in-front of the examiner on his mother‘s lap. The arm circumference is measured to the nearest 0.1 cm with a flexible steel or fibre-tape, which must be placed gently, but firmly, round the limb to avoid compression of the soft tissue (WHO, 1996).

MUAC measurement is taken in the left hand midway between the elbow and shoulder so that the hand should be in relaxed and hanging by the side. In May 2009, the World Health Organization and UNICEF issued a joint statement on “WHO child growth standards and the identification of severe acute malnutrition in infants and children”. To reflect this, a standard colour coded MUAC tape was made available, which describes the

cutoff points for children as follows (WHO and UNICEF, 2009) :

Table 2.2: MUAC measurement cut-offs for under-five children

MUAC range	**Colour code**	**Interpretation**
Less than 115mm	Red	Severe wasting
115mm to 125 mm	Yellow	Moderate wasting
Greater than 125 mm	Green	Normal

Part-III

Materials and methods

3.1 Research instruments

Equipments needed for performing the survey were;

a) Child weighing machines: - Child weighing machines having capacity of 100kg in maximum and could measure to the nearest 0.1kg. (1 piece).
b) Height measuring stand (Stadiometer):- The height measuring tape of 5ft capacity and could measure to the nearest 0.1cm. (1 piece).
c) MUAC tape: - For measuring mid-upper arm circumference and could measure to the nearest 0.1cm. (1 piece)
d) Questionnaire:- A well designed set of questionnaire to collect information on household characteristics, food availability and its consumption, health facility etc.

3.2 Research design

Cross-sectional descriptive study was conducted. An area survey of under five year Tajpuriya children of Gauradaha Municipality, Jhapa district consisted of two parts that were important in field based nutritional survey of designed research.

a) Anthropometric measurement (height, weight, MUAC) of under-five children.
b) Household survey with the help of questionnaires.

3.3 Study variables

Study variable were categorized into two groups:

1. **Dependent variables:** Nutritional status indicated by weight for height, height for age, weight for age, MUAC.
2. **Independent variables:** Six categories of factors were assessed as independent variables**;**

a) Socio-economic and demographic variables; religion, family size, income, education occupation.
b) Child characteristics; age, sex, birth order, breastfeeding status and morbidly status

c) Child caring practices; feeding, hygiene.
d) Maternal characteristics; age, number of children ever born, extra food during pregnancy/lactation, care during pregnancy or lactation.
e) Environmental health condition; Water supply, fuel for cooking.

3.4 Study area

The study was conducted in Tajpuriya community of Gauradaha municipality, Jhapa district, Mechi zone, Nepal.

3.5 Target population

Tajpuriya children of 6-59 months of age were included as target population of the study whereas mother and care giver of those children were the respondents.

Inclusion and exclusion criteria

Inclusion criteria:- Tajpuriya children aged 6-59 months who lived in Gauradaha municipality were included in the study.
Exclusion criteria:- The study participants who were seriously ill or who were not available at household during the time of survey were excluded in the study.

3.6 Sample size

The sample size was determined using a single proportion formula by assuming 50% of prevalence of malnutrition in Tajpuriya community of Gauradaha municipality, 95% confidence interval (CI), 8 % desired precision, Z-value 1.96 is used at 95% CI and margin of error of 8%. (n= sample size, P= prevalence, d= margin of error).

$n = Z^2 P (1-P)/d^2$
$= (1.96)^2 * 0.5 * 0.5/(0.08)^2$
$= 3.8416 * 0.25/(0.0064)$
$= 150.0625$
$= 150$

Under-five population of Tajpuriya children was not found. Thus calculated sample size was adjusted for non-response. As some children/house may refuse or unavailable so considering non-response rate as 10%, the adjusted sample size was calculated to be 165.

3.7 Sampling technique

Purposive sampling technique was used. Out of 13 wards, 6 wards (1,2, 3, 5, 8 and 9) were selected. Households containing children of 6-59 months age were included in the study.

3.8 Pre–testing

The study was pre- tested among the 6-59 months ten Tajpuriya children from a similar community. The pre-testing was conducted to establish accuracy of questionnaire and to check for consistency in the interpretation of questions and to identify ambiguous items. After review of instruments all suggested changes were made before being administered in the actual study.

3.9 Validity and reliability

To ascertain the degree to which the data collection instruments will measure what they purposed to measure, the instruments was validated by a group of professionals from Central Campus of Technology, Department of Nutrition and Dietetics. The aspects tested in the questionnaire were also drawn from the available literature in nutrition education for young children. The questionnaire was also pre-tested prior to data collection to ascertain content and face validity.

Reliability refers to quality control measure of data collected. Training for data collection was received. Calibrated instruments were used and instruments were set at zero before taking measurements. Questionnaire was checked daily for completeness, consistency and clarity as mentioned earlier. Monitoring was done by supervisor visiting the research site periodically.

3.10 Data collection techniques

Data on socio-demographic and economic factors, maternal characteristics, child caring practices etc. obtained from the respondents was collected on a structured form of questionnaire after obtaining informed consent. Interview was conducted with parents/care takers of the children to fill the questionnaire.

Similarly data on anthropometry measurement of a child was obtained by following method.

Height: Height was measured using stadiometer where the subject stood (without shoes) on a horizontal platform with his heels together and head positioned looking forward with hip and head touching the wall. Height should be recorded to the nearest 0.1cm (Adhikari and Krantz, 2013). The length of each child aged 6 - 24 months was measured lying flat and centrally on measuring boards placed on a hard flat surface on the ground. The length was read to the nearest 0.1 cm (head and feet against the base of the board and foot piece respectively) (Tamiru, 2015).

Weight: Weight was measured using digital weight scale where subject stood on the center of the weight scale platform with minimal clothing. Readings were taken at nearest 100gm (Adhikari and Krantz, 2013). In case of children age below two years and those who were unable to stand alone, their weight was obtained from the difference between weights of mother as she/he held the child and the weight of the mother alone (Tamiru, 2015).

Mid Upper Arm Circumference (MUAC): MUAC was measured using MUAC tape by placing a tape around the child's left arm between the elbow and the shoulder. Tape consists of three colors where in the green strip denotes a child of adequate nutrition status, yellow strip denotes a child at risk of developing malnutrition and a child in red strip indicates with severe malnutrition (Adhikari and Krantz, 2013).

3.11 Data analysis

Quantitative data was firstly cleaned, coded and was entered in statistical software. Similarly qualitative data were transcribed and coded by assigning labels to various categories. The verified test parameters were used to establish the relationships between the variables and nutritional status of students. SPSS 20 and WHO anthro 3.2.2 software version was used to assess individual nutritional status and chi square test was used to find the associated factors for malnutrition.

3.12 Ethical consideration

Permission to conduct the research was obtained from Central Campus of Technology, Department of Nutrition and Dietetics and Gauradaha municipality.

Written consent was obtained from the parents of respective children who were selected for conducting the research. Respondents were assured that the data were collected for the purpose of the study and will be treated with the uttermost confidentiality.

Part-IV

Results and Discussion

Survey was conducted to find the prevalence and the factors associated with it in Tajpuriya community. The results of the survey are presented in the following headings.

4.1 Socio-economic and demographic characteristics

A total of 165 under-five Tajpuriya children were included in the study with a response rate of 100%. The participants were from a family who had an average of 6.63(±2.21) and 1.85(±1.23) family size and under-five children respectively. The religion distribution shows 71.5 %(118) Hindu with higher percentage, followed by Christian 21.2%(35) and others 7.3%(12).

Table 4.1 shows that 18.2%(30) of the fathers were illiterate, 27.3%(45) were having primary level, 20.6%(34) lower secondary, 29.7%(49) secondary level, 3.6%(6) higher secondary and above and 0.6%(1) with informal education.

According to the family size distribution 49%(82) household were with 5-7 members, followed 28.5%(47) with 8-10 members, 17%(28) with 1-4 members and 4.8%(8) with greater than 11 members. Survey shows 62.4%(103) of the family head engaged in agriculture, followed by labour 15.2%(25), service 6.7%(11) and business 15.8%(26).

Considering the estimated annual income categorized by Ministry of health and population as depicted in Table 4.1 those with annual income range of 1 lakhs to 3 lakhs had the highest percentage 48.5%(80), followed by less than 1 lakhs 26.1%(43) and the lowest percentage 25.5%(42) from the more than 3 lakhs. The major source of income was agriculture followed by agriculture,labour, business, and service.

Lifestyle of Rajbanshi and Tajpuriya are quite similar. This study result is somehow similar to the study conducted in other community like in Rajbanshi which shows that 35.4% were illiterate while 64.6% were literate. Majority of people were engaged in agriculture (52%) and labour (24%). Their average family size was found to be 5.76 (Subba, 2001). Similarly study conducted in Dhimal community in Morang district shows that 22.9% were illiterate while 77.1% were literate. Most of the people main occupation was found to be farming 54.5% while remaining were labour business and service (Tamang and Nepal, 2007).

The frequency of all the socio-economic and demographic characteristics of study population is expressed in table 4.1.

Table 4.1: Distribution of socio-economic and demographic characteristics of Tajpuriya community

Variable	Frequency	Percent
Religion		
Hindu	118	71.5
Christian	35	21.2
Other	12	7.3
Father education status		
Illiterate	30	18.2
Informal education	1	0.6
Primary level	45	27.3
Lower secondary	34	20.6
Secondary level	49	29.7
Higher secondary and above	6	3.6
Family size(No. of family member)		
1-4	28	17
5-7	82	49.7
8-10	47	28.5
More than 11	8	4.8
Family head occupation		
Agriculture	103	62.4
Service	11	6.7
Labour	25	15.2
Business	26	15.8
Annual income of the family		
Less than 1 lakh	43	26.1
1 Lakh to 3 Lakh	80	48.5
More than 3 Lakh	42	25.5

4.2 Mothers characteristics

A table 4.2 shows that the mean age of mothers participated in survey was found to be 23.64 (±2.05) years. Most of the mothers age were at the age group 20-25 years with 63.6%(105), followed by age group 25-30 with 31.5%(52) and less than 20 years with 4.8%(8). Most of the family mothers were found to be illiterate with 34.5%(57) followed by primary level 25.5%(42), lower secondary 21.8%(36), secondary level 9.7%(16), higher secondary and above and with informal education 3%(5). Mothers occupation was

distributed as in housewife 62.4%(103), service 6.7%(11), labour 15.2%(25) and business 15.8%(26). All the major maternal characteristics under study are listed below.

Table 4.2: Maternal characteristics of Tajpuriya community having 6-59 months age children

Variables	Frequency	Percent
Age group of mother		
Less than 20	8	4.8
20-25	105	63.6
25-30	52	31.5
Mother education		
Illiterate	57	34.5
Informal education	5.0	3.0
Primary level	42	25.5
Lower secondary	36	21.8
Secondary level	16	9.7
Higher secondary and above	9	5.5
Mother occupation		
Housewife	103	62.4
Service	11	6.7
Labour	25	15.2
Business	26	15.8
Age at pregnancy		
less than 18	30	18.2
18-20	125	75.8
More than 20	10	6.1
Iron and folate tablet supplementation		
Yes	57	34.5
No	108	65.5
Knowledge about sarbottam pitho		
No	101	61.2
Yes	64	38.8
Source of Vitamin A		
Green leafy vegetable	79	47.9
Yellow fruits	16	9.7
Do not know	69	41.8
Knowledge about malnutrition		
No	119	72.1
Yes	46	27.9
Cause of malnutrition(N=46)		
Inadequate balanced diet	41	24.8
Curse of god	5	3.03

The mean of pregnancy age was found to be 18.66(±1.45) years. Survey shows that maximum women become pregnant at the age group 18-20 year with 75.8%(125), followed by age group less than 18 with 18.2%(30) and least at age group more than 20 years with 6.1%(10). Many mothers i.e., 34.5%(57) had not taken iron and folate tablet during pregnancy, most of them left taking it after few months as they think that taking iron tablets leads to heavy baby which causes difficulty in child birth. Mothers were given extra food and during pregnancy and lactation.

Almost 72.1% (119) mother did not know about malnutrition while 27.1%(46) mothers were well-known about it. Among 46 mothers who were known about malnutrition, 24.8%(41) mothers reported that the cause of malnutrition is inadequate balanced diet. Similarly, 41.8%(69) mothers did not know the source of vitamin-A while 47.9%(79) mentioned green leafy vegetable as its source, 9.6% and 0.6% mentioned yellow fruits and meat and fish respectively as its source.

4.3 Child characteristics

Majority of the children were males 92 (55.8%) and females 73 (44.2%) and had mean age of 29.04(±15.98) months. Majority of them were in 36-47 months 23.6%(39) age group followed by 48-60 months 20%(33) , 12-23 months 20%(33), 6-11months 18.8%(31) and 24-35 months 17.6%(29). Most of the mothers 77%(127) had single children under-5 year and remaining 23%(38) have 2 children under-5 years of age. The mean number of under-five children in a family was found to be (1.23±0.422).

Regarding the birth order 40.6%(67) were first child, 33.3%(55) were second child, 19.4%(32) were third child and 6.7%(11) were fourth child of the family. Out of total children, 38.2%(63) children's weight at birth was below normal (less than 2.5), 37.6%(62) were above 2.5 kg while 24.2 %(40) did not know the birth weight of their children. All the major child characteristics under study are listed below in the table 4.3.

Table 4.3: Child characteristics of 6-59 months Tajpuriya children

Variables	Frequency	Percent
Gender		
Female	73	44.2
Male	92	55.8
Age group of children		
6-11	31	18.8
12-23	33	20
24-35	29	17.6
36-47	39	23.6
48-59	33	20
No. of under-five children		
1	127	77.0
2	38	23.0
Birth Order		
1	67	40.6
2	55	33.3
3	32	19.4
4	11	6.7
Child Birth Weight		
Less than 2.5	63	38.2
More than 2.5	62	37.6
Do not know	40	24.2

4.4 Child caring practices

Out of total respondents, 72.1%(119) of respondents mentioned that breastfeeding to their child was initiated within 1 hour of delivery, 17%(28) within 8 hours, 7.9%(13) after 24 hour of delivery and 3%(5) of respondent did not reveal the initiation time of breast feeding. Respondents who fed colostrum to their baby was found to be 85.5%(141) while 14.5%(24) did not feed colostrum. Pre-lacteal feeding practice as a goat milk as their tradition was 46.1%(76) while 53.9%(89) did not feed anything. While study conducted in Jhagad community in eastern Nepal shows that 32.7% of mothers breastfeed immediately after childbirth and about 60% practiced prelacteal feeding (Shah *et al.,* 2015). As similar to this study a research report of World Bank shows that Madhesi community of Nepal feed honey and goat milk as a prelacteal food as they believe that mother first milk is dirty which affect the child health. And also there is strong belief that goat milk is more nutritious than mother's milk (Devkota and Bennett, 2014).

The mean duration of breast feeding of Tajpuriya children was found to be 30.9±6.3 months. 53.9%(89) of children under survey were still taking breast milk during the survey period. Most of the respondents i.e. 86.7%(143) did not feed bottle milk to the baby while 13.3%(22) of babies were fed bottle milk. Out of total respondent, 86%(151) children had initiated complementary feeding while 8.5%(14) were not initiated complementary food yet. Out of 151 respondents, 14.5%(24) had initiated complementary feeding before 6 months of child age while 24.8%(41) at 7 months of age, 36.4%(60) at 8-9 months of child age and 15.7%(26) children at more than 10 months of age. The type of complementary food given to children was same as other family members in 53.9%(89), followed by jaulo 37.6%(62) and lito by 8.5%(14) of the respondent.

Almost 97.5%(161) of respondent use packaged iodized salt while 2.4%(4) of them use both rock salt and iodized packaged salt. This finding is similar to national data which shows that more than 95% people consumed iodized salt (MoHP, 2011). Seventy seven percent of children were supplemented with vitamin A and deworming tablets while 23% children were not supplemented with it. During survey period, 35.8%(59) children were ill, most of them were suffering from fever 20.6%(34) followed by diarrhoea 7.3%(12), coughing 4.2%(7) and blood in stool 3.6%(6). The preference of health service for treatment of children during acute illness was highest to both health-post and *dhami* 45.5%(75) followed by health-post 22.4%(34), homemade medicine 20.6%(37) and medical shop 11.5%(19). Study on Rajbanshi community also shows that still many people (51%) visits *dhami/Jhakri* and *Shaman* for the treatment. Because of their beliefs on witchcraft, reliance on Traditional Faith Healer (TFH) for treatment is quite strong in this community (Subba, 2001).

Major child caring practices under study are listed below in table 4.3.

Table 4.4: Distribution of different child caring practices in tajpuriya community

Variables	Frequency	Percent
Time of initiation of breastfeeding		
Within 1 hour	119	72.1
Within 8 hour	28	17.0
After 24 hour	13	7.9
Cannot remember	5	3.0
Feeding colostrum		
Yes	141	85.5
No	24	14.5
Pre-lacteal feed		
Nothing	89	53.9
Goats milk	76	46.1
Continuation of breastmilk during survey		
Yes	89	53.9
No	76	46.1
Bottle feeding		
Yes	22	13.3
No	143	86.7
Exclusive breastfeeding		
Yes	97	58.8
No	68	41.2
Time of initiation of complementary feeding		
Less than 6 months	24	14.5
7 months	41	24.8
8-9 months	60	36.4
More than 10 months	26	15.7
Not started yet	14	8.5
Types of complementary foods		
Lito	14	8.5
Jaulo	62	37.6
Similar to family foods	89	53.9
Illiness		
Diarrhoea	12	7.3
Blood in stool	6	3.6
Fever	34	20.6
Coughing	7	4.2
Nothing	106	64.2
Treatment center		
Health post	34	22.4
Homemade medicine	37	20.6
Medical shop	19	11.5
Dhami and healthpost	75	45.5

4.5 Environmental and hygienic practices of the household

Survey shows that most of the people use Tube well as a source of drinking water. Out of total respondents 85.5%(141) use Tube well for drinking and remaining 12.7%(21) and 1.8%(3) use Drinking water tap and well respectively as a source of drinking water. It also shows that 95.8%(158) percent do not purify water before drinking and remaining 4.2%(7) purify before drinking. While national data shows that 86.9% rural people donot purify water (MoHP, 2011). Household using firewood as a source of cooking fuel was 48.5%(80) while 12.1%(20) use both firewood and cylinder, 30.3%(50) and 9.1%(15) use cowdung and gober gas respectively as a cooking fuel. Most of the people 83%(137) had their own toilet facility in their house and 17%(28) of respondent did not have toilet facility in their house. Respondent using soap water for washing hand after toilet was found to be 89.7% while remaining people used ash. This practice was found to be quite improved than the study conducted in Katahari VDC where only 61% people use soap water while other use only water or ash/mud water to wash hand after toilet (Karn *et al.*, 2012). All the major environmental and hygienic characteristics under study are shown in table 4.5.

Table 4.5: Environmental and hygienic characteristics of Tajpuriya community

Variables	Frequency	Percent
Source of Drinking Water		
Tube-well	141	85.5
Drinking water tap	21	12.7
Well	3	1.8
Purification of Drinking Water		
Yes	158	95.8
No	7	4.2
Source of fuel		
Fire wood	80	48.5
Firewood and cylinder	20	12.1
Cowdung	50	30.3
Gober gas	15	9.1
Toilet facility		
Yes	137	83.0
No	28	17.0
Wash hand after toilet		
Soap-water	147	89.7
Ash –water	18	10.3

4.6 Prevalence of malnutrition

Figure 4.1 shows the result of prevalence of malnutrition on Tajpuriya children. The overall magnitude of under nutrition among children age 6-59 month of Tajpuriya community were 36.4%, 16.4%, and 24.8% for stunting wasting and underweight respectively. Moreover severe and moderate malnutrition was found among the children i.e. stunting 17% and 19.4%, wasting 3.6% and 12.8% and underweight 1.8% and 23% respectively.

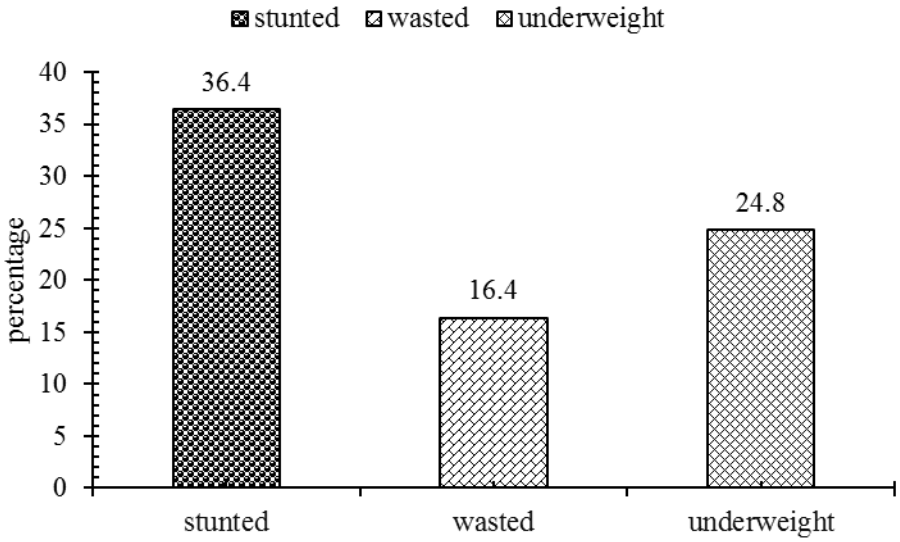

Fig.4.1 Prevalence of stunting, wasting and underweight in Tajpuriya community

The result of wasting and underweight of this study was found to be lower than the result of Terai indigenous children i.e. 22.6% and 36.6% while stunting was found to be greater in this study. Prevalence of stunting in Terai indigenous children is 30.7% (Pyakuryal *et al.*, 2014). NDHS 2011 shows 41%, 11%, and 29% of children in Nepal are found to have stunting, wasting and underweight. The result of this study revealed that the prevalence of wasting was quite higher compared with NDHS 2011. However the result of stunting and underweight was found similar with the NDHS result of Terai region i.e. 37.4% and 29.5% respectively (MoHP, 2011) and the result of NMICS 2014 with stunting 37% and underweight 30%. Prevalence of wasting is near to the study conducted in 280 under five children of former-Kamaiyas in Nepal. The finding of that survey was 55.7% were stunted, 18.6% were wasted and 41.4% were underweight (Khatri *et al.*, 2015).

This study result also showed that the prevalence of under-nutrition of children age 6-59 month was higher than the study conducted in a Rajbanshi community of Biratnagar,

where stunting, wasting and underweight was 19.80%, 20.79% and 10.21% respectively (Bhagat, 2015). And also the result was quite higher than the study conducted in under-5 year children in western Nepal where 34.5% stunting, 15.1% wasting, and 20.2% underweight (Shrestha, 2014). This may be different because of the particular marginalized ethnic group, study period, study area, socioeconomic characteristic, health service delivery, and cultural belief of study area. It indicates that the children of Tajpuriya community were still in critical nutritional stress. Addressing nutritional problems this community is therefore most for overall improvement of the nutrition status of the country.

Result also revealed that prevalence of under nutrition was quite similar to a cross-sectional study conducted in the Far-west Terai of Nepal with stunting 35%, wasting 16% and underweight 35% (Borgen, 2010). comparative study conducted in Belahara VDC of Dhankuta district in Nepal the prevalence of underweight, stunting and wasting was 27%, 37% and 11, respectively (Gurung and Sapkota, 2009). While the prevalence of wasting is high in this study which may be due to the minimal time for feeding and caring for the children as most of the mothers were laborer, recurrent episodes of hygiene related illness like diarrhoea, fever etc which may be due to hygienic practices in Tajpuriya community.

4.6.1 Distribution of nutrition status according to gender

Table 4.6 shows the distribution of malnutrition on the basis of gender. The prevalence of under nutrition was higher among the girls than boys. According to WHO Growth Standard of under nutrition indicator about 34.6% male and 38.1% female were stunted. Out of them, 11.1% male and 22.6% female were severely malnourished while 23.5% male and 15.5% female were moderately malnourished.

Similarly for weight for height, 18.5% male and 14.3% female were wasted. Out of them, 2.5% male and 4.8% female were severely wasted while 16% male and 9.5% female were moderately wasted**.**

On the basis of weight for age, prevalence of underweight was found to be 19.8% and 29.8% for males and females respectively. Out of them 2.5% male and 1.2% female were severely underweight. Compared with the sex stunting and underweight was found higher in females while wasting was found higher in males. Higher prevalence of wasting is males

is in agreement with the national data while the higher prevalence of underweight in females is contradictory to national data (MoHP, 2011).

Table 4.6: Prevalence of under-nutrition among Tajpuriya children by gender based on WHO z-score

	Severely malnourished	Moderately malnourished	Normal
Height for Age(Stunting)			
Male (%)	11.1	23.5	65.4
Female (%)	22.6	15.5	61.9
Weight for Height(Wasting)			
Male (%)	2.5	16	81.5
Female (%)	4.8	9.5	85.7
Weight for Age(Underweight)			
Male (%)	2.5	17.3	80.2
Female (%)	1.2	28.6	70.2

4.6.2 Distribution of nutrition status according to age

Table 4.7 shows the distribution of malnutrition based on age groups. Compared with the age group highest prevalence of severe stunting 28.6%, severe wasting 9.1% and severe underweight 3.7% was found in the group (24-35), (6-11) and (48-59) months respectively. While stunting (57.6%), wasting (18.2%) and underweight (36.4%) was found in the age group 6-11 months. Distribution of wasting high in this age group was found similar to national data while stunting and wasting was found higher in 36-47 and 18-23 months respectively (NDHS, 2011).

Table 4.7: Prevalence of Under Nutrition among 6-59 months Tajpuriya children by age based on Who z- score (n=165)

Age Group		WHZ %		HAZ %		WAZ %	
(months)	N	<-3	<-2	<-3	<-2	<-3	<-2
6-11	33	9.1	18.2	27.3	57.6	3	36.4
12-23	38	2.6	13.2	21.1	34.2	2.6	31.6
24-35	28	3.6	17.9	28.6	50	Nil	28.6
36-47	39	Nil	17.9	5.1	23.1	Nil	15.4
48-59	27	3.7	14.8	3.7	18.5	3.7	11.1

The lowest prevalence of stunting (18.5%), wasting (13.2%) and underweight (11.1%) was found in the age group (48-59), (12-23) and (48-59) months. Survey shows that

prevalence of under nutrition was more prevalent in the age group 6-11 months. This can be supported with the fact that child dependency on complementary foods increases in this age but most of the child were fed complementary food lately in this community, most of the mothers were pregnant before 20 years of age which may be the leading cause of low birth weight further increasing the risk of under-nutrition. Women are not mentally and physically matured for having child and taking proper care of child and themselves in early pregnancy thus resulting under-nutrition.

4.6.3 Distribution of nutrition status according to MUAC measurement

Table 4.8 shows the prevalence of wasting based on MUAC measurements. Based on MUAC measurements no child was found to be severely wasted defined as MUAC less than 11.5 cm. Based on MUAC, 6.7% of 6 -59 months aged children were moderately wasted (MUAC greater than 11.5 cm but less than 12.5 cm) while 18.8% were mildly wasted (MUAC greater than 12.5 cm but less than 13.5 cm).

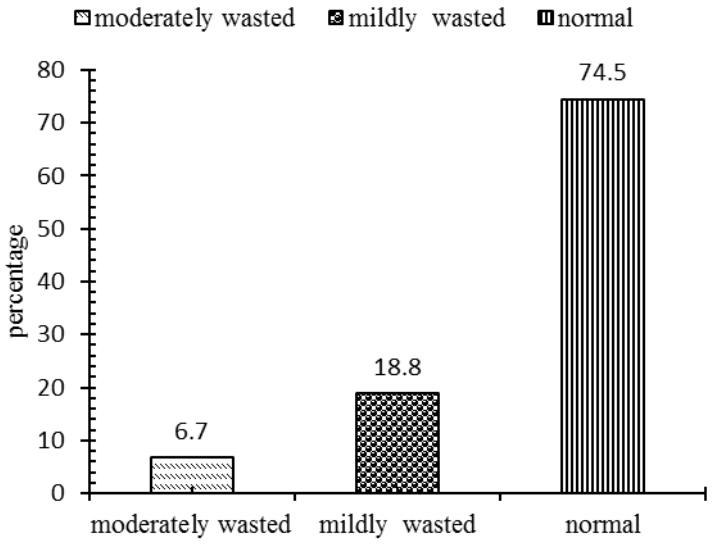

Fig.4.2 Distribution of nutrition status according to MUAC measurement

4.6.4 Nutrition status comparision with WHO standard

Distribution of wasting, stunting, underweight and wasting based on MUAC among under-five children of Tajpuriya community comparing with general population based on WHO standard are shown in Figure 4.3, 4.4, 4.5 and 4.6 respectively.

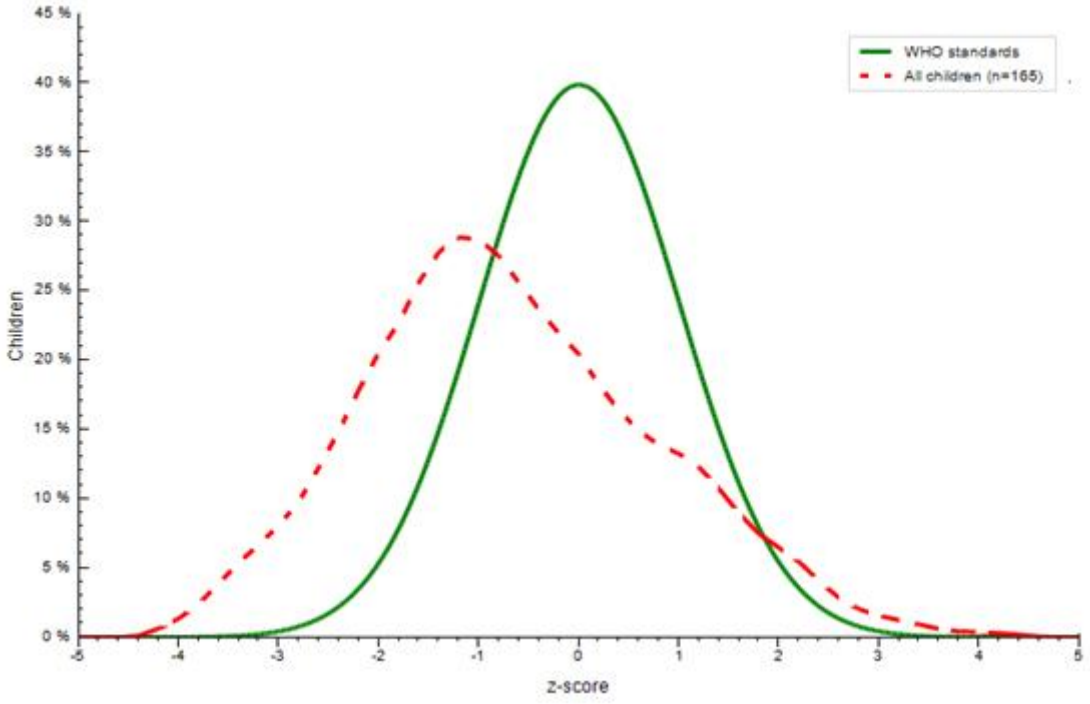

Figure 4.3 Distribution of wasting among Tajpuriya children based on WHO standard (n=165).

The median weight for height z-score of survey children was found to be -0.79 which is less than 0.79 with the reference to WHO standard. This cause curve to slightly skewed to the left side of WHO standard curve showing the prevalence of wasting among study population.

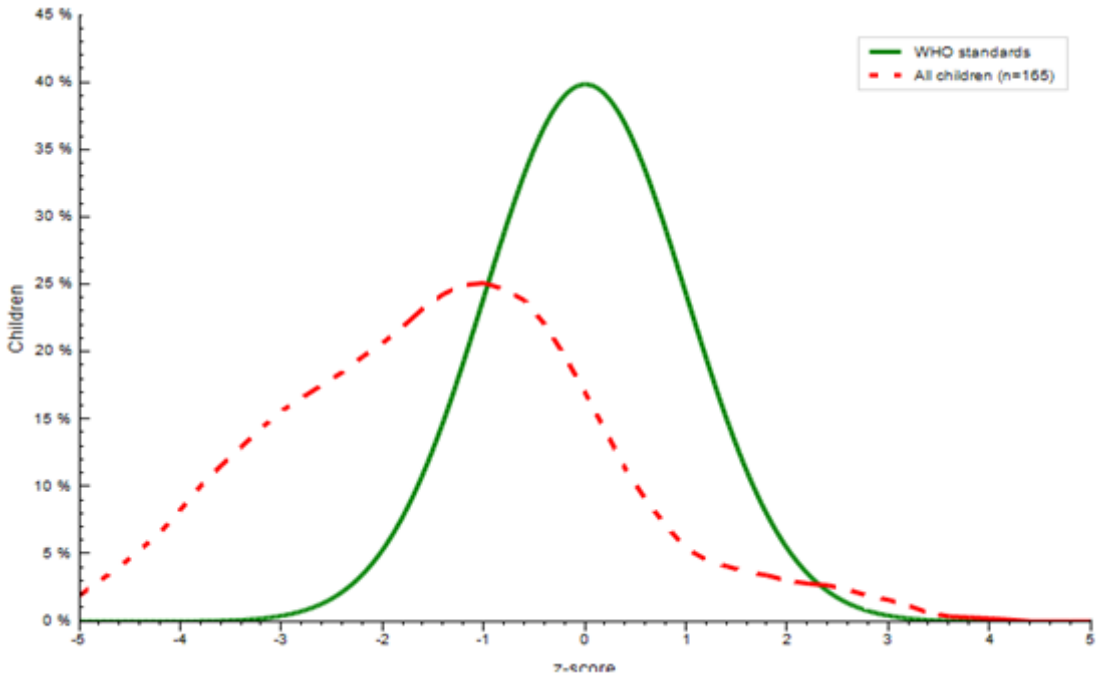

Figure 4.4 Distribution of Stunting among 6-59 months Tajpuriya children based on WHO standard.

The median weight for height z-score of survey children was found to be -1.33 which is less than 1.33 with the reference to WHO standard. This cause curve to slightly skewed to the left side of WHO standard curve showing the prevalence of stunting among study population.

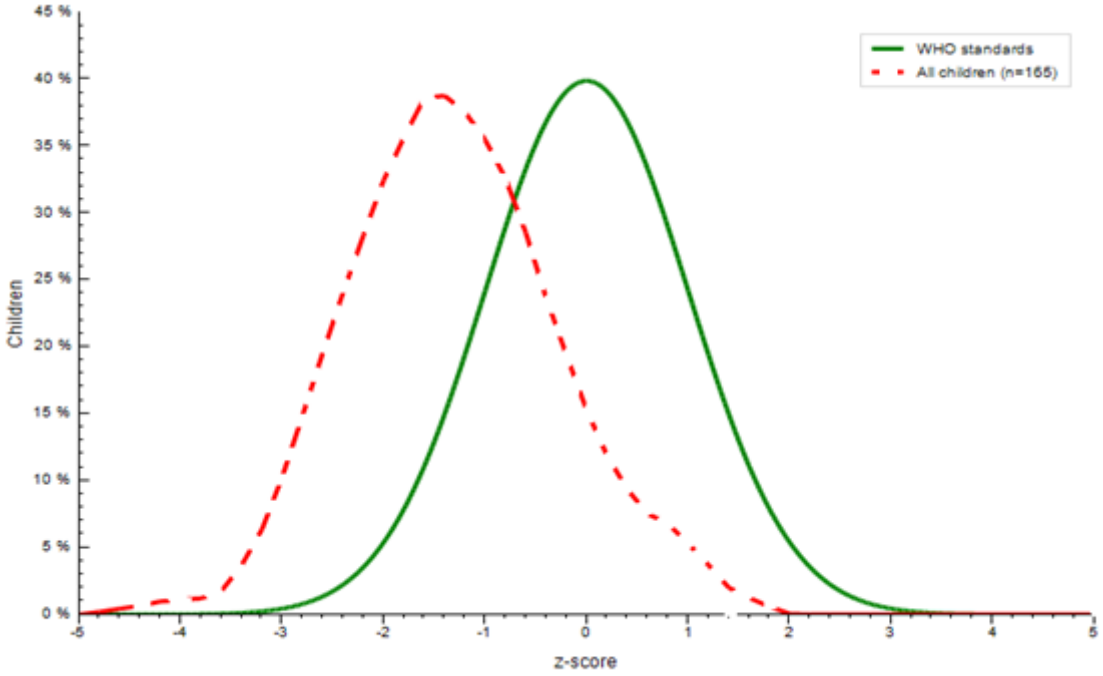

Figure 4.5 Distribution of Underweight among 6-59 months Tajpuriya children based on WHO standard

The median weight for height z-score of survey children was found to be -1.34 which is less than 1.34 with the reference to WHO standard. This cause curve to slightly skewed to the left side of WHO standard curve showing the prevalence of underweight among study population.

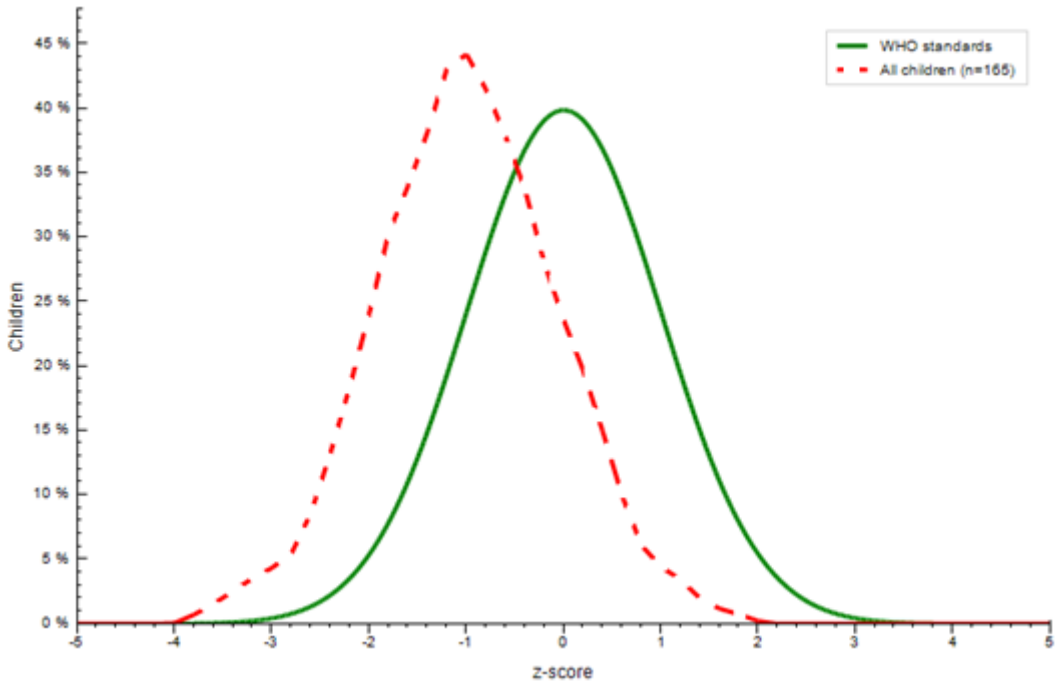

Figure 4.6 Distribution of wasting according to MUAC-for-age among 6-59 months Tajpuriya children.(n=165)

The median MUAC for age z-score of survey children was found to be -0.95 which is less than 0.95 with the reference to WHO standard. This cause curve to slightly skewed to the left side of WHO standard curve showing the prevalence of undernourished among study population.

4.7 Factors associated with under nutrition

Under nutrition was assessed by stunting, wasting, and underweight. Chi-square test was used to assess the factor associated with these factors.

4.7.1 Factors associated with stunting

The Chi-square test showed that there was significant association of stunting with Age at first Pregnancy (P=0.027). Family size, birth weight, gender, mothers educational status, family annual income, age at first pregnancy, mother's occupation, birth order of children, and initiation of breastfeeding were found insignificant with stunting in the survey area.

The survey shows that there is significant association of stunting with age at first pregnancy. Similar study conducted in Southern Brazil (Vitolo *et al.*, 2008) and in Bhutanese Refugee in Nepal showed that there is significant increase in the prevalence of

stunting as the decrease in the age at first pregnancy (Win, 2013). According to Ramakrishnan (2004), if a woman has a child at an early age this further reduces her opportunity to reach an optimal body size with adequate nutrient stores before pregnancy and thereby giving birth to low birth weight which can be the pre-determinant factor for stunting of the child. A young mother who is having a baby for the first time may experience breast-feeding difficulties, which may result into underfeeding of her child. Also, different socio-economic factors related to the age of the mother and her experience in raising children may affect child nutrition and health conditions (Nyaruhunha *et al.*, 2006) . The nutritional status of newborns and infants is directly linked with the health and nutritional status of the mother before, during and after pregnancy. It is estimated, for example, that half of all child stunting occurs in utero (SCN, 2010). Major factors associated with stunting were shown in the table 4.9 below.

Table 4.8 Factors associated with stunting in 6-59 months Tajpuriya children

		Height for Age Category		Chi-Square	P-Value
		Stunting	Normal		
Family size	Less than 5	7(25.05%)	21(75%)	2.073	0.150
	Greater or equals to 5	54(39.4%)	83(60.6%)		
Weight of child at birth	Less than 2.5 kg	37(37.0%)	63(63.0%)	0.000	0.992
	More than 2.5 kg	24(36.9%)	41(63.1%)		
Gender of children	Male	31(33.7%)	61(66.3%)	0.957	0.328
	Female	30(41.1%)	43(58.9%)		
Mother educational status	Illiterate	19(32.8%)	39(67.2%)	0.566	0.452
	Literate	41(38.7%)	65(61.3)		
Age at first pregnancy	Less than 20	61(31.1%)	95(60.9%)		0.027*°
	above 20 year	0(0%)	9(8.7%)		
Family annual income	less than 1 lakhs	14(32.6%)	29(67.4%)	2.062	0.357
	1-3 lakhs	34(42.4%)	46(57.5%)		
	More than 3 lakhs	13(31.0%)	29(69.0%)		
Mother occupation	Housewife	39(36.1%)	69(63.9%)	0.099	0.753
	Labour, business	22(38.6%)	35(61.4%)		
Birth order of children	First	26(39.4%)	40(60.6%)	0.536	0.464
	Second or more	34(34.7%)	64(65.3%)		
Initiation of breastfeeding	Within 1 Hour	44(38.6%)	70(61.4%)	0.760	0.244
	After 1 Hour	16(32.0%)	34(68.0%)		

*Fisher exact test, °Significant at 5% level of significance

4.7.2 Factors associated with wasting

Table 4.10 shows, Chi-square test analysis results of factors associated with wasting. The test showed that there was significant association of wasting with Family size (P=0.050), number of under-five children (P=0.017) and mother education (P=0.05). Birth weight, age at first pregnancy, family annual income, mother occupation, mother education, and age of children were found insignificant in the survey area.

Family size classified as less than 5 members and more than 5 members was found to be significantly associated with wasting. The prevalence of wasting in family less than 5 members and more than 5 members were 1(3.6%) and 26(19%) respectively. This can be supported with the fact that child gets more care and attentions in small family, every requirement are easy to fulfill in small family. This result is in agreement with the similar study conducted in Dibugarh Assam (Islam *et al.,* 2014), Sayo Woreda, East Wollega, Ethiopia (Tolera *et al.,* 2014) and in Shinille Woreda, Ethiopian Somali regional state (Abdibari *et al.,* 2016) which shows that as family size increases chance of becoming wasting also increases.

Mother education was found to be statistically significant with wasting. Child of illiterate mother was more likely to be wasted. 24% of children from illiterate mothers were wasted while 12.3% of children from literate mothers were wasted. This may be due to well-educated mothers had efficient management technique with limited resources, more child caring practices, increases their earning income possibility, better health promoting behavior which may reduce the probability of morbidities and improve nutrition status of their children (Meshram *et al.*, 2016). The result was found consistent with the result of similar study conducted in tribal population living in riverine area, Dibrugarh, Assam (Islam S. *et al.,* 2014), Faryab, Afghanistan (Frozanfar *et al.*, 2016) and in Surat region, Gujarat (Meshram *et al.*, 2016) which showed that mother education is significantly associated with wasting.

Number of under-five children was found significantly associated with wasting. Survey shows that child of family having two under-five children was likely to be more wasted i.e. 28.9% than the child of family having one child i.e. 12.6%. This finding was found in

agreement with the similar study conducted in Ghana (Miah, 2014). This can be supported with the fact that with the increase in the child number, it may strain intra-household availability of resources and childcare practices, children within the household compete for the food which may affect the both quality and quantity of food, adequate maternal attention and care may decrease with an increase in the number of children living in a household, and may make children more vulnerable to infections and morbidity (Miah, 2014). Factors associated with wasting were shown in the table 4.6.2 below.

Table 4.9 Factors associated with wasting in 6-59 months Tajpuriya children

		Weight for Height Categories		Chi - Square	P-value
		Wasted	Normal		
Family size	Less than 5	1(3.6%)	27(96.4%)		
	5 or more than 5	26(19.0%)	111(81.0%)		0.050*°
No of under-five child	1	16(12.6%)	111(87.4)	5.712	0.017°
	2	11(28.9%)	27(71.1%)		
Weight of child at birth	Less than 2.5 kg	20(9.3%)	80(90.7%)		
	More than 2.5 kg	7(5.88%)	58(94.12%)	2.453	0.117
Gender of child	Male	17(18.5%)	75(81.5%)	0.679	0.410
	Female	10(13.7%)	63(86.3%)		
Family annual income	Less than 1 lakhs	11(25.6%)	32(74.4%)		
	1-3 lakhs	9(11.2%)	71(88.8%)		
	More than 3 lakhs	7(16.7%)	35(83.3%)	4.201	0.122
Mother occupation	Housewife	15(13.9%)	93(86.1%)		
	Service, labour, business	12(21.1%)	45(83.6%)	1.399	0.237
Mother education	Illiterate	14(24.1)	45(75.9%)	3.843	0.05°
	Literate	13(12.3%)	93(87.7%)		
Age of children	less than 24 month	10(14.9%)	57(85.1%)		
	more than 24 month	17(17.3%)	81(82.7%)	0.171	0.680
Initiation of breastfeeding	Within 1 Hour	18(15.7%)	97(84.3%)		
	After 1 Hour	9(18.0%)	41(82.0%)	0.140	0.708

*Fisher exact test, °Significant at 5% level of significance

4.7.3 Factors associated with underweight

There was significant association of underweight with age of children (P=0.005) and current breastfeeding status (P=0.003). Age of children categorized as less than 24 months and more than 24 months was found to be associated with underweight. Children with age less than 24 months were more likely to be underweight. This finding was in agreement with the similar study conducted in the rural area of western Ethiopia (Hailemariam and Nekemte, 2014) and Ethiopian Beta-Israel children (Asres and Eidelman, 2011). While the study conducted in Ghana shows that older age are associated with underweight (Aheto *et al.*, 2015). This result might be due to inappropriate initiation of complementary food, poor and low quality complementary food, lack of proper care and timely feeding to the child when they need it the most, frequent illness, etc. Poor quality complementary foods may result into a deficit tissue and fat mass compared particularly after illness. Therefore, adequate breast-feeding, combined with timely and proper complementary feeding are important in ensuring child health and normal growth (Kirsten *et al.*, 2001).

Current breastfeeding status was found to be associated with underweight. Survey shows that children who were taking breast milk during survey were more underweight i.e. 34.8% while 14.5% who were not taking breast milk during survey were underweight. This might be due to that many children were breast fed for older age too. Frequent feeding with breast milk provides satiety to child so they show lesser interest in complementary food leading to inappropriate calories and protein intake. This result was found consistent with the similar study conducted in Ghana (Miah, 2014). Survey shows that no significance association of Number of Under five year children, Family Head Occupation, Age of children, Educational Status of Mother, Family Annual Income and Gender of children. Factors associated with underweight were shown in the table 4.11 below.

Table 4.10 Factors associated with Underweight in 6-59 months Tajpuriya children

		Weight for Age Category		chi -	
		Under Weight	Normal	Square	P-value
Number of child below 5 Year	1	28(22%)	99(78.0%)	3.374	0.066
	2	14(36.8%)	24(63.2%)		
Family size	less than 5	4(14.3%)	24(85.7%)		0.137*
	5 or Greater than 5	38(27.7%)	99(72.3%)		
Age of children	less than 24 month	24(37.5%)	40(62.5%)	4.855	0.028˚
	more than 24 month	18(17.8%)	83(82.2%)		
Mother occupation	Housewife	24(22.2%)	84(77.8%)	1.721	0.190
	Service, labour, business	18(31.6%)	39(68.4%)		
Mother educational status	Illiterate	16(27.6%)	42(72.4%)	0.320	0.572
	Literate	25(23.6%)	81(76.4%)		
Family annual income	less than 1lakhs	16(37.2%)	27(62.8%)	4.408	0.110
	1- 2 lakhs	18(22.5%)	62(77.5%)		
	More than 3 lakh	8(19.0%	34(81.0%)		
Current breastfeeding status	Yes	31(34.8%)	58(65.2%)	8.954	0.003˚
	No	11(14.5%)	65(85.5%)		
Gender of children	Male	19(20.7%)	73(79.3%)	2.527	0.112
	Female	23(31.5%)	50(68.5%)		

*Fisher exact test, ˚Significant at 5% level of significance

Part-V

Conclusions and Recommendations

5.1 Conclusions

As the study on the Tajpuriya community was not done before, this study has assessed the present nutrition status of the children and factors associated with it in Gauradaha Municipality. Prevalence of stunting, underweight and wasting in Tajpuriya community was found to be 36.4%, 24.8% and 16.4% respectively. Prevalence of underweight and wasting was found comparatively lower than Terai indegenous children while stunting was found higher in this community. Similarly, wasting was found higher in this community in comparision with NDHS 2011. On gender basis, stunting and underweight was found higher in females while wasting was found higher in males. On the basis of age, high prevalence of stunting, underweight and wasting was found in age group 6-11 months.

The result of this study indicates that stunting was found to be significantly associated with maternal age at pregnancy and wasting was found to be associated with family size, mother education and number of under-five children. Similarly, underweight was found to be significantly associated with age of children and current breastfeeding status. The cultural belief associated with malnutrition, hygiene and sanitation, pre-lacteal and complementary feeding, misconception on iron and folic acid supplements during pregnancy, etc which are contributing factors of under-nutrition still exist in this community. Thus, this study shows that overall nutrition status of Tajpuriya children was found to be poor and since such study in this community was not done before, the findings of this study might be helpful for implementing program to improve the nutrition status of these children.

5.2 Recommendations

Based on the result of this study, there are critical issues that should be addressed in order to mitigate the problem of under-five child malnutrition in the study area.

a) Early pregnancy, number of under-five children and family size were found to be contributing factor for the malnutrition of children. Thus there is need to aware mother on complication and outcome of early pregnancy, importance of family planning and birth spacing.
b) Children of illiterate mothers were found to be more malnourished thus there is necessary to educate them as educated mother is more aware in terms of good nutrition, better hygiene and care of the child.
c) Timely introduction of complementary food should be advocated as most of the children were lately initiated their complementary feeding which is also one of the important determinants of under-nutrition.
d) Misconception and beliefs on the iron and folate supplements, pre-lacteal feeding, time on introduction of supplementary food etc are need to be changed through awareness program on health and nutrition.
e) Nutrition education, environmental sanitation and hygienic practices need to be promoted at family and community levels to improve nutrition of the children and reduce childhood illnesses.
f) Appropriate intervention targeted to community management like supplementary feeding programs might be appropriate to manage wasting, which is an indication of acute malnutrition in study community.

Part-VI

Summary

Child malnutrition in the form of stunting, wasting, underweight and clinical malnutrition has significant implications for healthy human development. This cross-sectional study was conducted to assess the nutritional status of 6-59 months children of Tajpuriya community of Gauradaha municipality, Jhapa and factors associated with it using anthropometrics measurements and structured questionnaire respectively. Data collected was analyzed using WHO Anthro version 3.2.2 and SPSS version 20. Chi-square test was used to analyze the factors associated with nutritional status.

Out of 165 children, 44.2% were female and 55.8% were male. Most of the families were Hindu 71.5% and maximum family's main occupation was agriculture i.e. 62.4%. 34.5% of mothers were illiterate. Most of the women 58.2% were housewife followed by labour 36.3%. Mothers initiating their breastfeeding within an hour were 72.1% and 46.1% children were fed goatmilk as prelacteal food.

The prevalence of stunting, wasting and underweight was found to be 36.4%, 16.4% and 24.8% respectively which is quite near to national data but wasting is found higher in this community.The survey shows that stunting and wasting was found higher in females while underweight was found higher in males.

Chi-square test analysis showed that there was significant association of stunting with maternal age at first pregnancy (P=0.027), Underweight with age of child (P=0.005) and current breastfeeding status (P=0.003) and Wasting with family size (P=0.050), mother education (P=0.05), and number of under five children (P=0.017).

The result of the study revealed that under-nutrition is still an important problem in Tajpuriya community. Similarly, family size, number of under-five children, mother education, initiation of breastfeeding, age of child, current breastfeeding status and maternal age at first pregnancy were found to be risk factors associated with under-nutrition of Tajpuriya children. This was the first study in this community thus the findings of the study might be helpful for identifying appropriate intervention to reduce the existing prevalence of malnutrition of the community.

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Appendices

Appendix A

Survey Questionnaire

Code no. : - | | | | | Date of Interview: 2072

A. General Information

1) Name of head of household:
2) Ward No.:
3) Respondent : Mother Father Other Family Members
4) Mother's Name:
5) Mother's Age:
6) Child Name: DOB:

B. Family Description

1) No. of total family members:
   Female: Male:
2) No. of children: Boys: Girls:
3) No. of children below 5 year:
4) Type of family?
   a. Nuclear b. joint
5) What is your religion?
   a. Hindu b. Buddhist c. Christian d. Muslim e. Others
6) What is the main occupation of your family?
   a. Agriculture b. Service c. Labour d. Business e. Foreign employment f. Others
7) What is the main income source of your family?
   a. Agriculture b. Service c. Labour d. Business e. Foreign employment f. Others
8) How long is the family income sufficient to fulfill the needs of family members?
   a. <3 months b. 3 – 6 months c. 6-12 months d. >12 months e. Can save some

9) Annual income of your family

a. < 1 lakh b. 1 to 3 lakh c. > 3 lakh

10) Mother's educational qualification

a. Illiterate b. Primary level c. Secondary level d. Higher secondary level and above e. Informal Education

11) Father's educational qualification

a. Illiterate b. Primary level c.Secondary level d.Higher secondary level and above d. Informal Education

12) What is the occupation of mother?

a. Housewife b.Service c.Labour d. Others e. Business

C. Personal and environmental hygiene

1) What is your source of drinking water?

a. Tube well b. River c. Well d. Drinking water tap e. Other

2) Do you purify drinking water?

a. No b. Yes

3) Do you have toilet facility in your house?

a. No b. Yes

4) Do you wash your hand after going to toilet?

a. No b. Yes

5) What do you use to wash your hand?

a. Soap water b. Ash water c. Mud d. Only water e.other (specify)

6) What cooking fuel do you use for cooking?

a. Fire wood b. Bio gas c. Dried animal dung

d. Stove e.LPG e. Others

7) How do you manage garbage coming out of your house?

a. In a pit b.By burning c.Dispose in river d.throwing haphazardly

e. others (specify)

D. Nutrition and breast feeding related information

1) Did you feed colostrum to your baby?

a. No b. Yes

2) What did you feed to your baby before feeding colostrum milk?

a. Nothing b. Honey and Ghee c.Cow's milk d. Alcohol e. Others

3) If yes then when did you initiate breast feeding?

a. Within 1 hour of birth b. Within 8 hours of birth

c. Within 24 hour of birth d.Cannot remember e. Other

4) Are you breast-feeding your child?

a. Yes b. No

5) If not, what is the reason?

a. Insufficient breast milk b. It harms c. It is unhygienic d.Child cannot swallow e. Others

6) If yes, then how many times do you breast feed your child?

……times/day

7) How long did you breast feed your child?

……months/years

8) Did you exclusively breastfeed your child for 6 months?

a.Yes b. No

9) How long a child shou0ld be breastfed?

……..months/ year

10) When did you start giving foods other than breast milk to your child?

a. 4 months b.5 months c.6 months
d. 7 months e. More than 7 months

11) In your view, from when a child should be given other foods along with breastmilk?

Child age..……..

12) What do you feed to your child?

a. Lito b. Jaulo c.Supper flour porridge d. Same as other family members e.Others

13) Do you know about "supper flour porridge"?

a. Yes b. No

14) Did you feed bottle milk to your baby?

a. Yes b. No

15) Weight of child during birth?

a. Less than 2.5 Kg b. More than 2.5 Kg c. Don't know

16) Do you know about malnutrition (*Runche* & *Sukenass*)?

a. Yes b. No

17) If yes, what is the main cause of malnutrition?

a. Inadequate balanced diet b. Being touched by pregnant women

c. Curse of god d.Others

18) What type of salt do you use in your home?

a. Rock Salt b. Packaged Salt c.Aayo Nun

19) If you take iodised salt, why iodised salt is necessary in our body?

a.Prevent goiter b. Physical development c.Mental development

d. Don't know e. Others

20) Did you give "Vit.A" capsule and "De-worming" tablet to your baby?

a. No b. Yes

21) In your view, in which following food item vitA is found?

a.Green leafy vegetable b. Meat & fish c. Yellow fruits

d. Milk & milk products e. Don't know f. Others

22) Do you feed green leafy vegetables to your child?

a.Always b. Twice a week c. Thrice a week d.When available e.Never

f. Other

23) Do your children have any medical complication?

a. Nothing b. Blood in stool c.Diarrhoea d. Difficulty in breathing

e. Coughing f. Fever g. Rapid breathing h. Shivering i.Others.

24) Where do you take your children for treatment during illness?

a. Nearby healthpost b. Homemade medicine c. *dhami/jhakri* d. Medical shop

e. Female community health volunteer f. Nowhere g. Others

E. Child and Maternal Health Related Information

1) Mother's age when she got married? …….. year

2) Mother's age when she was pregnant for first time? …….year

3) Weight of child during birth?

a. Less than 2.5 Kg b. More than 2.5 Kg c.More than 4kg d. Don't know

4) Do pregnant mother require additional nutrients?

a. No b.Yes

5) Did you take iron and folate tablet during pregnancy?

a. No b. Yes If yes, how long did you take it? ……

F. Anthropometric measurements

Weight:				Mean weight=
Height:				Mean height=
MUAC				Mean MUAC=

Signature of Respondent Signature of Interviewer

Appendix B

INFORMED CONSENT

Namaste!

I Miss Sushila Upreti, graduate student in Department of Nutrition and Dietetics conducting a dissertation work for award of bachelor‘s degree in Nutrition and Dietetics.

The topic for the study is “Nutritional status of 6-59 months childrens of Tajpuriya community of Gauradaha Municipality, Jhapa.”

I have been told in a language that I understand about the study. I have been told that this is for a dissertation procedure, that my and my son/daughter‘s participation is voluntary and he/she reserve the full right to withdraw from the study at my own initiative at any time without having to give reason and that refresh to participate or withdraw from the study at any stage will not prejudice my/his/her rights and welfare. Confidentiality will be maintained and only be shared for academic purposes.

I hereby give consent to participate in the above study. I am also aware that I can withdraw this consent at any later date, if I wish to. This consent form being signed voluntarily indicates participate in the study until I decide otherwise. I understand that I will receive a signed and dated copy of this form.

I have signed this consent forms before my participation in the study.

Signature of parent/guardian: _____ Sign of witness: _____

Date: Date:

Place: Place:

I hereby state the study procedures were explained in the detail and all questions were fully and clearly answered to the above mentioned participant /his/her relative.

Investigator‘s sign:

Date:

Contact address

Appendix C

Photo gallery

Map of study area

Interview with respondent

Measuring Height

Measuring MUAC