

**ASSOCIATION BETWEEN MOTHERS NUTRITIONAL
KNOWLEDGE IN CHILDCARE PRACTICES AND NUTRITION
STATUS OF 6-59 MONTHS *BATAR* COMMUNITY CHILDREN OF
JHORAHAT VDC, MORANG**

by

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**Association between Mothers Nutritional Knowledge in Childcare
Practices and Nutrition Status of 6-59 Months *Batar* Community
Children of Jhorahat VDC, Morang**

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

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Approval Letter

This *dissertation* entitled *Association between Mothers Nutritional Knowledge in Childcare Practices and Nutrition Status of 6-59 Months Batar Community Children of Jhorahat, Morang* presented by Bhisma Rai has been accepted as the partial fulfillment of the requirements for the Bachelor of Science in Nutrition and Dietetics.

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Abstract

The aim of the present work was to find out the mothers' nutritional knowledge in childcare practices and nutritional status of 6- 59 months children of *Batar* community in the rural area of Morang district of Nepal, a community based cross sectional descriptive study was conducted. The data were collected from mothers of 144 children. Census sampling technique was used for data collection. A structured questionnaire was administered to the mothers. Anthropometric measurements and basic associated factors were collected. SPSS version 20 and WHO Anthro 3.2.2 version were used for data analysis. Chi-square technique was used to assess factors associated to nutritional status of children.

Prevalence of underweight, stunting and wasting were 27.8%, 23.6% and 19.4%, respectively. Majority of mothers (63.2%) had average knowledge score, 28.5% had poor knowledge score and only 8.3% of mothers had good knowledge score. There was no significant difference in the prevalence among male and female children. Calorie intake by the children was significantly ($P < 0.05$) associated with stunting, wasting and underweight. Similarly, study indicated that having kitchen garden at home was significantly ($P < 0.05$) associated with stunting. Current breastfeeding status, reason of malnutrition and foods during diarrhea were significantly ($P < 0.05$) associated with wasting. The use of iron-folate tablets during pregnancy by mothers and nutritional knowledge score was significantly ($P < 0.05$) associated with underweight.

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List of Abbreviations

Abbreviation	Full form
CBS	Central Bureau of Statistics
EBF	Exclusive Breast Feeding
FAO	Food and Agriculture Organization
FCHV	Female Health Volunteers
GON	Government of Nepal
HAZ	Height for Age Z-score
ICMR	Indian Council of Medical Research
IDA	Iron Deficiency Anemia
IDD	Iodine Deficiency Disorder
LBW	Low Birth Weight
MAM	Moderate Acute Malnutrition
MDGs	Millennium Development Goals
MoHP	Ministry of Health and Population
MUAC	Mid Upper Arm Circumference
NA	Not Allocated
NDHS	Nepal Demographic Health Survey
NPHC	National Population and Housing Census
ORS	Oral Rehydration Solution
ORT	Oral Rehydration Therapy
PEM	Protein Energy Malnutrition

PHC	Primary Health Centre
RDA	Recommended Dietary Allowance
SAM	Severe Acute Malnutrition
SD	Standard Deviation
SLC	School Leaving Certificate
SPSS	Statistical Package for Social Science
UNICEF	United Nations Children's Fund
VAD	Vitamin A Deficiency
VDC	Village Development Committee
WAZ	Weight for Age Z-score
WFP	World Food Program
WHO	World Health Organization
WHZ	Weight for Height Z-score

PART I

Introduction

1.1 Background of the study

Nutrition is the science that deals with digestion, absorption and metabolism of food, i.e., the utilization of food in the body. It may be defined as “the science that interprets the relationship of food to the functioning of living organism. It includes the uptake of food, liberation of energy, elimination of wastes and all the processes of synthesis essential for maintenance, growth and reproduction. These fundamental activities are characteristic of all living organisms from the simplest to the most complex plants and animals” (khanna *et al.*, 2005).

The importance of nutrition education as a means for improving the nutrition of the community in the developing countries has been increasingly realized during recent years. Lack of knowledge of the dietary requirements and the nutritive value of different foods is the main contributory cause for the widespread occurrence of malnutrition among pre-school children and other vulnerable groups of the population in the developing countries. Nutrition education should be practiced and adopted to suit the socio-economic conditions, food habits and local food resources. It should include effective demonstration feeding in which mothers take active part (Swaminathan, 2008).

Nepal is one of countries with highest malnutrition rate. In Nepal, the nutritional status of mothers and children under five is extremely poor. Over the last 20 years, no improvement has been observed in the nutritional status of children (MoHP, 2011). Nepalese children under age five facing multiple obstacles for survival and development. Exposure to infectious diseases, malnutrition, and poor hygiene and sanitation and lack of a healthy environment compromise early childhood development. In addition, a mother’s nutritional status during pregnancy and her general well-being impact the health of her child during pregnancy as well as after delivery. NDHS 2011 shows that, 41% of children under five years of age are stunted, 11% are wasted and 29% are underweight. Adequate nutrition is critical to children’s growth and development. The period from birth to age two is especially important for optimal physical, mental and cognitive growth, health and development. Unfortunately, this period is often marked by protein-energy and

micronutrient deficiencies that interfere with optimal growth. Childhood illnesses such as diarrhea and acute respiratory infections (ARIs) also are common (MoHP, 2011).

Malnutrition continues to be a primary cause of ill health and mortality among children in developing countries. It is one of the major public health problems and accounts for about half of all child deaths worldwide. Malnutrition commonly affects all groups in a community, but infants and young children are the most vulnerable because of their high nutritional requirements for growth and development. Women and young children bear the brunt of the disease burden associated with malnutrition (WHO, 2005).

WHO (2005) estimates that malnutrition is associated with about half of the 10.7 million child deaths among under-five children occurring each year in the developing world. It is estimated that about 30% of all the world's children under five years accounting to about 150 million children are malnourished in terms of weight for age. It is estimated that the majority of them live in Asia and especially Southern Asia and the risk of being underweight is about 1.5 times higher in Asia than in Africa. The effects of childhood malnutrition leads to physical and psychological effect, continue through adulthood, cause intergenerational impact, loss of human potential leading to loss of social productivity (Chhetri, 2005).

Jhorahat is a Village Development Committee (VDC) in Morang district in Koshi zone of south-eastern Nepal. The total population of Jhorahat VDC is 4844 with 2457 males and 2387 females (2001). Farming is the main source of income for people living in Jhorahat and it is also an agricultural trade center. It is situated along a secondary road between Biratnagar and East-west highway. Being near to Biratnagar (5 km), some residents of the area work as laborers in factories. Brahmin, Chhetris, Tharus, Musahars, Rajbansi, Batars, Jhangad, Bhojpuri, Newars, Kamis, Damais, etc., lives in Jhorahat VDC. According to National Population and Housing Census 2011, total household of Jhorahat VDC was 1254, only 214 households using tap water and 1031 household using tube well water. Out of 1254 households in Jhorahat VDC, 745 households do not have any toilet facilities, 251 households have flush toilet, 254 households have ordinary toilet facilities and 4 households toilet facility not stated (CBS, 2014).

1.2 Statement of problem and justification

Malnutrition is a major public health problem over larger area of developing countries and particularly amongst low socio-economic groups. Half of the children born in low-income societies die before they are five years of age. A significant proportion of these deaths are attributed directly or indirectly to malnutrition (Jose-Gaby *et al.*, 2009). Malnutrition during childhood can also affect growth potential and the risk of morbidity and mortality in later years of life. Mother's education has profound effect on child's nutritional status. Education is one of the most influential factors affecting an individual's knowledge, attitudes and behaviors in various facets of life. Educational attainment in Nepal is very low among women, who are much more disadvantaged than men (Survey, 2011).

In Nepal dalits (underprivileged community) have high participation in the wage based works in the society. Labor is the most popular among dalits because they are landless and had no any options to be engaged in their own land. Literacy rate of Terai dalit is even more miserable than of the hill dalits as it is only 21.1%. According to study the literacy rate of *Batar* with six years and above of schooling is 23.4% and none of the *Batar* is complete bachelor and above level of study. Dalit women literacy rate and education is lesser than that of dalit men (Bhattachan *et al.*, 2009).

Batar community is one of the marginalized community of Nepal and considered as untouchable caste/Terai dalit. They are backward in education, health seeking practices and in hygiene and sanitation practices (Bhattachan *et al.*, 2009). There are very few researches conducted on *Batar* community in national level. In Jhorahat VDC there was no any researches conducted before on this community. Government has not implemented any effective program to uplift their living standards, education levels, etc. It is seen that *Batar* community is suffering from nutritional problem. The factors behind the poor nutritional status and under-five mortality rate are needed to be identified to support the *Batar* community to improve their nutrition status and decrease the under-five mortality rate.

The reasons for selecting *Batar* community for the study are as follows:

1. They are one of the poor and oldest communities in Nepal.
2. Their economic status still not lies in an average.
3. Most of them are illiterate and uneducated so, they were not much aware of food habits and about nutrition.

4. There are very few researches carried out about them.

1.3 Objectives of the study

1.3.1 General objective

The general objective of this survey is to find out the mother's nutritional knowledge in child care practice and to determine nutritional status of children between 6-59 months.

1.3.2 Specific objectives

1. To determine the nutritional status of *Batar* children aged 6-59 months lived in Jhorahat VDC.
2. To assess the nutritional knowledge level of mothers in recommended childcare practices relating to nutrition.
3. To assess the belief and feeding practice of mothers of (6-59 months) children.
4. To identify the factors which are responsible for malnutrition.

1.4 Research questions

1. What is the current nutritional status of 6-59 months *Batar* community children in Jhorahat VDC?
2. What are the factors associated with nutritional status of 6-59 months *Batar* children?
3. What is the level of maternal knowledge in childcare practice in the study population?
4. Does household socioeconomic status influence mother's ability to translate acquired knowledge into practice in order to improve the nutritional status of their children?

1.5 Significance of the study

The findings of the study will be helpful to:

1. Provide nutritional knowledge to mother on childcare practice and also encourage other local people to improve current nutritional status of children by improving feeding pattern, faulty food habits and food beliefs of 6-59 months of children.
2. Identify nutritional status of 6-59 months of *Batar* children who are at risk of being malnourished and who need special care and attention.
3. Discover the problems related to child nutrition, care practice, feeding pattern, beliefs and other direct or indirect associated factors of *Batar* community.
4. Provide information to Government, other private sector and voluntary institution like NGOs, INGOs about nutritional status of under-five year *Batar* children.
5. Serve as helpful guide to make a program related to nutrition for this area.
6. Identify health problems affecting families and how these are manage

1.6 Limitations of the study

1. In *Batar* community some families are illiterate so that correct age or birth date of child may not be obtained.
2. It cannot be generalized to other populations.
3. Seasonal variation may be there as this is cross sectional study done for specific period of time.

1.7 Assumption

Most of *Batar* children under five years of age in Jhorahat VDC might be malnourished because of low socio-economic status, lack of nutritional knowledge in mothers, unhygienic care practice and infectious and diarrheal diseases.

PART II

Literature review

2.1 Mother nutrition knowledge

A mother is the principal provider of the primary care that her child needs during the first five years of life. Nutritional awareness of mothers plays an important role in the health of children aged 0-5 years. The type of care she provides depends to a large extent on her knowledge and understanding of some aspects of basic nutrition and health care. Mothers educational level, position, health and nutritional status is central to the quality of life and is a key ingredient of her child's health, nutritional status, behavioral and other aspects of child welfare in developing countries (Christian *et al.*, 1988). Knowledge of mothers has an important role in the maintenance of nutritional status of the children. Adequate knowledge regarding various aspects of feeding practices during pregnancy and during infancy is very essential especially among females as they are going to influence the feeding practices of this vulnerable group. The knowledge of child nutrition and caring practices can be expected to have significant bearing on their children's nutritional status but conflicting results have been reported in this regard whereas some studies have observed a positive relationship between childhood malnutrition and maternal knowledge and beliefs regarding nutrition (Kaur *et al.*, 2015).

A study in Rural Terai of Eastern Nepal shows that child malnutrition has significant relation with maternal education, socioeconomic status and feeding practices. The education of mothers has several positive effects on care of children in comparison to mother with no education. The educated mother utilizes the health care facility, discusses more about the illness of the child with health care provider and follows the instructions about feeding and caring practices given by the health workers. Faulty feeding practices like late initiation of breast feeding, starting artificial feeding before 6 months and early and late start of complementary foods causes malnutrition (Chhetri, 2005).

Study conducted in Nigeria revealed that most of the mothers had insufficient nutrition knowledge in which only 20% of mothers had good knowledge on health and nutrition of their children, 44.6% had fair knowledge and 35.5% had poor knowledge score (Jemide *et al.*, 2016).

2.2 Education status of Nepalese mother

Women who receive even a minimal education are generally more aware than those who have no education of how to utilize available resources for the improvement of their own nutritional status and that of their families. Education may enable women to make independent decisions, to be accepted by other household members, and to have greater access to household resources that are important to nutritional status (Girma and Genebo, 2002). Several researches show that there is a strong linkage between maternal education and children's health. Children's born to educated women suffer less from malnutrition which manifests as underweight, wasting, and stunting in children. In general, the higher the level of education of a woman, the more knowledgeable she is about the use of health facilities, family planning methods, and the health of her children. NDHS 2011 shows that 40% of women age 15-49 have never been to school, 12% have only some primary education, 6% have completed primary school, 24% have only some secondary education, 11% have completed secondary school, and 8% have a secondary education or higher. Older women and those who reside in rural areas are most likely to have no education (Survey, 2011).

Similar observations were noted for the prevalence of both underweight and severe underweight. Survey conducted by CBS shows that literate head of households tend to consume a better quality diet than those with an illiterate head of household. While overall calorie consumption is similar, households headed by a literate family member tend to consume a more diverse diet. Little difference existed in the prevalence of stunting, underweight and wasting among children whose mothers had little or no education, as compared to those who had only limited education. This finding suggests that at least some minimum level of educational achievement (at least five years) may be necessary to realize the tangible benefits of education in the nutritional well-being of children (National Planning Commission and Statistics, 2013).

2.3 Exclusive breastfeeding (EBF)

"Exclusive breastfeeding" is defined as no other food or drink, not even water, except breast milk (including milk expressed or from a wet nurse) for 6 months of life, but allows the infant to receive ORS, drops and syrups (vitamins, minerals and medicines) (WHO, 2017).

According to WHO (2005), only one in two Nepali children less than 6 months of age are exclusively breastfed. Breast milk is the best nutrition for babies to achieve proper growth and development and is said to be the first immunization. only one in two Nepali children less than 6 months of age are exclusively breastfed (NPCS, 2003).

In Nepal, every year 57,000 under-five children lose their lives, among which 54% of death occurs within the first month of life. Twenty-two percent of newborn deaths can be prevented through breastfeeding within the first hour of birth. Breastfeeding is very common in Nepal, with 98% of children ever breastfed. WHO recommends that children receive nothing but breast milk (exclusive breastfeeding) for the first six months of life. Seventy percent of Nepalese children under six months are being exclusively breastfed. The median duration of any breastfeeding among children 0-35 months is 33.6 months while the median duration of exclusive breastfeeding is 4.2 months (MoHP, 2011).

Exclusive breastfeeding (EBF) is estimated to prevent approximately 10% of child deaths and as such plays important role in meeting Nepal's Millennium Development Goals (MDGs) of reducing child mortality between 1996 and 2015 from 162 to 38 per 1,000 lives born. Therefore, it is important that EBF until six months of age is encouraged and supported by the health sector, families and communities in Nepal, however very little is known about the determinants of EBF in Nepal (Khanal, 2013).

2.4 Weaning practice in Nepal

Complementary foods should be introduced when a child is six months old to reduce the risk of malnutrition because the mother's milk alone is not sufficient to sustain growth beyond 6 months. In Nepal, 70% of children ages 6–9 months are breast-fed and eating complementary foods (MoHP, 2011). Complementary food is a common cultural practice followed by Nepalese people, which plays vital role in the child's milestone for growth and development. Weaning is advantageous in reducing early infant mortality death. Although timing of weaning varies across societies but is always determined by the mother's characteristics, choices, knowledge and perceptions about child's health or cultural beliefs related to feeding (Bohler, 1996). According to survey conducted in Jhangad community of Jhorahat VDC all mothers had heard about weaning, there was a difference between the times for the initiation of weaning, 76% started weaning after completion of 6 months of age. Early weaning was found relatively low in Jhangad community (Subba *et al.*, 2014).

2.5 Diarrhea in children

Diarrhea is common in children under five years of the age in Nepal. In Nepal, the major risk factors in acquiring diarrhea are poor water quality and sanitary conditions, unhygienic stool disposal, contamination of food items and poor household economic conditions. Annually, about 30,000 to 45,000 children under-five die due to diarrhea in Nepal. Managing diarrhea at home is quite common among rural mothers, but their level of knowledge is poor (Ansari *et al.*, 2012).

Oral Rehydration Therapy (ORT) is the giving of fluid by mouth to prevent and/or correct the dehydration that is a result of diarrhea. As soon as diarrhea begins, treatment using home remedies to prevent dehydration must be started. If adults or children have not been given extra drinks, or if in spite of this dehydration does occur, they must be treated with a special drink made with oral rehydration salts (ORS) (Ruxin, 2014).

A study conducted in Sunsari, Nepal reported that, Majority (97.6%) of the mother had information about ORS and also its usefulness in the management of dehydration due to diarrhea. Fifty percent mothers could make ORS properly and gave ORS to their children ideally (after each stool). The correct preparation and ideal use of ORS have not reached in proper way to the mothers of Sunsari district. Use of ORS definitely lowers the mortality due to dehydration, an effect that can clearly be seen in the short term. Intervention such as increasing women's literacy, improving basic sanitation and health care services and raising the general nutritional status of the population can only be expected to decrease the diarrheal diseases morbidity and mortality in long term (Jha *et al.*, 2006).

A study conducted in Morang revealed that knowledge about signs of dehydration was poor in most mother and none of the mothers were able to mention all the steps for correct and complete preparation of oral rehydration salt (ORS) and salt-sugar-water (SSW) solutions (Ansari *et al.*, 2012).

Children of mothers with an SLC and higher and those in the highest wealth quintile are less likely than others to suffer from diarrhea. The prevalence of diarrhea is higher among children living in households with non-improved toilet facilities than in households with improved toilet facilities that are not shared (MoHP, 2011).

2.6 Malnutrition in children

Malnutrition is the result of deficiency, excess or imbalance of nutrients. It is a state of impaired functional ability which may occur due to insufficient food intake or the lack of foods that supply the nutrients. Thus, the term malnutrition also covers the term undernutrition which is defined as “the state in which either the food intake is inadequate in some respect to meet the body demands or the physiological and environmental conditions are such that the body is unable to utilize the sufficient food material to provide for proper growth, maintenance and repair (Khanna *et al.*, 2005).

Malnutrition is a serious condition that occurs when a person’s diet doesn't contain the right amount of nutrients. The term malnutrition means “poor nutrition” and refers to under nutrition, over nutrition and imbalance. Malnutrition is caused by having an inadequate diet or a problem absorbing nutrients from food. There are many reasons why these might happen, including having reduced mobility, a long-term health condition or a low income.

Medical conditions that can lead to malnutrition include:

- A condition that causes a lack of appetite, such as cancer, liver disease, persistent pain or nausea.
- A mental health condition, such as depression or schizophrenia, which may affect your ability to look after yourself.
- A health condition that requires frequent hospital admissions.
- A health condition that disrupts your body’s ability to digest food or absorb nutrients, such as Crohn's disease or ulcerative colitis.
- Dementia- people with dementia may be unable to communicate their needs when it comes to eating.
- Dysphasia- a condition that makes swallowing difficult or painful.
- Persistent vomiting or diarrhea.
- An eating disorder, such as anorexia nervosa.

People may also be at risk of becoming malnourished if their body has an increased demand for energy - for example, if it's trying to heal itself after major surgery, or a serious injury such as a burn, or if experience involuntary movements, such as a tremor (NHS, 2015).

Malnutrition remains one of the most common causes of morbidity and mortality among under-five children throughout the World. Every year, 7.6 million children die before they reach the age of five, most from preventable or treatable illnesses and almost all in developing countries. Malnutrition is an underlying cause of more than a third (35%) of these deaths. Malnourished child have lowered resistance to infection; therefore, they are more likely to die from common childhood diseases such as diarrhea and respiratory infections. In addition, malnourished children that survive are likely to suffer from frequent illness, which adversely affects their nutritional status and locks them into a vicious cycle of recurring sickness, faltering growth and diminished learning ability (Mengistu *et al.*, 2013).

2.7 Types of malnutrition

The main types of malnutrition prevailing in humans are protein energy malnutrition (PEM) and micronutrient malnutrition, brief descriptions of which are given in the following sections.

2.7.1 Protein energy malnutrition (PEM)

It results from a diet lacking in energy and protein because of a deficit in all major macronutrients, such as carbohydrates, fats and proteins. In children, protein–energy malnutrition is defined by measurements that fall below 2 standard deviations under the normal weight-for-age (underweight), height-for-age (stunting) and weight-for-height (wasting). Protein-energy malnutrition usually manifests early, in children between 6 months and 2 years of age and is associated with early weaning, delayed introduction of complementary foods, a low-protein diet and severe or frequent infections (Müller and Krawinkel, 2005).

Classification of PEM according to Müller and Krawinkel (2005) is as follows:

1. Marasmus: The term marasmus is derived from the Greek word *marasmos*, which means wasting. Marasmus involves inadequate intake of protein and calories and is characterized by emaciation. Marasmus is caused by a severe nutritional deficiency in general. It is usually found in very young infants and very young children. It can be prevented by breastfeeding. It is actually caused by the total or partial lack of nutritional elements in the food over a period of time (Müller and Krawinkel, 2005).

2. Kwashiorkor: The term kwashiorkor is taken from the Ga language of Ghana and means “the disease that the young child developed when displaced from his mother by another child or pregnancy”. Kwashiorkor usually manifests with edema, changes to hair and skin color, anemia, hepatomegaly, lethargy, severe immune deficiency and early death (Müller and Krawinkel, 2005).

Difference between marasmus and kwashiorkor (Samanka, 2012) is as follows:

1. Marasmus usually affects very young children while kwashiorkor affects slightly older children.
2. Marasmus children need to be treated with additional doses of vitamin B and a nutritious diet. Kwashiorkor patients are treated by adding more protein in their diet.
3. In marasmus weight is less than 60% of the mean for the age while in kwashiorkor body weight is 60-80% of the expected weight.
4. Edema is usually seen in kwashiorkor but not common with marasmus.
5. In marasmus, muscle wasting is obvious with severe loss of subcutaneous fat, but in kwashiorkor, muscle wasting is sometime hidden by edema.
6. Hair changes are uncommon in marasmus, but in kwashiorkor, hair is sparse and de-pigmented.

3. Marasmic-Kwashiorkor: A children with features of both nutritional marasmus and kwashiorkor are diagnosed as having marasmic-kwashiorkor. A child with early kwashiorkor can developed marasmus by severe infective diarrhea and prolonged under feeding. Similarly an infant with marasmus may develop kwashiorkor if fed on protein deficient carbohydrate rich food along with adequate salt (Müller and Krawinkel, 2005).

2.7.2 Micronutrient malnutrition

Deficiencies in iron, iodine, vitamin A and zinc are still major public health problems in developing countries. Micronutrient deficiencies affect at least 2 billion people worldwide (Müller and Krawinkel, 2005).

A) Vitamin A deficiency (VAD)

Vitamin A deficiency (VAD) is the leading cause of preventable blindness in children and increases the risk of disease and death from severe infections. The main underlying cause

of VAD as a public health problem is a diet that is chronically insufficient in vitamin A that can lead to lower body stores and fail to meet physiologic needs. Vitamin A is found in breast milk, other milk, liver, eggs, fish, butter, mangoes, papayas, carrots, pumpkins and dark green leafy vegetables. The liver can store an adequate amount of the vitamin for four to six months. VAD can also increase the severity of infections, such as measles and diarrheal diseases in children, and slow recovery from illness. Forty percent of children whose mothers have no education consume vitamin A rich foods, compared to 54% of children whose mothers have an SLC and higher education (MoHP, 2011).

B) Iron Deficiency Anemia (IDA)

Anemia, characterized by a low level of hemoglobin in the blood, is a major health problem in Nepal, especially among young children and pregnant women. The most common cause of anemia is inadequate dietary intake of nutrients necessary for synthesis of hemoglobin, such as iron, folic acid and vitamin B₁₂. Anemia also results from sickle cell disease, malaria and parasitic infections. NDHS 2011 indicate that 46% of children in Nepal are anemic; 27% are mildly anemic, 18% are moderately anemic, and less than 1% is severely anemic. The prevalence of anemia among children under age five has declined by only two percentage points in the past five years (MoHP, 2011).

Study conducted in South Asia showed that deficiency of iron in the first trimester of pregnancy results in significant decrements in fetal growth and is generally more damaging to pregnancy outcome than iron deficiency anemia in the second or third trimesters. In Nepal, mothers not consuming iron supplement during their pregnancy are reported to more likely have LBW babies (Vir, 2016).

C) Iodine Deficiency Disorder (IDD)

Iodine is present in the body in minute amounts, mainly in the thyroid gland. Its only confirmed role is in the synthesis of thyroid hormones. Iodine deficiency is a major public health problem for populations throughout the world, but particularly for young children and pregnant women. Iodine deficiency, most frequently caused by inadequate iodine intake, has serious effects on body growth and mental development. Fortification of salt with iodine is the most common method of preventing iodine deficiency. In Nepal, the compound used for fortification of salt is potassium iodate (KIO₃). NDHS (2011) result

shows that 73% of children live in households that use adequately iodized salt, with more children in urban (91%) than rural (71%) areas. The percentage of children living in households that use adequately iodized salt is lowest in the Far-Western development region (51%), particularly the Far-Western hill sub-region (41%). Mother's education and household wealth are positively associated with the likelihood of children living in households with adequately iodized salt (MoHP, 2011).

D) Zinc deficiency

Zinc is an essential component of a large number of enzymes, and plays a central role in cellular growth and differentiation in tissues that have a rapid differentiation and turnover, including those of the immune system and those in the gastrointestinal tract. The positive impact of zinc supplementation on the growth of some stunted children, and on the prevalence of selected childhood diseases such as diarrhea, suggests that zinc deficiency is likely to be a significant public health problem, especially in developing countries. Zinc deficiency is often hard to identify as its clinical manifestations are largely non-specific. The symptoms of severe deficiency include dermatitis, retarded growth, diarrhea, mental disturbances and recurrent infections. In children, impaired growth (stunting) is one of the possible consequences of zinc deficiency (Abrams, 2017).

2.8 Cause of malnutrition in under-five children

There are multiple factors associated with childhood malnutrition and these are often interrelated. One simply cannot say that these are the cause of childhood malnutrition because it is a complex phenomenon. The most immediate determinants are poor diet and diseases which are themselves caused by a set of underlying factors; poverty, educational level of mother, faulty feeding practices, vitamin A status, low status of women, birth order, unsafe drinking water, mother's occupation, diarrhea, etc. These underlying factors themselves are influenced by the basic socio-economic and political conditions (Chhetri, 2005).

Study conducted on malnutrition among under-five children in Bangladesh revealed that household economic status, mother's education, father's education, mother's antenatal visits, mother's age at birth and mother's BMI are the most significant factor /determinants of child's malnutrition (Siddiqi *et al.*, 2011). Similarly, research conducted in Belahara

VDC of Dhankuta District in Nepal showed that poor socio-economic status was found risk factors for both stunting and underweight. Children reared in the jointly family were found less like to be stunted than those in nuclear family (Sapkota and Gurung, 2009b). Also ethnic group and age of mothers at pregnancy seems to have significantly ($P < 0.05$) associated with stunting but maternal education not associated with stunting (Mengistu *et al.*, 2013).

Study conducted in Dhanusha, Central Terai of Nepal revealed that general economic status of the family does not have effect on nutritional status of children. Proportions of underweight and stunted children is same from the families with sufficient and insufficient income while the proportions of children underweight and stunted are higher from families who extract and discard rice scum (*maad* in Nepalese language) (Sah, 2004). The term 'scum' used by the author implies starchy gruel from cooked rice (*maad* in Nepalese language).

2.9 Nutritional status

Nutritional status is defined as the health status of individuals or population groups as influenced by their intake and utilization of nutrients (Gibson, 2002).

NDHS 2011 explain that 41% of children under-five are stunted or too short for their age. This indicates chronic malnutrition. Stunting is more common in rural areas (42%) than urban areas (27%). Stunting is least common among children of more educated mothers and those from wealthier families. Stunting ranges from 31% in the Central hill and Eastern Terai to 60% in the Western mountain. Wasting (too thin for height), which is a sign of acute malnutrition, is far less common (11%). Underweight, or too thin for age, is more common 29% of Nepalese children under age five are underweight. In Terai there is 37% stunting, 11% of wasting and 29% of underweight and in Hills it shows 42% of stunting, 11% of wasting and 27% of underweight (MoHP, 2011).

Study conducted by Dhakal (2015) in Panchgachhi VDC, Jhapa showed that there was 22.7%, 29.9% and 20.6% children's under age five were underweight, stunted and wasted, respectively.

Similar study conducted in Musahar community of Madheli VDC, Sunsari by Chaudhary (2017) showed stunting, underweight and wasting was 61.7%, 41.7% and 10% of children's under age five, respectively.

Study conducted in Ethiopia showed that prevalence of under nutrition among children aged 6 -59 months were 57.1 %, 37.4% and 17.8% for stunting, underweight and wasting respectively (Tamiru *et al.*, 2015).

According to the study conducted in South Ethiopia revealed that prevalence of stunting, underweight and wasting were 47.6%, 29.1% and 13.4% respectively (Asfaw *et al.*, 2015).

2.9.1 Trends in children's nutritional status

Trends in the nutritional status of the children for the period 2001 to 2011 are shown in Fig. 2.1.

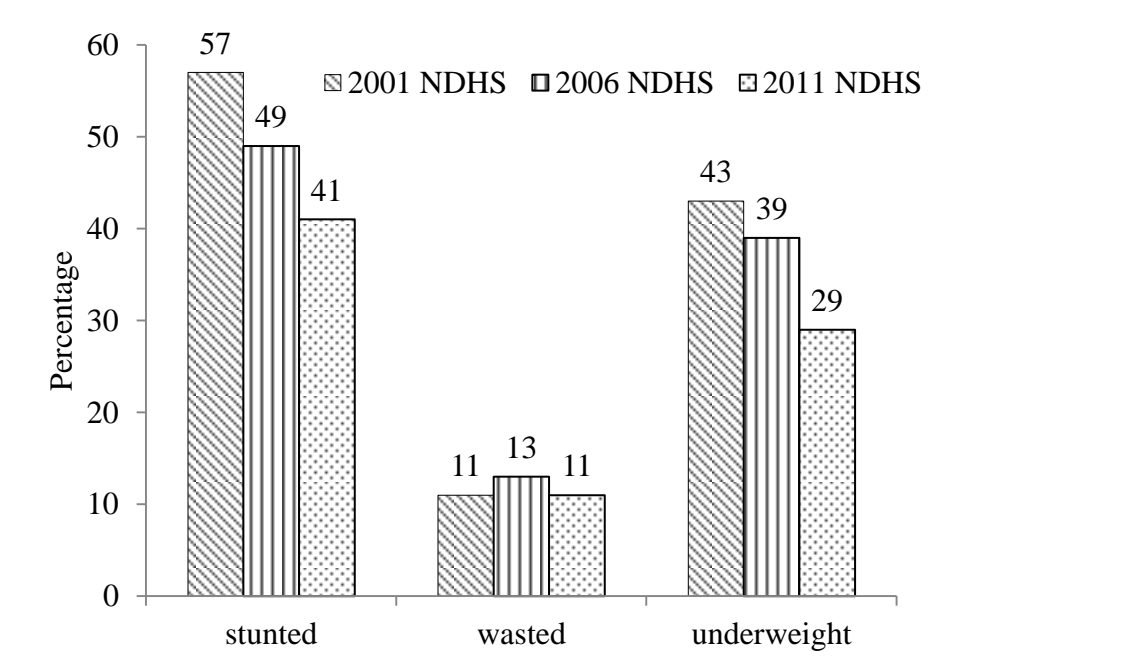


Fig. 2.1 Trends in nutritional status of children under-five years of age (MoHP, 2011)

In general, 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 (National Planning Commission and Statistics, 2013). The percentage of stunted children declined by 14% between 2001 to 2006 and declined by an additional 16% between 2006

to 2011. A similar pattern is observed for the percentage of underweight children, which dropped by 9% between 2001 to 2006 and by 26% between 2006 to 2011. Similarly, the percentage of wasting declined by 15% between 2006 to 2011 (MoHP, 2011).

Table 2.1 shows nutritional situation of under-five children and women from Demographic Health Survey (DHS) 2006 to 2011.

Table 2.1 Nutrition situation of under-five Nepalese children and women

Nepal nutrition data		
Population	28 million	
Population under-five year of age (0-59 months)	3.5 million	
	NDHS 2006(%)	NDHS 2011 (%)
Prevalence of stunting among children under 5 (0-59 months)	49	41
Prevalence of underweight among children under 5 (0-59 months)	39	29
Prevalence of wasting among children under 5 (0-59 months)	13	11
Prevalence of anemia among children aged 6-59 months	48	46
Prevalence of anemia among women of reproductive age (15-49 years)	36	35
Prevalence of thinness among women of reproductive age (15-49 years)	24	18
Prevalence of children aged 0-5 months exclusively breast-fed.	23	70
Prevalence of breast-fed children aged 6-23 months receiving a minimum acceptable diet.	N/A	24

Source: Nepal Nutrition Profile, USAID (2014)

A study conducted in Padampur VDC, Chitwan, showed that prevalence of stunting, underweight and wasting in Padampur VDC was found to be 22.7%, 37.3% and 25.7%, respectively (Ruwali, 2011).

Similarly, a cross-sectional study conducted in Belahara VDC of Dhankuta, Nepal showed that the prevalence of underweight, stunting and wasting was 27%, 37% and 11%,

respectively (Sapkota and Gurung, 2009a). Study conducted in Nigeria revealed that 23.6%, 22.0% and 14.2% of the sample children were stunted, underweight and wasted, respectively (Babatunde, 2011).

2.9.2 Factors affecting nutritional status

The conceptual framework developed by UNICEF in 1990 shows that causes of malnutrition are multi-sectorial, embracing food, health and caring practices. They are classified as immediate, underlying and basic causes, whereby factors at one level influence the other levels as shown in Fig. 2.2.

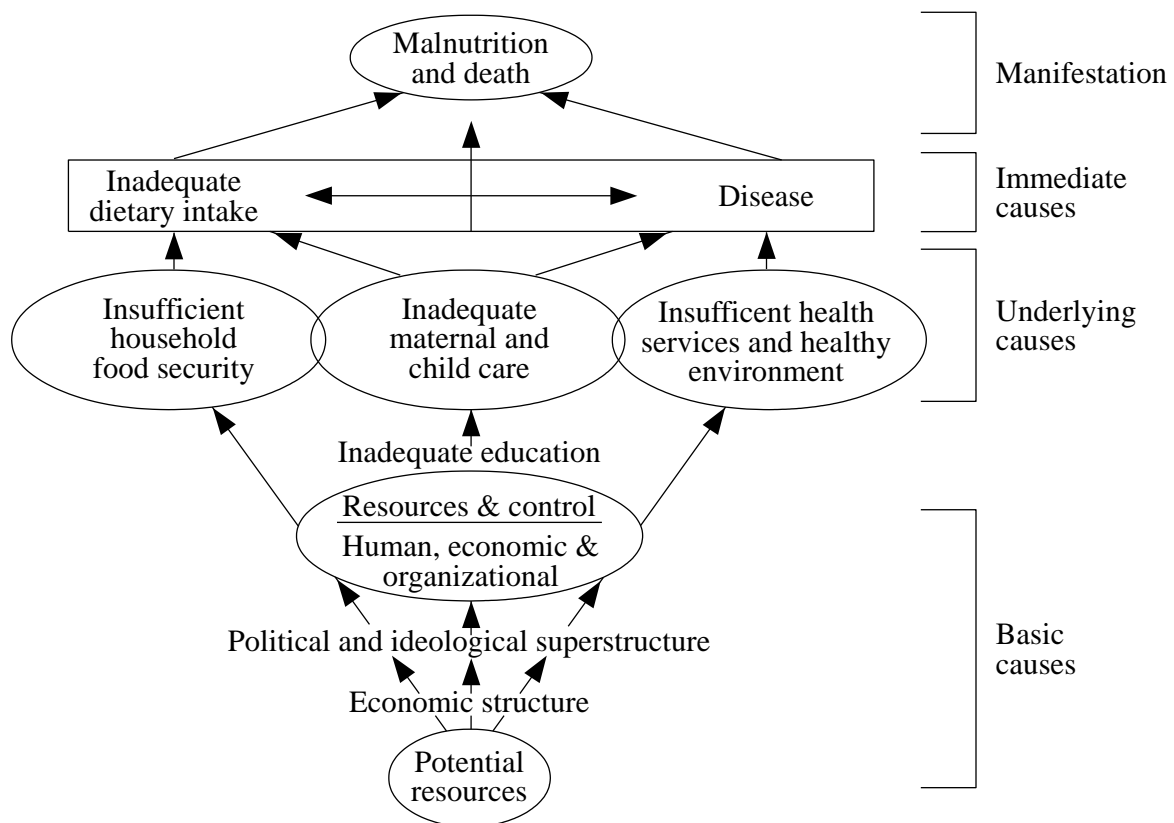


Fig. 2.2 Conceptual Framework on causes of malnutrition

Source: (UNICEF, 2015)

There are many factors that affect child nutritional status. Mother`s knowledge, awareness and feeding practices have direct effect on child`s nutritional status that might place the child at risk, especially during the weaning period. Also, other factors include food availability and its distribution system, consumption, income, and purchasing power, price of commodities, illiteracy, family size, socio-cultural and religious beliefs,

environmental sanitation and health facilities play very integral roles in the nutritional status of the children (Salah, 2004).

2.10 Nutritional requirements

Nutritional Requirements refers to the amount of food, energy and nutrient needed on an average per day by specific group and sex categories to meet the needs of healthy individuals for normal functioning of the body for work and growth (Burk, 1984). The recommended daily allowance (RDA) of nutrients for preschool children (1-6 years) is shown in Table 2.2.

Study conducted in Kenya showed that the proportion of stunted and underweight children was inversely and significantly ($P < 0.05$) correlated with children's energy intake and variety of foods (Mwaniki and Makokha, 2013).

Table 2.2 RDA of pre-schoolers children, ICMR 2010

Nutrients	Years	
	1 to 3	4 to 6
Calories (Kcal)	1060	1350
Protein (g)	16.7	20
Fat (g)	27	25
Calcium (mg)	600	600
Iron (mg)	9	13
Vitamin A (μg)	400	400
Zinc (mg)	5	7
Thiamine (mg)	0.5	0.7
Riboflavin (mg)	0.6	0.8
Nicotinic acid (mg)	8	11
Pyridoxine (mg)	0.9	0.9
Ascorbic acid (mg)	40	40
Folic acid (μg)	80	100
Vitamin B ₁₂ (μg)	0.2-1.0	0.2-1.0

Source: (ICMR, 2010)

2.11 Methods of assessing nutritional status

Nutritional assessment is defined as the interpretation of the information obtained from anthropometric, dietary, biochemical and clinical studies. The information obtained is used to determine the health status of individual or population, which is influenced by their intake and utilization of nutrients. The purpose of nutritional assessment is to identify individual or group at risk of becoming malnourished or who are malnourished. It also measures the effectiveness of nutritional program once initiated. It helps to develop suitable health care program according to community nutritional assessment result. In a clinical setting it is used to find nutritional status of the patient and provide suitable diet therapy or diet counseling (Joshi, 2008). Nutritional assessment can be done by following methods:

2.11.1 Direct method

2.11.1.1 Anthropometric method

It means physical measurement of body weight and dimensions. In a normal healthy individual the relationship among body storage compartments are relatively stable but when disease or stress is present, there is changes in storage compartment and their measurement act as an important component for dimension of nutritional status. Nutritional anthropometry has most commonly been conducted on preschool children, the age group in which PEM is usually most prevalent and most severe (Joshi, 2008). The anthropometric status indicators for under-five children are;

i. Height for age (H/A)

Z- score is defined as a score that indicates how far a measurement is from the median - also known as standard deviation (SD) score. The reference lines on the growth charts (labelled 1, 2, 3, -1, -2, -3) are called z-score lines; they indicate how far points are above or below the median (z-score 0) (Wang and Chen, 2012).

Height for age represents the long term effect of malnutrition in a population; not sensitive to recent, short term changes in dietary intake. The children whose z-score is below minus two standard deviation (-2 SD) from the median of the WHO reference population, are considered as stunted, or chronically malnourished and below minus three standard deviations (-3 SD), are considered severely stunted (Joshi, 2008).

The term “stunting” is used to describe a condition in which children fail to gain sufficient height, given their age. Stunting is an extremely low “height-for-age” (H/A) score. Stunting is often associated with long-term factors such as chronic malnutrition, especially protein-energy malnutrition, and frequent illness (INDEPTH, 2008).

ii. **Weight for height (W/H)**

Weight for height reflects recent nutritional status. The children whose z- scores below minus two standard deviations (-2 SD) are thin (wasted) or acutely malnourished and below minus three standard deviation (-3 SD) are considered severely wasted, more than two standard deviations (+2 SD) are considered overweight or obese (Joshi, 2008).

The term “wasting” refers to a situation where a child has failed to achieve sufficient weight for height (W/H). Weight-for-height is normally used as an indicator of current nutritional status. Wasting may be the consequence of starvation or severe disease. It can also be due to chronic conditions or a combination of both (INDEPTH, 2008).

iii. **Weight for age (W/A)**

It represents both chronic (height-for-age) and acute (weight-for-height) malnutrition. Children below minus two standard deviation (-2 SD), are considered as underweight. Children whose weight-for-age is below minus three standard deviation (-3 SD) are considered severely underweight .

The term “underweight” is used to describe a situation where a child weighs less than expected, given his or her age. Underweight is thus an extremely low “weight-for-age” (W/A) score. W/A reflects body mass relative to age. Unlike height, weight fluctuates over time and therefore reflects current and acute as well as chronic malnutrition. W/A is commonly used for monitoring growth and to assess changes in the magnitude of malnutrition over time (INDEPTH, 2008).

iv. **Mid-upper arm circumference (MUAC)**

MUAC is a measure of the diameter of the upper arm, and gauges both fat reserves and muscle mass. It is primarily used for children, but can also be applied to pregnant women to assess nutritional status. Measurement is simple and requires minimal equipment (Fig.

2.3). MUAC has therefore been proposed as an alternative index of nutritional status, in particular in situation where data on height, weight and age are difficult to collect. Classification of nutritional status according to MUAC as shown in Table 2.3 (INDEPTH, 2008).

Table 2.3 Classification of nutritional status according to MUAC

Nutritional status	MUAC	Indicator
Adequate nutrition	≥ 13.5 cm	Green
Risk of malnutrition	12.5- 13.4 cm	Green
Moderate acute malnutrition	≥ 11.5 - <12.5 cm	Yellow
Severe acute malnutrition	<11.5 cm	Red

Source: Wadhvani (2016)

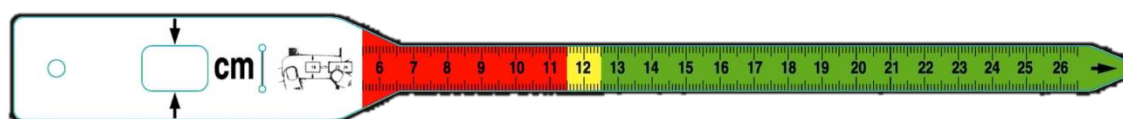


Fig. 2.3 MUAC tape

v. **Edema**

Edema is a swelling caused by the accumulation of fluid in the body tissues and can be categorized as:

- i. Mild (+): edema in both feet/ankles
- ii. Moderate (++): edema in both feet plus lower legs, hands or lower arms
- iii. Severe (+++): generalized edema including both feet, legs, hands, arms and face

2.11.1.2 Biochemical method

The biochemical evaluation of nutritional status includes quantitative determinations of nutrients (minerals and vitamins) their products of metabolism in the body and urine.

Example: serum albumin, hemoglobin estimation, serum retinol, urinary iodine, etc. (Bauer, 2002).

2.11.1.3 Clinical assessment

It is defined as assessment of the health of those parts of the body that can be readily observed in a routine physical examination. Clinical examination can be done by observing certain signs and symptoms which are associated with various nutrient deficiencies in various organs of body like skin, hair, mouth, tongue, nails, etc. (Bauer, 2002).

2.11.1.4 Dietary assessment

Dietary assessment deals with assessing a person normal food intake and quality of that diet. It consists of (Bauer, 2002):

1. Twenty- four hours dietary recall
2. Food frequency questionnaire
3. Dietary history
4. Food diary technique
5. Observed food consumption

2.12 Indirect methods

These include three categories (Jelliffe, 1966):

2.12..1 Vital health statistics

Vital health statistics like infant mortality rate, under-five mortality rate, nutritionally relevant diseases (for example diarrhea, tropical ulcer, tuberculosis and measles). A variety of vital statistic may be considered as indirect indicators of the nutritional status of the community (Jelliffe, 1966).

2.12.2. Ecological variable

Ecological variables include crop production, soil, irrigation, storage, transport and economic level of the population, as well as on such cultural influence as local cooking practice and food classifications, especially in relation to the distribution or restriction of foods for vulnerable age groups (Jelliffe, 1966).

2.12.3 Socio-economic factor

Socio-economic factor like per capita income, occupation, prices of food, budgeting, etc. (Jelliffe, 1966).

PART III

Methodology

3.1 Research design

The study carried out was analytical cross-sectional survey of under-five year age *Batar* children living in Jhorahat VDC, Nutritional survey of under-five children in *Batar* community of Jhorahat VDC consisted of:

1. Household survey with the help of questionnaire (Appendix B).
2. Anthropometric measurements of 6-59 months children (Appendix B).
3. The 24 hours dietary recall (Appendix B)

3.2 Study variables

The study variables were divided into two categories:

a) Dependent variables

1. Stunting (height for age): Height for age below -2 SD from the National center for Health Statistics/WHO reference median value (NCHS/WHO).
2. Wasting (weight for height): Weight for height below -2 SD from the NCHS/WHO reference median value.
3. Underweight (weight for age): Weight for age below -2 SD from the NCHS/WHO reference median value.

b) Independent variables:

1. Socioeconomic and demographic factors: head of household, ethnicity, family size, family type, income, occupation, education.
2. Maternal characteristics: age, number of children born.
3. Children characteristics.
4. Feeding practices (breast feeding, weaning, etc.)
5. Illness (common cold, fever, diarrhea, etc.)

6. Environmental and hygienic practice of the family.

3.3 Study area

The shaded regions in Fig. 3.1 (VDC, 2016) show the study area of this study.

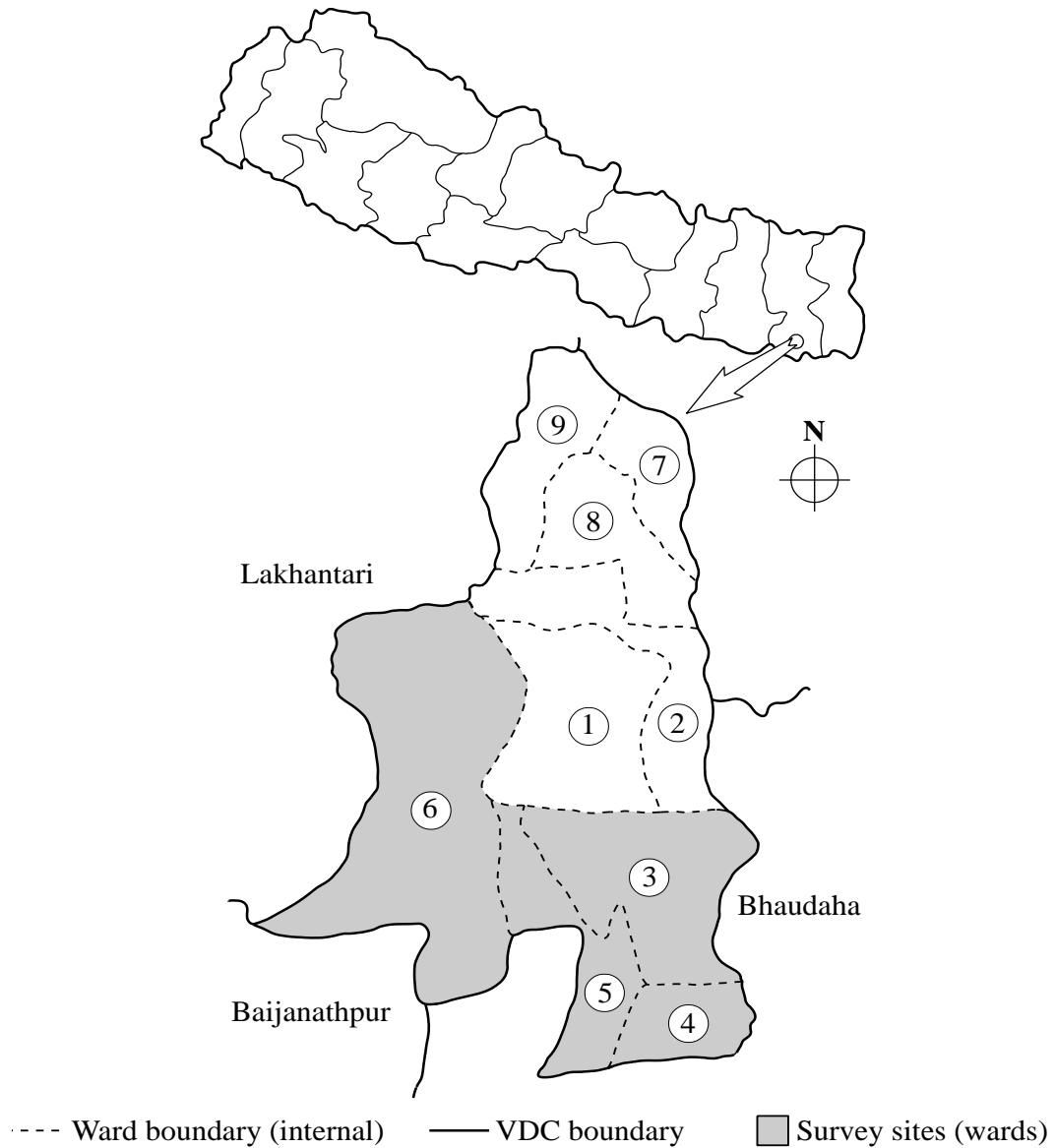


Fig. 3.1 Map of Jhorahat: Study area (3, 4, 5 and 6) in shaded region.

Batar community of Jhorahat VDC, Morang district was chosen as the study area. According to the recorded primary data (2016) of VDC office, this VDC is divided into 9 wards with 5,4,71 total populations, 1,226 households. *Batar* are living in 3, 4, 5 and 6 wards. There are 402 households of *Batar* with 1963 total population of them among which 993 are male and 970 are female. In Jhorahat VDC, majority of *Batar* are working as labor and most of the women are housewife. Some of them are also involve in farming.

3.4 Population distribution

Table 3.1 shows that population distribution of Jhorahat VDC.

Table 3.1 Population by caste/ethnicity and sex of Jhorahat VDC

Caste/ethnicity	Total	Male	Female
All caste	5387	2639	2748
Chhetri	112	57	55
Brahmin-hill	910	413	497
Magar	28	14	14
Tharu	1104	526	578
Tamang	32	17	15
Newar	36	17	19
Muslim	40	28	12
Kami	81	38	43
Yadav	11	7	4
Rai	20	8	12
Teli	33	17	16
Chamar/Harijan	68	44	24
Kurmi	11	5	6
Musahars	266	132	134
Rajbansi	251	135	116
Sudhi	70	31	39
Haluwai	22	10	12
Marwadi	56	29	27
Jhangad/Dhagar	232	113	119
Batar/Sardar	1868	933	935
Khawas	82	39	43
Others	54	26	28

Source: National Population and Housing (CBS, 2014)

Batar is one of the indigenous castes of Nepal. It is also known as Sardar caste. They live in east Nepal mainly in Sunsari, Morang and Saptari district. According to National Population and Housing Census (NPHC), in Jhorahat VDC total population of *Batar* was 1868, in which 933 were male and 935 were female .

According to 2001 census, the total population of *Batar* community was 35,839. Representing 0.16% of total populations. They are also considered as untouchable caste/ Terai dalit.

3.5 Target population

The measurement is taken 6-59 months of *Batar* children who are living in Jhorahat, VDC and interview was taken from mothers.

Inclusion and exclusion criteria:

Inclusion criteria: The children of 6 to 59 months *Batar* children were selected for survey. The mothers of selected children were also selected for the questionnaire.

Exclusion criteria: In absence of the study subject (child) at the time of household survey or being seriously ill.

3.6 Sampling method

This survey has adopted as census method. Census method is used where samples are less or in nationwide studies such as population census. So, every household of *Batar* children who are between 6 to 59 months of age were studied.

3.7 Sample size

The sampling technique used in this case is census method. The sample size is equal to the total number of children who lie in between age group of 6 months to 59 months and belongs to *Batar* community of Jhorahat VDC. According to personal communication with female health volunteer the total population of 6-59 months of age children was about 150. Thus the sample size for the study was 150.

3.8 Research instruments

Instruments used during survey were:

i. **Weighing machine:** For measuring the weight of children. Digital weighing machine with the capacity of 100 kg and having the least count of 0.1 kg, manufactured by Microlife Pvt. Ltd was used. The following paragraph describes the technique used for measuring weight of the children.

The subject was without shoes and with minimal clothing. The subject was stand on the center of weight scale platform with his/her weight equally distributed on both legs. In case for young infants weight was taken carrying the child by mother/caretaker and later on substrate to calculate the weight of child.

ii. **Height measuring scale (stadiometer):** For measuring the height of children. The height measuring tape was taken. It was prepared under the supervision of Central Campus of Technology, Department of Nutrition and Dietetics. The technique used for measuring height of the children was as follows:

For children above two years, they were asked to stand on vertical bar (Fig. 3.2) removing shoes and heels together, head position such that line of vision was perpendicular to the body, arms hanging freely by the side and back of head, buttocks and heels were in contact with the wall. Height was recorded to the nearest 0.1 cm.

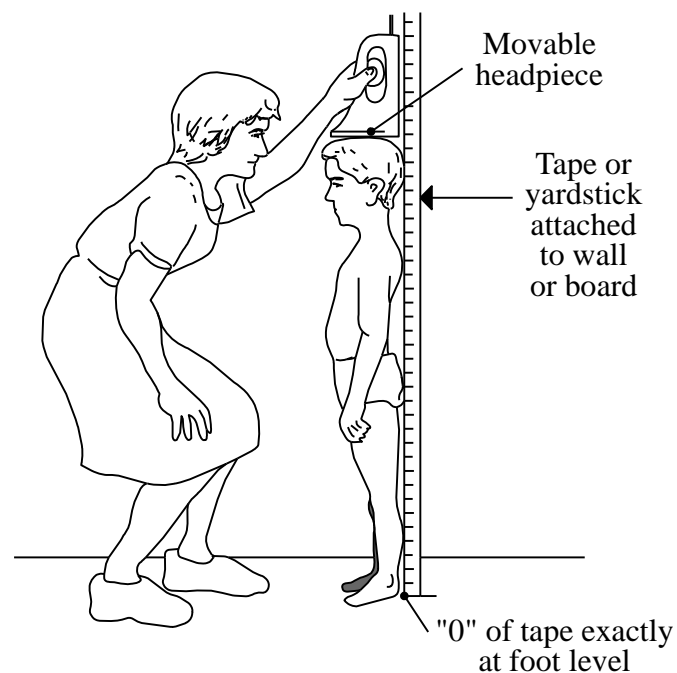


Fig. 3.2 Measurement of height of a child by using wooden stadiometer

For children below two years, they were laid on the ruled board of the infantometer (length measuring scale for children below two years). The board has attached fixed piece of wood at one end and moveable piece at the other. The child was stretched out on the board and moveable end flat is pressed against the bottom of the child foot and measurements are taken.

iii. **Mid Upper Arm Circumference (MUAC) tape**

Technique for measuring MUAC:

The subject was asked to bend his arms 90 degree with his/her palm facing upward. MUAC was taken on the left hand midway between the elbow and shoulder joint so that the hand was simply relaxed and hanging by the side Fig. 3.3 shows carrying out MUAC measurement.

9.236

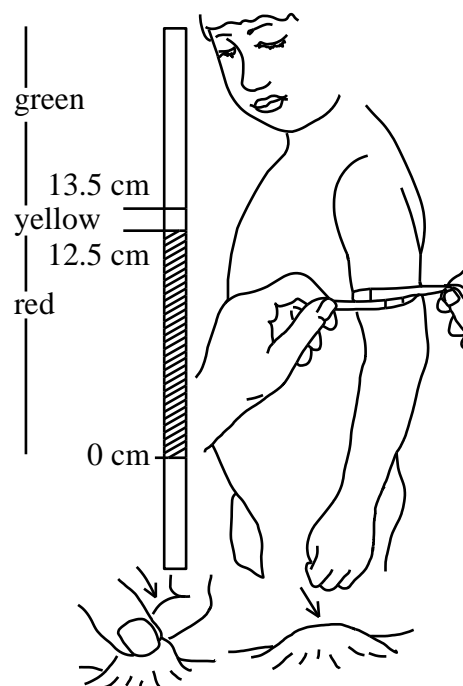


Fig. 3.3 Measurement of MUAC of a child

iv. **Set of questionnaire**

For collecting household information and knowledge of childcare practices among mother's, a well-designed questionnaire was prepared from various literature, viz., FAO guidelines (FAO, 2014), Saka (2014), Appoh and Krekling (2005).

There was twenty self-administrated questionnaire related to knowledge questionnaire. Based on the responses, each correct answer was given a score of 'one' and the wrong answer was given a score of 'zero'. The range of knowledge level score was adapted from National Journal of Community Medicine in which 0 to 10 scores indicate poor knowledge, 11 to 16 scores indicate average and 17 to 20 scores indicate good knowledge score of mothers (Shettigar *et al.*, 2013).

3.9 Pre- testing

This study was pre-tested among few 6-59 months children by using prepared sets of questionnaire and anthropometric instruments (Appendix B). Pre-testing can help to determine the strengths and weaknesses of survey concerning question format, wording and order. It also helps to establish accuracy and clarity of questionnaire and to check the consistency in interpretation of questions by respondents and to identify ambiguous items. After pre-testing, all the ambiguous, misleading and wrongly interpreted questions were omitted and questionnaire was revised in accordance with the findings of pre-testing.

3.10 Reliability and validity

3.10.1 Reliability

A scale should be reliable i.e., should give the same measurement under similar conditions. For example, an economic status scale is reliable only if two persons with apparently same economic status show the same scores. Reliability means dependability, stability, consistency, predictability and accuracy of the scale used (Singh, 2005).

Reliability of the instruments was tested by the test retest method. Two consecutive measurements were made at a short time difference by the same observer and were compared. Instruments was set at zero reading before taking measurements with standarized reference one. Closed supervision was done in the field.

Different definitions of Reliability are:

If the measurement measure same set of objects again and again with the same or comparable measuring instruments and get the same or similar results, then the measurement is called reliable.

Reliability means absence of errors of measurement in a measuring instrument.

Reliability means measures obtained from a measuring instrument, i.e., the truth measures of the property measured. This definition implies the accuracy of the scale.

3.10.2 Validity

A scale is said to be valid when it correctly measures what it is expected to measure. Validity defines the strength of the final results and whether they can be regarded as accurately describing the real world (Singh, 2005).

The weighing balance was validated by comparing the data provided by our weighing balance with standard weight. Likewise validity of the stadiometer was ascertained by comparing the measurement from our stadiometer and UNICEF stadiometer.

3.11 Data collection techniques

The data was collected with the help of structured questionnaire form, by face to face interview with mother of child with the help of structured questionnaire in which answers of every question was coded and recorded with unique identity number for each household of 6-59 months children.

3.12 Data analysis

Quantitative data was coded first and was entered in SPSS 20 (Page *et al.*, 2003), MS Excel (2010) and WHO Anthro version 3.2.2 (Blössner *et al.*, 2010). Chi-square test was used to identify the associated factors of malnutrition. Verified test parameters were used to establish the relationships between the variables and nutritional status of children.

3.13 Logical and ethical considerations

Permission was taken from Central Campus of Technology, Department of Nutrition and Dietetics and Village Development Committee of Jhorahat VDC and written consent was taken from children's mother.

PART IV

Results and discussion

The survey was carried out in Jhorahat VDC, Morang district from October 16 to 22. The study was mainly focused on the association between mother's nutritional knowledge in childcare practice and nutritional status of 6-59 months of age children in *Batar* community of Jhorahat. Two main approaches of this study is, anthropometry to obtain data regarding Anthropometric measurement and household survey to collect information regarding various nutritional and socioeconomic variables. The collected data were analyzed using WHO Anthro 3.2.2 (Blössner *et al.*, 2010) and SPSS version 20 (Page *et al.*, 2003) and results were obtained and conclusion was drawn. Which is discussed in the following section.

4.1 Socio-economic and demographic characteristics

As shown in the Table 4.1, all the children (100%) during survey belonged to Hindu religion. Majority (97.2%) of households were headed by male while only 2.8% households were headed by female. Regarding family type, 35.4% of families were nuclear family whereas 64.6% of families were joint families. Similarly 9.7% of households had concrete house whereas 90.3% of household had house made up of mud.

Economic status of the household is associated with the general health and development status of the family but study conducted in Dhanusa report that economic status of the family: general economic status of the family does not have effect on nutritional status of children. In his study the proportions of underweight and stunted children are same from the families with sufficient and insufficient income (but the author does not indicate family size it may be in the case of small family size). This may probably be due to that malnutrition is not merely effect of economic status, but is governed by food processing (preparation) and eating/feeding practices that is directly linked with the socio-cultural aspect (Sah, 2004).

Table 4.1 Socio-economic and demographic characteristic of survey population

Variable	Frequency	Percent
Family size		
1 to 4	39	27.1
5 to 8	105	72.9
Fathers occupation		
Farming	2	1.4
Business	2	1.4
Employment	14	9.7
Remittance	24	16.7
Labor	102	70.8
Family type		
Nuclear	51	35.4
Joint	93	64.6
Head of family		
Male	140	97.2
Female	4	2.8
Fathers education		
No	42	29.2
Primary	36	25.0
Secondary	58	40.3
Intermediate	8	5.6
Type of house		
Concrete house	14	9.7
Mud house	130	90.3
Annual income		
< 1 lakh	87	60.4
1 lakh to 2 lakh	52	36.1
> 3 lakh	5	3.5

In the present study, the annual income of 60.4% families were below one lakh, 36.1% families were between one lakh to two lakh and only 3.5% of families were greater than

three lakh annual income (highest income was came from remittance). Fathers of the children had better educational status than that of their mothers: 29.2% were illiterate whereas 25%, 40.3% and 5.6% had primary, secondary and intermediate level education, respectively (Table 4.1).

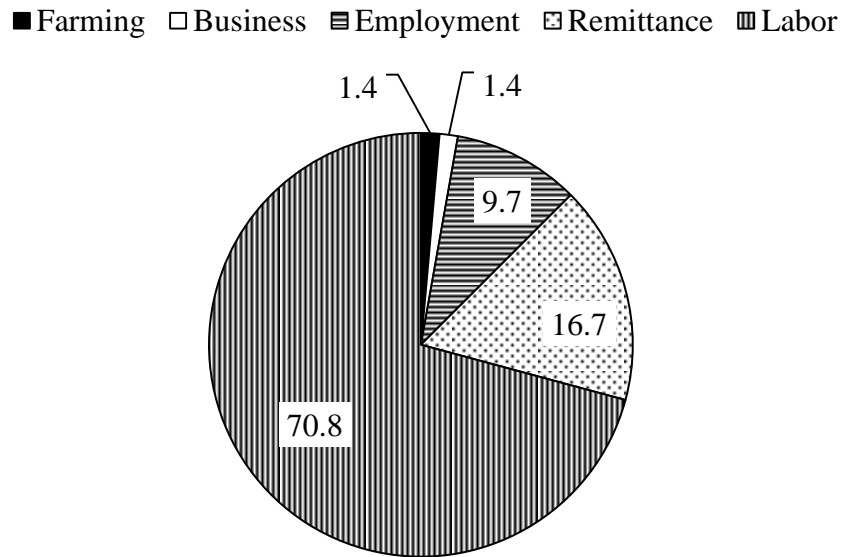


Fig. 4.1 Father's occupation among surveyed population

Fig. 4.1 shows that more than (70%) of fathers were employed in labor. Whereas 1.4% employed in farming as well as in business and 16.7% were employed in remittance. This indicates majority of them were labor.

4.2 Maternal characteristics

Table 4.2 shows that only 2.1% of mothers were in the age group below 20 years. Most of the mothers (81.9%) were in the age group between 20-30 years and 16% of mothers are above 30 years. More than 70% of mothers under the survey were housewife. Similarly, 20.8%, 1.4%, 2.8%, 1.4% and 1.4% of mothers was involved in farming, business, employment, remittance and labor, respectively. Maximum mothers (68.8%) were married in the age group between 15 and 19 years (Table 4.2).

Table 4.2 Maternal characteristics of survey population

Variable	Frequency	Percent
Mother age		
< 20	3	2.1
20-30	118	81.9
> 30	23	16.0
Mother occupation		
Housewife	104	72.2
Farming	30	20.8
Business	2	1.4
Employment	4	2.8
Remittance	2	1.4
Labor	2	1.4
Mother education		
No	78	54.2
Primary	30	20.8
Secondary	32	22.2
Intermediate	4	2.8
Marriage age		
< 15	2	1.4
15-19	99	68.8
20-25	43	29.9
First pregnancy		
15-19	66	45.8
20-35	78	54.2
Iron folate		
No	7	4.9
Yes	137	95.1
Vaccination		
No	2	1.4
Yes	142	98.6

A higher percentage of mothers (95.1%) had consumed iron and folic acid tablets during pregnancy and 98.6% of mother's had taken vaccination during pregnancy. Higher percentage of mothers had better knowledge regarding vaccination and iron folate tablet during pregnancy (Table 4.2).

□ Illiterate ■ Primary ▨ Secondary ■ Intermediate

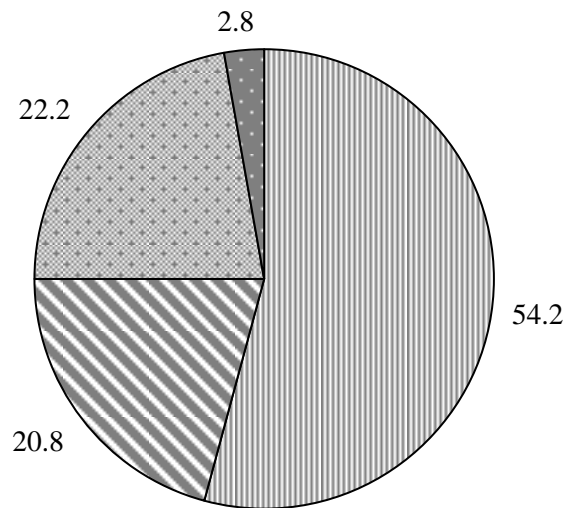


Fig. 4.2 Mothers' education level among surveyed population

Data regarding mothers education level is shown in Fig. 4.2 which indicates more than half (54.2%) of mothers were illiterate. Whereas 20.8% and 22.2% of mothers had some primary and secondary level education. Only 2.8% of mothers had attended intermediate level education. Level of illiteracy is higher than NDHS 2011 reports in which 40% of women age 15-49 were illiterate, 12% had primary education, 24% had some secondary education and 8% had intermediate level education (MoHP, 2011).

4.3 Child characteristics

Table 4.3 shows that out of 144 children, 49.3% were males and remaining 50.7% were females, male and female ratio were nearly equal to 1:1. About 17.4% of mothers did not know birth weight of their children and 23.6% of children had birth weight equal to 2.5 kg. Similarly, 45.1% of children had equal and more than 2.5 kg birth weight while 13.9% had birth weight less than 2.5 kg.

Table 4.3 Child characteristics of surveyed children

Variables	Frequency	Percent
Gender		
Male	71	49.3
Female	73	50.7
Age		
6-11 months	11	7.6
12-23 months	28	19.4
24-35 months	31	21.5
36-47 months	30	20.8
48-59 months	44	30.6
Birth weight		
No idea	25	17.4
> 2.5 kg	65	45.1
2.5 kg	34	23.6
< 2.5 kg	20	13.9
Recent disease		
Cold	15	10.4
Fever	18	12.5
No	107	74.3
Pneumonia	4	2.8
Calorie intake		
Adequate	87	60.4
Inadequate	57	39.6

As indicated in Table 4.3, about the prevalence of common childhood illness, 25.7% of children were sick in the two weeks preceding the survey. Calorie intake was found to be adequate in 60.4% of children and inadequate in 39.6% of the children.

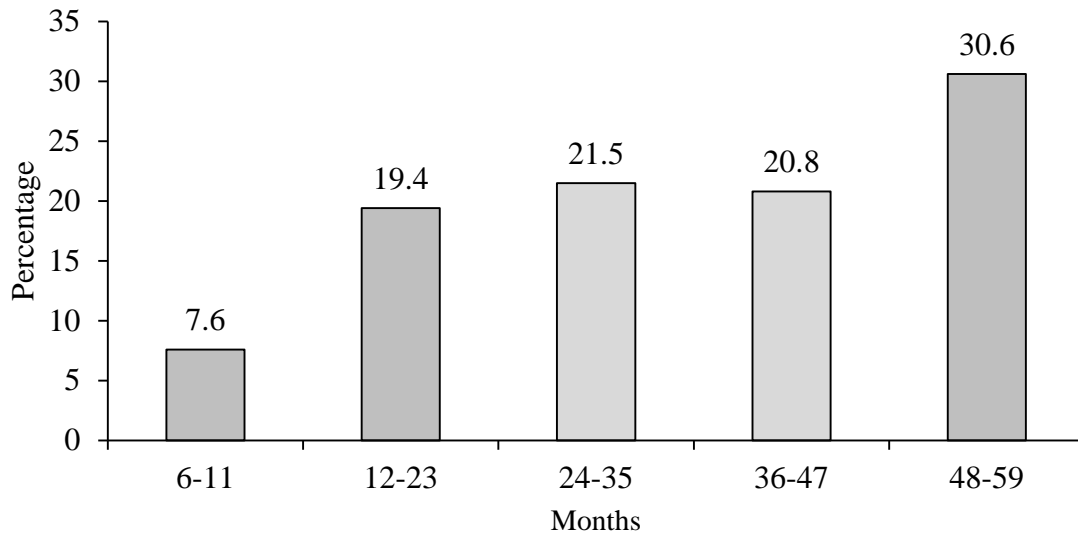


Fig 4.3 Age distribution of survey children

In present study highest percentage (30.6%) of children were found in age group between 48 to 59 months while only 7.6% of children are in age group 6 to 11 months as shown in Fig. 4.3.

4.4 Child care characteristics

Regarding breastfeeding status, 59% of children were still breastfeeding at the time of survey and other 1.4% couldn't breastfeeding due to refusal of children, maternal pregnancy and lack of milk secretion by mother. Similarly, 1.4% of the children were breastfeed less than six month of age and 38.2% of children breastfeed in between 6 to 59 months (Table 4.4).

The present study showed that, More than half (60.4%) of children suffered from diarrhea from their birth while rest of them (39.6%) never suffered from diarrhea during their lifetime.

As shown in Table 4.4, regarding the question towards giving cow milk to the children, 84.7% of mother's were gave cow milk to their children while 15.3% of mothers never gave cow milk to their children.

Table 4.4 Child care characteristics of surveyed children

Variables	Frequency	Percent
Duration of breastfeeding		
No	2	1.4
< 6 months	2	1.4
6-59 months	55	38.2
Still	85	59
Suffered from diarrhea		
No	57	39.6
Yes	87	60.4
Cow milk		
No	22	15.3
Yes	122	84.7
Fruits		
Never	24	16.7
Always	5	3.5
Sometimes	115	79.9
Green leafy vegetables		
Never	13	9
Always	13	9
Sometimes	118	81.9
Meat		
Never	7	4.9
Always	11	7.6
Sometimes	126	87.5
Types of food		
Family food	136	94.4
<i>Satu</i>	2	1.4
<i>Jaulo</i>	4	2.8
Others	30	20.8

Very low proportion (9%) of mother gives green leafy vegetables to their children in daily basis whereas 9% of mother did not give any kind of green leafy vegetables to their

children. Some mothers said that their children did not like to eat leafy vegetables, some replied that their children would catch cold if green leafy vegetables were given. Most (81.9%) mothers, however, were found to give leafy vegetable sometimes in a week. Similarly, 3.5% of mother always gave fruits to their children in a week. According to the survey, 16.7 % of mother couldn't give any kind of fruits to their children in a week due to the high price of fruits. Beside this unavailability of fruits and due to lack of knowledge, children are deprived from fruits and 79.9% of mothers gave fruits sometimes in a week. About 4.9% of mother seldom gave meat and fish products in a week the reason behind it was that some of them were vegetarian while some mothers had not yet started to give meat product to their children. Similarly, 7.6% of mother always gave meat and fish product to their children in a weak while most (87.5%) of the mothers sometimes gave meat and fish product in a weak.

Regarding vitamin A and de-worming tablet supplementation, all the children (100%) were supplemented with vitamin A and de-worming tablet. This is similar to findings of survey conducted in rural Terai of Eastern Nepal (Chhetri, 2005). While the effectiveness of National vitamin A supplementation program was higher than NDHS 2011 reports, National data on vitamin A supplementation revealed that nine in ten children aged 6 – 59 months received vitamin A supplement.

The type of complementary food given to children was the same as family food in 94.4% of the case, followed by *satu* (1.4%), *jaulo* (2.8%) and other foodstuffs (20.8%).

4.5 Mother's knowledge in childcare practices

Breastfeeding is universal in Nepal and 70% of children under six months are exclusively breastfed (MoHP, 2011). Regarding breastfeeding status in present study, high percentage (94.4%) of mothers breastfed their children and other 5.6% did not breastfeed due to lack of milk secretion by mother. About 77.8% of mothers were aware about the initiation of breastfeeding within an hour after birth which is higher than that in NDHS (2011) report, which revealed only 45% breastfeeding within one hour of birth (Table 4.5(a)).

The breast milk substitutes used among those who were not initiated into breastfeeding within one hour after birth were cow milk, goat milk, milk of other women, lactogen or sometimes nothing. All the mothers were aware about colostrum, 96.5% of children were

fed colostrum milk. Regarding the question towards knowledge of importance of feeding colostrum to the children, 45.1% of the mothers did not know the importance of feeding colostrum and 49.3% of mothers told colostrum feeding is good for child health, remaining 5.6% of mothers replied that colostrum feeding makes child healthy and strong. Similarly, most of the mothers (95.1%) had knowledge about exclusively breastfeeding until six months of age.

Table 4.5(a) Mother knowledge in childcare practices

Variables	Frequency	Percent
Breastfeeding		
No	8	5.6
Yes	136	94.4
Initiation of breastfeeding		
No	3	2.1
Within 1 hour	112	77.8
Within 8 hours	24	16.7
Within 24 hours	5	3.5
Colostrum		
No	5	3.5
Yes	139	96.5
Importance of colostrum		
No idea	65	45.1
Good for child	71	49.3
Makes child healthy and strong	8	5.6
Exclusive breastfeeding		
No	7	4.9
Yes	137	95.1
Breastfeeding knowledge of mothers		
Don't know	11	7.6
1 year	3	2.1
2 years	7	4.9
3 years	28	19.4
4 years	36	25
5 years	59	41
Complementary feeding knowledge		
At 6 months	17	11.8
Other	127	88.2
Complementary feeding times		
< 3	42	29.2
> 4	102	70.8

Table 4.5(b) Mother knowledge in childcare practices

Variables	Frequency	Percent
About sarbottam pitho		
No	92	63.9
Yes	52	36.1
Knowledge about malnutrition		
No	75	52.1
Yes	69	47.9
Malnutrition reason		
Don't know	86	59.7
Insufficient	55	38.2
Lack of sanitation	3	2.1
Knowledge about diarrhea		
No	1	0.7
Yes	143	99.3
Diarrhea reason		
Don't know	47	32.6
Dirty water	12	8.3
Lack of sanitation	85	59
ORS preparation		
No	9	6.3
Yes	135	93.8
Foods of diarrhea		
Don't know	28	19.4
Soup	42	29.2
As usual	74	51.4
Maad		
No	12	8.3
In animal feed	79	54.9
Discard	53	36.8
Nutrient in maad		
Don't know	126	87.5
Yes	18	12.5
Wash vegetables		
Before cutting	83	57.6
After cutting	61	42.4
Treatment place		
Hospital	107	74.3
Hospital and <i>dhami</i> (both)	37	25.7

Knowledge regarding start of complementary feeding to the child, only 11.8% of mothers gave correct answer i.e., after completion of six months of age. There was a variation in answers regarding times for initiation of weaning. Knowledge of mother regarding times of complementary food given to the children, 70.8% of mothers had answer giving food more than 4 times per day is good for child while 29.2% of mothers had replied giving food less than 3 times per day is enough for their child as shown in Table 4.5(a).

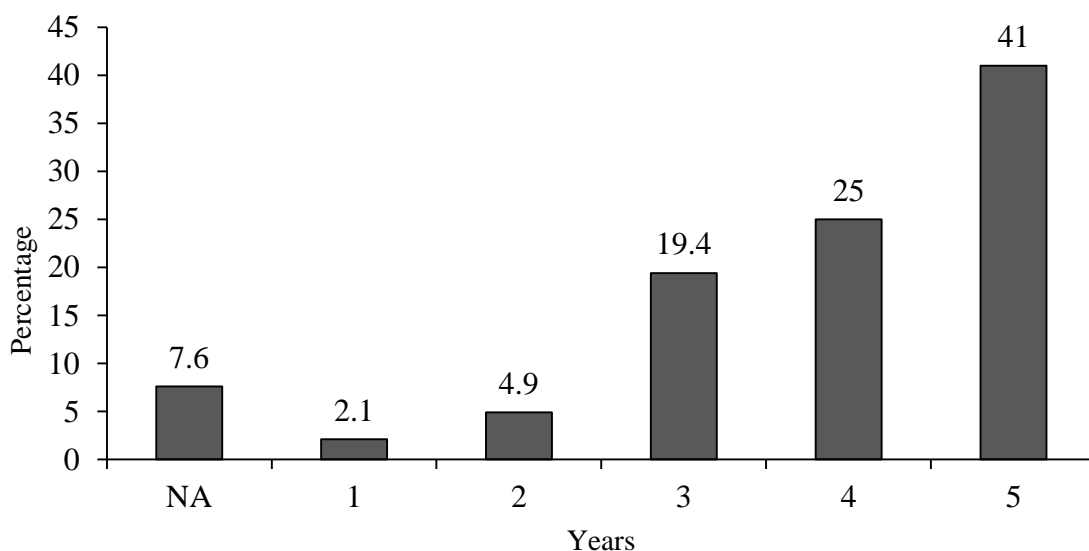


Fig. 4.4 Breast feeding knowledge of the mother

Variation was found between knowledge about breastfeeding in the mothers (Fig. 4.4). Maximum percentage (41%) of mother told that breastfeeding is good until the age of five years.

Out of 144 respondents, only 36.1% of mothers were hear/know about *sarbottam pitho* whereas 63.9% of mothers don't know about *sarbottam pitho* as shown in Table 4.5(b).

Based on the survey, more than half (52.1%) of mothers did not know about malnutrition. A further study among those having knowledge on malnutrition showed that 59.7% were unknown about the reason, 38.2% thought insufficient food as a cause of malnutrition while 2.1% of mother believed that lack of sanitation is the reason behind malnutrition in children.

Almost all mothers (99.3%) had knowledge about diarrhea. The majority of the mothers (59%) believed that lack of sanitation is the main reason for diarrhea and 8.3% of the

mother replied that dirty water can cause diarrhea while 32.7% did not know the causes of diarrhea. Majority of mother, 93.8% were told that they know the preparation of ORS solution while 6.3% of the mother's don't know how to prepare ORS solution at home. Survey conducted in marginalized community of Morang, report that knowledge about signs of dehydration was poor in most mother and none of the mothers were able to mention all the steps for correct and complete preparation of Oral Rehydration Salt (ORS) and Salt-Sugar-Water (SSW) solutions (Ansari *et al.*, 2009).

Regarding the knowledge about type of food given to children who had diarrhea, 51.4% of mothers replied that usual food should be given during diarrhea and 29.2% of mothers said soup/fluid should be given during diarrhea while 19.4% did not know what kind of food should be given during diarrhea.

The present study found that 8.3% of families did not extract *maad* due to the use of rice cooker while rest of the families (91.7 %) extracted it. Among them (54.9%) fed *maad* to the animals while 36.8% discarded. Study conducted in Dhanusa showed that children from families where rice scum is extracted and discarded are more likely to be underweight and stunted than children from families who do not discard. The proportions of children underweight and stunted are higher among families who were extract and discard rice scum (Sah, 2004).

Higher percentage (87.5%) of mothers had no knowledge about *maad* also contain nutrient, only 12.5% of mothers had heard about *maad* also contains some nutrients.

Knowledge about cutting green leafy vegetables, 57.6% of mothers used to wash vegetables before cutting while 42.4% of mothers used to wash vegetables after cutting. The knowledge of mothers regarding use of iodized salt was satisfactory. Almost all mothers 97.9% replied that using iodized salt was good as compared to other salt.

Almost all of the people could reach their nearest health facility within ten minutes to about half an hour. More than half 74.3% take their children in hospital for treatment and 25.7% of people take their children in both hospital and '*dhamijhakri*' (witchdoctor) as shown in Table 4.5(b).

4.6 Mother’s knowledge level score

The mother knowledge level score was used as described by Shettigar *et al.* (2013). The scores found for mothers of the study area are shown in Table 4.6. The score was ranges from minimum 5 to maximum 17.

Table 4.6 Distribution of knowledge level among mothers (n=144)

Level of knowledge	Scores	Mothers (n=144) (%)
Poor	0-10	41 (28.5)
Average	11-16	91 (63.2)
Good	17-20	12 (8.3)

Table 4.6 shows the level of knowledge of mothers, around 41 (28.5%) had poor knowledge, more than half of the mothers 91 (63.2%) had average knowledge and only 12 (8.3%) had good knowledge regarding the knowledge in childcare practices. Therefore it can be interpreted that most of the mothers are having average knowledge regarding childcare practices.

4.7 Household characteristics

Almost all household have toilet facility because that place was “open-defecation-free area” but lack of knowledge regarding hygiene and sanitation some household especially children are still not using toilet facility (Table 4.7).

As shown in Table 4.7 the main source of drinking water used by household was tube well, i.e., 97.9%. Only 2.1% of household use tap water as a source of drinking water as shown in Table 4.6. None of the household was purified/treated water before they drink. Similar study conducted in Ethiopia showed that children from families not treated their drinking water were more likely affected by wasting as compared to the children from families treated their drinking water (Mengistu *et al.*, 2013).

Table 4.7 Household characteristics

Variables	Frequency	Percent
Source of water		
Tube well	141	97.9
Tap water	3	2.1
Fruit tree		
No	111	77.1
Yes	33	22.9
Kitchen garden		
No	73	50.7
Yes	71	49.3
Domesticated animals		
No	38	26.4
Yes	106	73.6

Maximum (77.1%) of households did not have any kinds of fruit trees. Only 22.9% of households had some kind of fruit trees like mango, bayar, guava trees. More than half (50.7%) of households did not have kitchen garden. Families who had kitchen garden (49.3%) were also grown only some seasonal vegetables in less amounts. So, the kitchen gardening practices were seen less. Most families (73.6%) had domesticated animals, mainly cow, ox, duck, goat, chicken. Only 26.4% of families did not have any kind of domesticated animals (Table 4.7).

4.8 Nutritional status of children

Out of 144 children 71 were male and 73 were female. In which 23.6% was found to be stunted, 19.4% was found to be wasted and 27.8% was found to be underweight as shown in Fig. 4.5. According to NDHS 2011 41%, 11% and 29% of Nepalese children are found to have stunted, wasted and underweight, respectively. The result of this study was revealed that prevalence of stunting was lower but prevalence of wasting was higher and underweight is slightly lower than NDHS result.

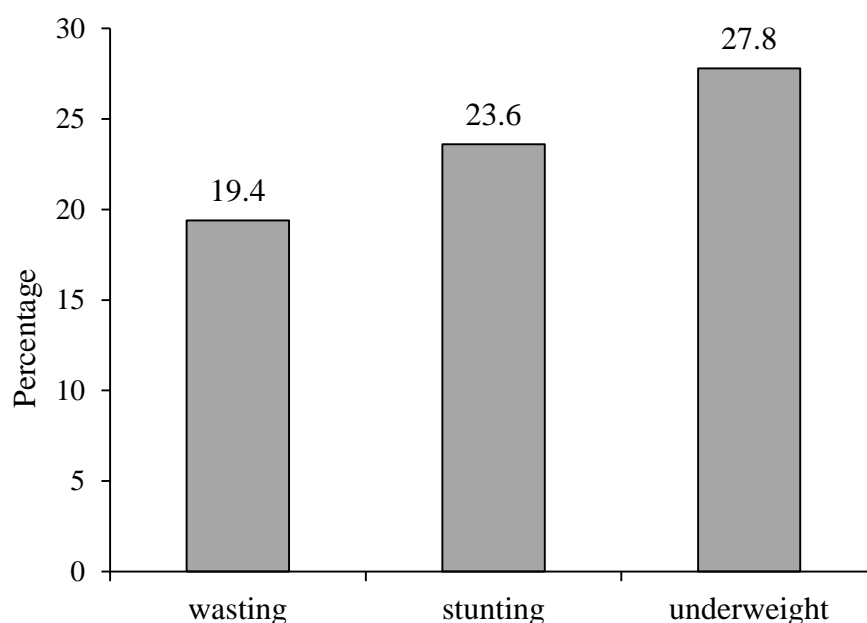


Fig. 4.5 Prevalence of malnutrition among surveyed children

Study conducted in rural Terai of Eastern Nepal by Chhetri, (2005) showed that stunting was 36.6%, wasting was 29.8% and underweight was 53.3% which is relatively higher percentage of malnutrition than present study.

Table 4.8 Age distribution of malnutrition

Age group (months)	N	WHZ (%)		HAZ (%)		WAZ (%)	
		<-3	<-2	<-3	<-2	<-3	<-2
6- 11	16	Nil	25.0	6.3	50.0	6.3	25.0
12- 23	29	6.9	20.7	13.8	20.7	6.9	34.5
24-35	43	4.7	27.9	14.0	23.3	11.6	32.6
36-47	28	Nil	10.7	3.6	14.3	3.6	14.3
48-59	28	Nil	10.7	10.7	21.4	Nil	28.6

From the Table 4.8, it is observed that prevalence of wasting, and underweight was more prevalent in 24- 35 months age group while prevalence of stunting was higher in age group 6-11 months. In present study stunting is higher in younger age children this may be due to the lack of nutritional care during adolescent, pregnancy and lactating period. Similar survey conducted in central Terai of Dhanusa showed that stunting was increasing in

higher age. But proportion of stunted children is also higher for six months and below age (Sah, 2004).

4.9 Nutritional situation according to gender

Table 4.9 shows that prevalence of wasting, stunting and underweight according to their gender.

Table 4.9 Distribution of nutritional situation according to gender

	<-3 Z-score	<-2 Z-score	>-2 Z-score
Wasting			
Male	3 (4.2%)	11 (15.5%)	57 (80.3%)
Female	1 (1.4%)	13 (17.8%)	59 (80.8%)
Stunting			
Male	7 (9.9%)	10 (14.1%)	54 (76.1%)
Female	8 (11.0%)	9 (12.3%)	56 (76.7%)
Underweight			
Male	4 (5.6%)	17 (23.9%)	50 (70.4%)
Female	5 (6.8%)	14 (19.2%)	54 (74.0%)

From Table 4.9, it was seen that 4.2% of male and 1.4% of female children were found to be severely wasted. Similarly, 15.5% of male and 17.8% of female children's was moderately wasted. The survey showed that prevalence of wasting was equal in both sexes.

The result showed that 9.9% of male and 11% of female children were found to be severely stunted and 14.1% of male and 12.3% of female children were moderately stunted. Overall, the survey showed that prevalence of stunting was equal in both sexes.

In the case of underweight 5.6% of male and 6.8% of female children were severely underweight and 23.9% of male and 19.2% of female children were moderately underweight. The result showed that underweight was found to be higher in male child than female.

4.10 Distribution of malnutrition according to MUAC measurement

Table 4.10 Distribution of malnutrition according to MUAC measurement

MUAC range	Frequency	Percent
Severe (< 11.5)	11	7.7
Moderate (11.5-12.5)	12	8.3
Normal (\geq 12.5)	121	84.0

On the basis of Mid-Upper Arm Circumference (MUAC) 7.6% of children were found to be severely malnourished, 8.3% of children were found to be moderately malnourished and 84% of children were found to be normal (Table 4.10).

4.11 Weight for Height curve

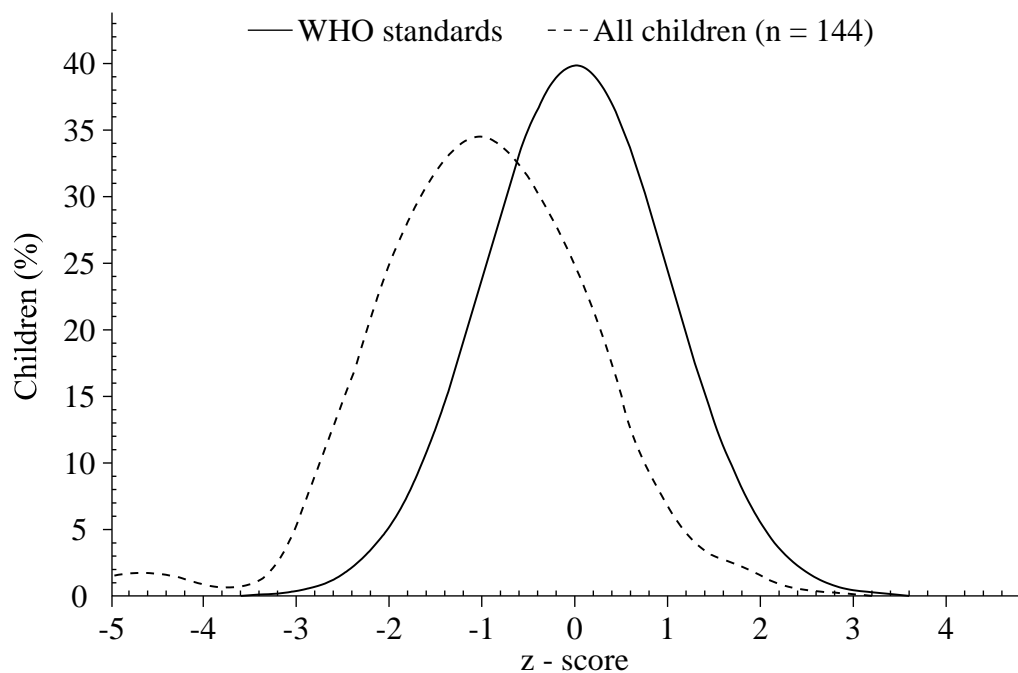


Fig. 4.6 Weight for Height curve with reference to WHO standard

The median weight-for-height z-score of survey children was found to be -1.01 which is less by 1.01 with reference to WHO standard. This is why curve is slightly skewed to the left side of the WHO standard curve showing the prevalence of wasting among the study population as shown in the Fig. 4.6.

The present study revealed that the overall prevalence of wasting is to be 19.4% which is higher than national prevalence of wasting i.e., 11% (NDHS, 2011). The term wasting is normally used as an indicator of current nutritional status. In the current study higher percentage of mothers were illiterate. NDHS (2011) survey showed that a mother's level of education generally has an inverse relationship with wasting levels. The present study also showed that illiterate mother had low nutritional knowledge score as compared to literate mothers which may be the reason behind high percentage of wasting to the children of this community as compared to the National level.

In contrast to our study, the study conducted in Musahar community of Madheli VDC, Sunsari by Chaudhary (2017), 10% wasting was observed which is lower than present study while study conducted in Padampur VDC, Chitwan by Ruwali (2011) showed that prevalence of wasting was 25.7% which is higher than present study.

Similarly, 17.7% wasting was observed in North West Ethiopia which is slightly lower than present study. This could be attributed to a large extent to the income of their parents (Edris, 2007).

4.11.1 Factor affecting wasting

The Chi-square test revealed that there is significant association for wasting with duration of breastfeeding ($P=0.028$), reason of malnutrition ($P=0.032$), knowledge of food during diarrhea ($P=0.013$), calorie intake by the children ($P=0.003$) and mothers' nutritional knowledge ($P=0.001$) and there is no significant association for wasting with mother education (Table 4.11).

In present study, children who were currently breastfeeding at that time were found to be more wasted. This could be because of their younger age, as different studies have shown that wasting is prevalent in younger children. Study conducted in Sri Lanka shows that Prevalence of wasting was low in both age groups under 6 months and 6-11 months, with high prevalence values seen in the age group 24-35 months of age (Jayatissa *et al.*, 2012). Which indicate prevalence of wasting is higher in younger age, in present study young children were still breastfeeding but some of old children stop continuation of breastfeeding, this may be the reason behind children who are still breastfeeding has higher rate of wasted than other children's. The significant association between current status of

breastfeeding and wasting ($P = 0.025$) was also found in Panchgachhi VDC, Jhapa (Dhakal, 2015).

Table 4.11 Factors associated with wasting

Factors		Weight for Height		χ^2 value	P- value
		Wasting	Normal		
Duration of breast feeding	No	0 (0%)	2 (100%)	9.107	0.028
	< 6 months	0 (0%)	2 (100%)		
	6-59 months	5 (9.1%)	50 (90.9%)		
	Still	23 (27.1%)	62 (72.9%)		
Malnutrition reason	No idea	20 (23.3%)	66 (76.7%)	6.86	0.032
	Insufficient	6 (10.9%)	49 (89.1%)		
	Lack of sanitation	2 (66.7%)	1 (33.3%)		
Food during diarrhea	No idea	11 (39.3%)	17 (60.7%)	8.742	0.013
	Soup	6 (14.3%)	36 (85.7%)		
	As usual	11 (14.9%)	63 (85.1%)		
Calorie intake	Adequate	10 (11.5%)	77 (88.5%)	8.869	0.003
	Inadequate	18 (31.6%)	39 (68.4%)		
Mothers nutritional knowledge	Poor	16 (39%)	25 (61.0%)	14.125	0.001
	Average	11 (12.1%)	80 (87.9%)		
	Good	1 (8.3%)	11 (91.7%)		
Mothers education	No	19 (24.4%)	59 (75.6%)	4.871	0.181*
	Primary	3 (10%)	27 (90.0%)		
	Secondary	6 (18.8%)	26 (81.2%)		
	Intermediate	0 (0%)	4 (100%)		

*Statically not significant (P- value > 0.05)

Food during diarrhea is significantly associated with wasting. Children's of mothers who did not know what kinds of food are given to the children during diarrhea was more wasted than other children. NDHS 2011 report showed that 71% of children who had diarrhea were given the same amount of fluid as usual, 14% were given more, 10% were

given somewhat less than the usual amount and 1% were given much less fluid. Four percent of children with diarrhea were not given any liquids (Table 4.11).

The association of calorie intake and wasting was found to be statistically significant. Children who consumed inadequate calorie were found to be more wasted than the children who consumed adequate calories. Study conducted in Ethiopia revealed that, most serious nutritional problems are mainly due to low intake of food (Mengistu *et al.*, 2013). Mothers nutritional knowledge is significantly associated with wasting. Mother who had poor knowledge score level have higher percentage of wasted children's than mother who had average or good knowledge score.

There was no significant ($P > 0.05$) association between mothers education with child wasting. This is similar to the study conducted in North West Ethiopia (Edris, 2007) and Panchgachhi VDC, Jhapa (Dhakal, 2015).

4.11 Height for Age curve

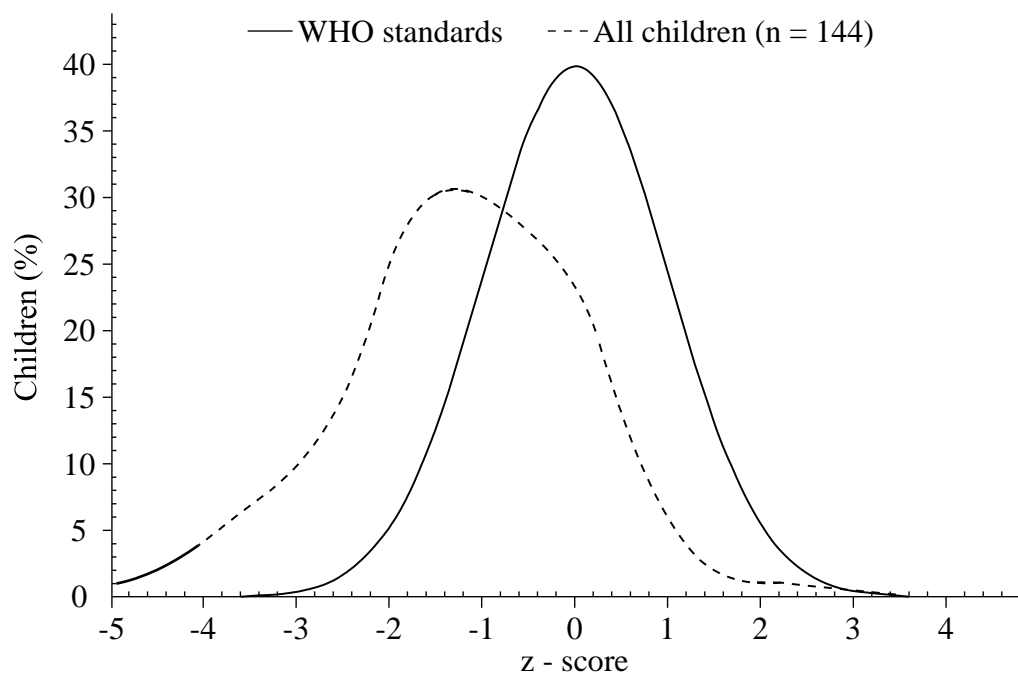


Fig. 4.7 Height for age curve with WHO standard

The median height for age z-score of survey children was found to be -1.30 which is less by 1.30 with the reference to WHO standard. This is why the curve is slightly skewed to the left side of WHO standard curve showing the prevalence of stunting among study population as shown in Fig. 4.7.

Present study revealed that the overall prevalence of stunting to be 23.6% which is lower than national data (41%) reported by NDHS, 2011. NDHS report and several other reports revealed that stunting was higher in mountain region than Terai region. In the study area there was higher percentage of illiterate mothers and also they have poor knowledge on nutrition, poor feeding practices and child caring practice was found. During the survey more than half of the children had inadequate calorie intake, long term inappropriate calorie intake can cause malnutrition to the children. Inappropriate calorie intake and poor nutritional knowledge may be the reason of stunting in children in the current study.

The prevalence of stunting was slightly higher than the study conducted in Padampur VDC, Chitwan by Ruwali (2011) in his study 22.7% of the under-five children's were stunted while the prevalence of stunting was lower than the study conducted in Belahara VDC, Dhankuta by Sapkota and Gurung (2009) in their study 37% of under-five children were stunted.

4.12.1 Factors affecting stunting

From the Table 4.12, it can be concluded that there is significant association between kitchen garden ($P=0.024$) and calorie intake ($P=0.001$) whereas there was no significant association with marriage age ($P=0.094$), *maad* ($P=0.748$) and family type ($P=0.669$) with stunting while study conducted in Dhanusa by Sah (P=2004) showed that use of *maad* has noticed effect on stunting.

Kitchen garden is the easiest ways of ensuring access to a healthy and fresh diet at home. This is especially important in rural areas where people have limited income earning opportunities and poor access to markets. In this study not having kitchen garden at home was significantly ($P < 0.05$) associated with stunting. This may be due to the parents did not have enough money to buy fresh vegetables in daily basis, having kitchen garden help them to save their money to buy other needs and they also get fresh vegetables at home that contain adequate macro and micronutrients. Children who are not getting enough nutrients from their food were high risk of being stunted. The children from households who did not have kitchen gardens at home were deprived from fresh foods and nutrients for longer time especially during off season because during off season price of foods were high. Due to very low income most of the families are unable to buy sufficient and good quality foods in daily basis during off season due to the high price of foods which may be

the reason for high stunting in the children from households who did not have kitchen garden at home.

Calorie intake was significantly associated with stunting. Children who consume inadequate amounts of calorie were found to be more stunted. Similar study conducted in Nairobi, Kenya showed that risk of stunting was 3.3 times lower among children who had adequate energy intake compared to the children who took inadequate energy (Mwaniki and Makokha, 2013).

Table 4.12 Factors associated with stunting

Factors		Height for Age		χ^2 value	P- value
		Stunting	Normal		
Kitchen garden	No	23 (31.5%)	50 (68.3%)	5.118	0.024
	Yes	11 (15.5%)	60 (84.5%)		
Calorie intake	Adequate	12 (13.8%)	75 (86.2%)	11.746	0.001
	Inadequate	22 (38.6%)	35 (61.4%)		
Marriage age	< 15	0 (0%)	2 (100%)	4.724	0.094*
	15-19	28 (28.3%)	71 (71.7%)		
	20-25	6 (14%)	37 (86.0%)		
Maad	No	2 (16.7%)	10 (83.3%)	0.582	0.748*
	In animal feed	18 (22.8%)	61 (77.2%)		
	Discard	14 (26.4%)	39 (73.6%)		
Family type	Nuclear	11 (21.6%)	40 (78.4%)	0.183	0.669*
	Joint	23 (24.7%)	70 (75.3%)		

* Statistically not significant at 5% level of significance (P- value >0.05)

The result showed that, there is no significant association between marriage age, *maad* and family type with stunting (Table 4.12).

4.13 Weight for Age curve

The median weight for age z-score of survey children was found to be -1.40 which is less by 1.40 with reference to WHO standard. This cause the curve slightly skewed to the left

side of WHO standard curve showing the prevalence of underweight among study population as shown in Fig. 4.8.

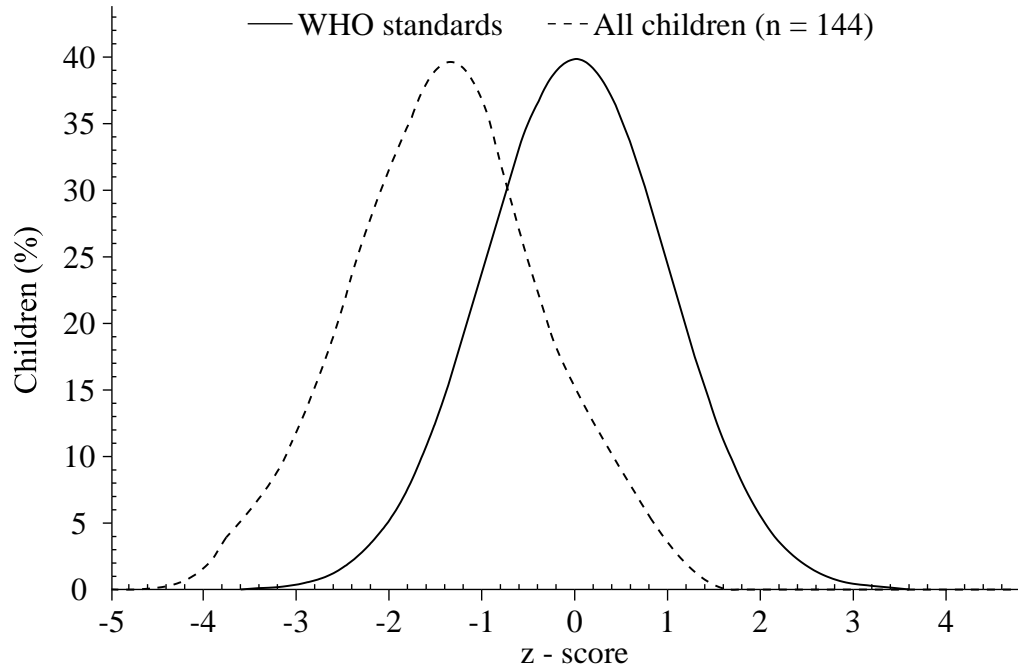


Fig.4.8 Weight for Age curve with reference to WHO standard

In present study 27.8% were underweight which is slightly lower than national NDHS 2011 reports in which 29% were underweight. The cause of underweight may be due to inadequate calorie intake by the children and poor nutritional knowledge level of the mothers. Similar study conducted in Musahar community at Madheli VDC, Morang found that 41.7% of children age 6- 59 months were underweight which is higher than this study (Chaudhary, 2017).

A study conducted in North East Ethiopia showed that 28.5% were underweight which is slightly higher than this study (Edris, 2007).

4.13.1 Factors associated with underweight

Table 4.13 Factors associated with underweight

Factors		Weight for Age status		χ^2 value	P-value
		Underweight	Normal		
Iron folate	No	6 (85.7%)	1 (14.3%)	4.462	0.002
	Yes	34 (24.8%)	103 (75.2%)		
Malnutrition					
reason	No idea	23 (26.7%)	63 (73.3%)	7.882	0.019
	Insufficient food	14 (25.5%)	41 (74.5%)		
	Lack of sanitation	3 (100%)	0 (0%)		
Calorie					
intake	Adequate	11 (12.6%)	76 (87.4%)	25.093	0.000
	Inadequate	29 (50.9%)	28 (49.1%)		
Mothers					
nutritional					
knowledge	Poor	19 (46.3%)	22 (53.7%)	10.830	0.004
	Average	20 (22%)	71 (78.0%)		
	Good	1 (8.3%)	11 (91.7%)		

Statistically significant association was found between iron folate intake during pregnancy (P=0.002), malnutrition reason (P=0.019) and calorie intake (P=0.000) and mother's nutritional knowledge (P=0.004) with underweight.

In the present study, there was significant association between iron folate intakes with underweight. Children born to mother who consumed iron folate during pregnancy had less chance of having underweight baby. Similar survey (Ramakrishnan, 2004) conducted in South Asia, showed that iron supplementation is documented to have a significant effect on low-birth-weight. In Nepal, mothers not consuming iron supplement during their pregnancy are reported to more likely have LBW babies (Vir, 2016). Improving the iron and folate intake of women of reproductive age could improve pregnancy outcomes and enhance maternal and infant health. Iron and folic acid supplementation can ensure the iron and folate status of women before and during pregnancy therefore in this study mothers

who take iron and folic acid tablet during pregnancy had less chance of being underweight baby.

Underweight was significantly associated with calorie intake by the children. In this study children who consumed inadequate calories were found to be more underweight. Which is similar to the study conducted in Kenya, in which proportion of underweight children was inversely and significantly ($p < 0.05$) correlated with children's energy intake (Mwaniki and Makokha, 2013).

Mothers' nutrition knowledge was significantly associated with underweight (0.004). Prevalence of underweight was significantly higher among children whose mothers had poor nutritional knowledge level. Study conducted in Nigeria also shows that there is significant relationship between maternal nutrition knowledge with underweight (Jemide *et al.*, 2016).

Part V

Conclusions and recommendations

5.1 Conclusions

This study has generally assessed the mothers' nutritional knowledge in childcare practices and nutritional status of 6-59 months *Batar* children in Jhorahat VDC. Based on the study the conclusions are:

- i. The prevalences of underweight, wasting and stunting in children between 6-59 months of *Batar* children were 27.8%, 19.4% and 23.6% respectively. The prevalence of malnutrition was similar in both sexes.
- ii. Wasting and underweight was highest in the age group between 24-35 months while stunting was highest in the age group between 6-11 months.
- iii. Calorie intake by the children's had significant relationship with child malnutrition (stunting, wasting and underweight).
- iv. The duration of breastfeeding, reasons of malnutrition, food during diarrhea and mothers nutritional knowledge score are significantly associated with wasting.
- v. Having kitchen garden at home has significant association with stunting.
- vi. Iron folate intake during pregnancy, reason of malnutrition and mothers nutritional knowledge score has significant association with underweight.
- vii. The determinants of malnutrition like mothers education, marriage age, *maad* and family type though considered as important factors affecting nutritional status of under five children were not significantly associated with any forms of malnutrition in this study.
- viii. In the nutrition knowledge score, about 63.2% of the mothers had average knowledge score. This indicates that the nutritional knowledge of the mothers was in average range. Nutrition knowledge score was found to be significantly associated with wasting and underweight while there is no significant association between stunting.

5.2 Recommendations

Based on the results of this study following recommendations could be made in order to improve the nutritional status of children under-five years in the survey area.

- i. There is the need for intervening nutritional and health education as educated mother is most likely to provide better care in terms of good nutrition and better hygiene which in turn improve the nutritional status.
- ii. Promotion of locally available nutritious food and practice of kitchen garden at home should be encouraged to the mothers.
- iii. Supplementary feeding programs for children under-five through network of childcare centers should be organize to improve nutritional status of children.
- iv. Similar cross – sectional descriptive or longitudinal survey can be conducted to determine the magnitude and distribution of malnutrition and other probable causes of malnutrition.

PART VI

Summary

Association between mothers' nutritional knowledge in childcare practices and nutrition status of 6-59 months *Batar* community children of Jhorahat VDC, Morang was carried out by taking 144 children of *Batar* community. Census sampling method was taken for data collection.

Hundred and forty-four children of *Batar* community were taken. Anthropometric measurements (like height, weight, MUAC, edema) were taken to assess the nutritional status of *Batar* children and structured questionnaire was asked to the mothers to examine knowledge level in child care practices. The data collected were analyzed by using SPSS version 20 (Page *et al.*, 2003) and WHO Anthro 3.2.2 (Blössner *et al.*, 2010) version and Chi-square test was used to test the association between factors assumed responsible for malnutrition.

Prevalence of underweight, wasting and stunting was 27.8%, 19.4% and 23.6% respectively. When analysis was done to find the possible factors associated with malnutrition it was seen that prevalence of malnutrition was similar to both sexes. Prevalence of underweight and wasting was more prevalent in 24-35 months age and stunting was higher in age group 6-11 months. Among 144 children, 71 were male and 73 were female and 59% of children were still breastfeeding at the time of survey.

Majority of households (97.2%) were headed by male. Regarding family type, 35.4% of families were from nuclear family while 64.6% from joint families and annual income of 60.4% families was below one lakh.

Most of the mothers (81.9%) were in the age group between 20-30 years. More than 70% of mothers under the survey were house-wife and 68.8% of mothers were married in age group between 15 to 19 years. Survey result showed that 77.8% of mothers were aware about initiation of breastfeeding within an hour after birth and 96.5% of children were given colostrum milk after the birth. More than half of the mothers (63.2%) had average knowledge score regarding the knowledge in child care practices.

Chi-square test analysis of the determinants of nutritional status indicated that, calorie intake by the children's was significantly ($P < 0.05$) associated with stunting, wasting and underweight. Mother's knowledge score and reason of malnutrition were significantly ($P < 0.05$) associated with wasting and underweight. There was significant ($P < 0.05$) association of wasting with duration of breastfeeding and types of food during diarrhea. Stunting was significantly ($P < 0.05$) associated with kitchen garden at home and underweight was significantly ($P < 0.05$) associated with iron folate intake during pregnancy.

From the findings of this study, it is concluded that malnutrition is still an important problem among 6-59 months of *Batar* children in Jhorahat VDC. To reduce the burden of malnutrition among these children, a combined effort by the government, non-governmental organizations and the community is essential to improve the nutritional status of children. Effective, efficient and equitable program should be designed to reduce child malnutrition. A healthy mother can give birth to a healthy children, thus the intervention programs for improving the nutritional status of children must focus not only on children but also on their mothers.

The result obtained from this dissertation can be used by the government as well as other organizations for eradicating the malnutrition problem.

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Appendices

Appendix –A

Consent letter

नमस्कार,

मेरो नाम भीष्मा राई हो, म केन्द्रीय प्रविधि क्याम्पस, धरानमा पोषण तथा आहार विज्ञान (BND), चौथो वर्षमा अध्ययनरत विद्यार्थी हु। यस संकायको चौथो वर्षको पाठ्यक्रम अन्तर्गत म शोधपत्र गरिरहेको छु। मेरो शोधपत्रको विषय "Association between mothers nutritional knowledge in childcare practices and nutrition status of 6-59 months *Batar* community children of Jhorahat VDC, Morang" रहेको छ। यो अध्ययनको उद्देश्य यस क्षेत्रका बालबालिकाको पोषण स्थितिको बारे जानकारी संकलन गर्नु रहेको छ। यो जानकारीले हाम्रो अध्ययनलाई सहज बनाई हामीलाई सहयोग गर्नेछ र यसले यस गा.वि.स. को पोषण स्थितिलाई सुधार गर्नका लागि पनि केहि मद्दत गर्न सक्नेछ।

तपाईंको छोरा/छोरी यस अध्ययनको लागि सहभागी हुन छानिनु भएको छ र म तपाईंलाई यस सर्वेक्षणका प्रश्नहरु गर्ने छु, तपाईंको बच्चाको केहि नाप लिनेछु। यो सर्वेक्षणले तपाईंको बच्चाको पोषण स्थिति बारे थाहा हुन्छ र बच्चालाई पोषण सम्बन्धि विशेष पर्ने वा नपर्ने पनि थाहा पाउन सक्नुहुनेछ। अध्ययनका केही प्रश्नहरु नितान्त व्यक्तिगत पनि हुन सक्छन् र तपाईंले दिनु भएको सबै जानकारीहरु महत्वपूर्ण हुनेछन् र सो जानकारीहरु एकदमै गोप्य राखिनेछ साथै तपाइबले दिनुभएको सुचना तथा तथ्याङ्कको दुरुपयोग गरिनेछैन। यो अध्ययनमा तपाईंको सहभागिता स्वैच्छिक हुनेछ। यदि तपाईंलाई कुनै वा सबै प्रश्न व्यक्तिगत वा सम्बेदनशील लागेमा उत्तर नदिन पनि सक्नु हुन्छ। तर म यो आशा गर्दछु कि तपाईं यस अध्ययनमा सहभागी हुनु हुनेछ।

के तपाईं यस अध्ययनमा सहभागी हुन इच्छुक हुनुहुन्छ ?(इच्छुक भए मात्र प्रश्न गर्ने नभए अन्तवार्ता टुङ्ग्याउने)

म यस अध्ययनमा सहभागीहुन इच्छुक छु र यस अध्ययनका लागि आवश्यक पर्ने मेरो बच्चाको नाप तौल लिन अनुमति दिन्छु।

अध्ययनमा छानिएको बच्चाको अभिभावकको सहि.....

सर्वेक्षण गरेको मिति

सर्वेक्षण गर्ने को सहि.....

Appendix-B

Questionnaire for mother's

A. General Description

Code No.	Ward No.
Child's Name	Age
Date of Birth	Gender: Male / Female
Mother's Name	Age

B. Child's Description

Anthropometric measurement of children

Height (cm)	Weight (Kg)	MUAC (cm)	edema (Yes / No)

1. Weight of newly born child? >2.5 kg / 2.5 kg / < 2.5 kg / No idea
2. Did your child is affect by any disease recently?

C. Family members description

1. Head of household: M /F
2. Total members: M / F
3. Total Children: M /F
4. Family Type: Single /Joint
5. Religion: Hindu / Christian / Other
6. What is your husband's occupation? Agriculture / Business / Employment/ Foreign Employment / Labor / Other
7. What is your occupation? Housewife / Agriculture / Business / Employment/ Foreign Employment / Labor / Other
8. Father's education level? Primary Level (1-5) / Secondary Level (6-10) / Intermediate / None
9. Mother's education level? Primary Level (1-5) / Secondary Level (6-10) / Intermediate / None
10. Family's annual Income?.....
11. House structure? Cemented / Mud

D. Mother's health description

1. Age of marriage? 15 or less / 15-19 years / 20-35 years / 35 or more

2. Age at first pregnancy? 15 or less / 15-19 years / 20-35 years / 35 or more

3. Did you take iron and folic acid tablet during your pregnancy? Yes/ No

4. Vaccinations during pregnancy? Yes / No

E. Knowledge of mother regarding breastfeeding and weaning

1. What was your child's age up to which you breast-fed?

2. Had your child suffered from diarrhea? Yes / No

3. Did you give Vitamin A capsule and de-worming tablet supplementation to your child?
Yes / No

4. Do you feed cow milk to your child? Yes / No

5. How many times per week your child is fed fruits? Daily / Sometimes / Never

6. How many days per week your child is fed green leafy vegetables? Daily/ Sometimes/
Never

7. How many days per week your child is fed meat or fish items? Daily/Sometimes/ Never

8. Did you feed anything except mother's milk to your child? Yes/ No

9. What food items do you feed to your child?

i. *Lito*

iii. Same as other family members

ii. *Gilo* rice

iv. *Sarbottam pitho* v. Others

10. Do you restrict any foods to your child? Yes / No

11. If yes, why do you?

F. Mother Nutritional Knowledge

1. Did you breast-feed your child as soon as birth? Yes / No

If not, what was the reason?

2. At what time is it suitable to initiate breastfeeding? Within 1 hour/ 8 hours /24 hours / no
idea

3. Why colostrum feeding is important to the child? don't know/ good for child health/
makes child healthy and strong

4. Did you feed colostrum to your child? Yes / No

5. Do you know about exclusively breastfeeding? Yes / No

6. How long a child should be breastfed? 1/ 2/ 3/ 4/ 5/ 5 or more/don't know

7. At what age to start feeding other foods to the child?

8. How many times per day child should be fed food? 3 or less / 3 / 4 / 4 and more

9. What kinds of salt are good to use at home? Iodized salt/ non-iodized salt / both (iodized,
non iodized)

10. Do you know about *sarbottam pitho*? Yes/ No

11. Do you have knowledge about malnutrition? Yes/ No
12. If you know about malnutrition, what may be the cause of it?
- i. Poor hygiene
 - ii. Dirty water
 - iii. Lack of diet
 - iv. Superstition
 - v. Poor sanitation
 - vi. Don't know
 - vii. God's curse
13. Do you have knowledge about diarrhea? Yes / No
14. If you know about diarrhea, what may be the cause of it?
- i. Poor hygiene
 - ii. Superstition
 - v. Lack of diet
 - vii. God's curse
 - iii. Dirty water
 - iv. Poor sanitation
 - vi. Don't know
15. Do you know the process of preparing Oral Rehydration Solution (ORS) at home? Yes/ No
16. What kinds of food should be given to the children during diarrhea?
- i. Soup
 - ii. Same as usual
 - iii. No idea
17. What would you do with the *maad* ?
- i. Mix on curry
 - ii. Do not extract
 - iii. Mix on animal's feed
 - iv. Discard
18. Do you know extracted *maad* also have nutrients? Yes/ No
19. When will you wash your vegetables? Before cutting / After cutting
20. Where do you take your child for treatment during illness?
- i. Hospital (health post)
 - iv. No idea
 - iii. *Dhami-jhakri* and hospital both

G. Additional knowledge

1. What is your source of water for general household purposes?
- i. Water pumps
 - ii. Tap
 - iii. Boring
 - iv. Other
2. How do you prepare drinking water?
- i. By filter
 - ii. Boiling
 - iii. Other
 - iv. Direct use from source
3. Do you have toilet in your home? Yes /No
4. Do you have fruits tree at your home? Yes / No

5. Do you have kitchen garden at your home? Yes/ No

6. Which pets do you owe, if any?

Buffalo

Goat

Cow / Ox

Duck / Chicken

Pig

Other

24 hours dietary recall for children:

Timing	Description of food or drink	Brand name	Serving	Amount
Breakfast (6 to 9 AM)				
Lunch (9 to 11 AM)				
Snacks (11 to 5 PM)				
Dinner (6 to 11 PM)				

Questionnaire in Nepali

क. सामान्य जानकारी

कोड नं.	वडा नं.
बच्चाको नाम	उमेर
जन्म मिति	लिङ्ग: म. /पु.
आमाको नाम	उमेर

ख. बच्चाको विवरण

Anthropometric measurement of children

Height (cm)	Weight (Kg)	MUAC (cm)	Oedema (Yes/ No)

१. बच्चा जन्मदाको तौल? २.५के.जी./२.५के.जी./ २.५के.जी./ थाहा छैन
२. तपाईंको बच्चालाई भर्खरकुनै विरामी भएको थियो?

ग. परिवारको सदस्यको विवरण

१. घरमुली : म. /पु.
२. जम्मा परिवार संख्या: म. / पु.
३. जम्मा बच्चा : म. / पु.
४. परिवारको प्रकार : एकल / संयुक्त
५. धर्म : हिन्दु/क्रिस्चियन /अन्य
६. तपाईंको श्रीमानले के काम गर्नुहुन्छ? कृषि/व्यापार/नोकरी/वैदेशिक रोजकार/मजदुरी /अन्य
७. तपाईं के काम गर्नुहुन्छ? गृहिणी/ कृषि/व्यापार/नोकरी/वैदेशिक रोजकार/मजदुरी /अन्य
८. तपाईंको श्रीमानले कति पढ्नु भएको छ? प्राथमिक तह (१-५)/माध्यमिक तह (६-१०)/क्याम्पस/छैन
९. तपाईंले कति पढ्नु भएको छ? प्राथमिक तह (१-५)/माध्यमिक तह (६-१०)/क्याम्पस/छैन
१०. तपाईंको परिवारको वार्षिक आम्दानी कति छ?

११. घरको प्रकार : पक्की/ कच्ची

घ. आमाको स्वास्थ्य सम्बन्धी जानकारी

१. तपाईं कति वर्षको हुदाँ तपाइको विवाह भएको हो? १५ वर्ष भन्दा कम/ १५-१९ वर्ष/२०-३५ वर्ष/३५ वर्ष भन्दा माथि
२. तपाईं पहिलो पटक गर्भवती हुदाँ कति वर्षको हुनुहुन्थ्यो? १५ वर्ष भन्दा कम/१५-१९ वर्ष/२०-३५ वर्ष/३५ वर्ष भन्दा माथि
३. गर्भवती हुदाँ आइरन/ फोलेट चक्की खानु भएको थियो? थियो/थिएन
४. गर्भवती हुदाँ खोप लाउनु भएको थियो? थियो/थिएन

ङ. स्तनपान तथा थप आहारबारे आमाको ज्ञान

१. बच्चालाई आमाको दुध कति वर्षको हुदाँसम्म खुवाउनुभयो?
२. बच्चालाई भाडापखाला लागेको छ? छ/छैन
३. पोलियो थोपा (भिटामिन ए) र जुकाको औषधी खुवाउनु भएको छ? छ/छैन
४. बच्चालाई गाईको दुध खुवाउनुहुन्छ? खुवाउछु/ खुवाउदिन
५. हप्तामा कति पटक फलफुल खुवाउनुहुन्छ? सधै/कहिलेकाही/ खुवाउदिन
६. हप्तामा कति पटक हरियो सागपात खुवाउनुहुन्छ? सधै/कहिलेकाही/ खुवाउदिन
७. हप्तामा कति पटक माछामासु खुवाउनुहुन्छ? सधै/कहिलेकाही/ खुवाउदिन
८. बच्चा जन्मनासाथ आमाको दुधवाहेक केही खुवाउनु भएको थियो? थियो/थिएन
९. कुन प्रकारको खानेकुरा खुवाउनुहुन्छ? सातु (लिटो) /गिलो भात/अन्य परिवारको जस्तो/अन्य सेरेलेक /.....
१०. बच्चालाई कुनै खानेकुरा खुवाउन बार्ने गर्नुभएको छ? छ/छैन
११. छ भने किन?

च. आमाको पोषण सम्बन्धी ज्ञान

१. तपाईंले बच्चालाई जन्मनासाथ स्तनपान गराउनु भएको थियो? थियो/थिएन
गराउनु भएको थिएन भने किन?
२. बच्चालाई कति घण्टा भित्रस्तनपान गराउनुपर्छ? १/८/२४ भित्र/ थाहा छैन
३. बच्चालाई विगौतिदुध किन आवश्यक छ? थाहा छैन/ बच्चालाई राम्रो गर्छ/ बच्चालाई स्वस्थ र बलियो बनाउछ
४. बच्चालाई विगौतिदुध खाउनु भएको थियो? थियो/थिएन
५. तपाईंले पूर्णस्तनपान भनेको थाहा छ? छ/ छैन

६. बच्चालाई दुध कति वर्ष हुदांसम्म खुवाउनु पर्छ ? १/२/३/४/५/५ भन्दा बढी / थाहा छैन ।
७. दुधवाहेक अन्य खानेकुरा कहिलेबाट खुवाउन सुरु गर्नुपर्छ?
८. दिनमा कति पटक खाना खुवाउनु पर्छ ? ३ भन्दा कम/३/४/४ भन्दा बढी
९. कस्तो नुन प्रयोग गर्नुपर्छ ? आयो नुन/ ठिके नुन / थाहा छैन
१०. तपाईंलाई सर्वोत्तम पिठोको बारेमा थाहा छ ? छ/छैन
११. तपाईंलाई कुपोषण (कमजोरी) को बारेमा थाहा छ? छ/छैन
१२. थाहा छ भने किन हुन्छ ? खाना नपुगेर/ सरसफाईको कमीले/ भगवान रिसाएर / बोक्सी लागनाले/ कारण थाहा छैन
१३. तपाईंलाई भाडापखालाको बारेमा थाहा छ? छ/छैन
१४. छ भने के कारणले हुन्छ ? फोहोर पानी/ सरसफाईको कमी/ भगवनको सरापले/ थाहा छैन
१५. तपाईंलाई जिवनजल (पूनर्जलिय भोल) बनाउन आउछ? आउछ/ आउदैन
१६. भाडापखाला लाग्दा कस्तो खानेकुरा दिनुपर्छ? भोलिलो पदार्थ (भोल)/ अरुवेला खाएको जस्तै / अन्य
१७. भातको माड के गर्नुहुन्छ? चारोमा मिसाउछु/फाल्छु/ तरकारीकमा मिसाउछु/ माड तार्दिन्
१८. भातको माडमा पौष्टिक तत्व पाईन्छ बारेमा थाहा छ? छ/छैन
१९. तरकारी कति बेला धुनुहुन्छ ? काट्नु अघि / काटे पछि
२०. बच्चा विरामी हुदाँ कहाँ लैजानुपर्छ? हस्पिटल (स्वास्थ्य केन्द्र) /सुरुमा धामी अनि डाक्टरकोमा/धामी/ कही पनि लग्दिन

छ. अन्य जानकारी

१. पानीको लागी कुन स्रोत प्रयोग गर्नुहुन्छ? कल/धारा/बोरिड/ अन्य
२. पिउने पानीलाई कसरी प्रयोग गर्नुहुन्छ? फिल्टर गरेर/उमालेर/ अन्य/ केही नगरी
३. तपाईं को घरमा शौचालय छ ? छ / छैन
४. तपाईंको घरमा फलफुलको बोट छ? छ / छैन
५. तपाईंको घरमा करेसारवारी छ ? छ / छैन
६. घरपालुवा जनवार कुन कुन छ ?

भैसी

बाखा

गाई/गोरु

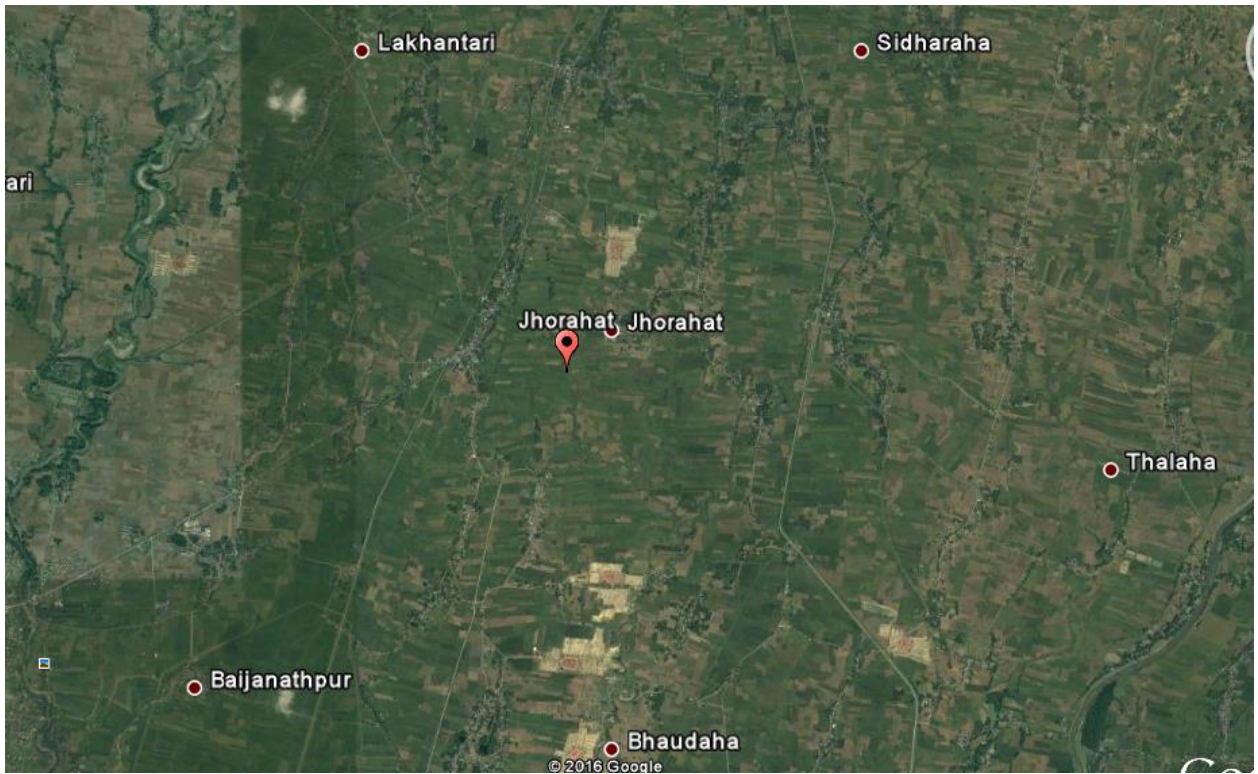
हाँस/कुखुरा

सुँगुर

अन्य

Appendix- C

Maps of Jhorahat VDC



Appendix- D
Photo Gallery



Fig. A Weighing of a child



Fig. B Measuring MUAC



Fig. C Filling up survey form by asking questionnaire at the study site.



Fig. D Primary Health Post of Jhorahat VDC, Morang.