

**ASSESSMENT OF FACTORS AFFECTING THE NUTRITIONAL
STATUS OF 6-59 MONTHS OF CHILDREN IN SATAR COMMUNITY
OF KANKAI MUNICIPALITY, JHAPA**

by

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Central Campus of Technology

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Tribhuvan University, Nepal,

March, 2017

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

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Approval Letter

This dissertation entitled *Assessment of factors affecting the nutritional status of 6-59 months of children in Satar community of Kankai Municipality, Jhapa* presented by Utsab Dhakal has been accepted as the partial fulfilment of the requirements for the B.Sc. degree in Nutrition and Dietetics.

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Regards,

Date of Submission:

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Utsab Dhakal

Abstract

A cross-sectional study was conducted to assess nutritional status of 6 to 59 months aged children of *Satar* community of Kankai Municipality, Jhapa. 128 children were found by applying census sampling technique for the assessment. Data was collected by using a structured questionnaire from 128 children paired with their respondent, anthropometric measurement and basic associated factors were collected. The response rate was 100%. SPSS version 20 and WHO anthro version 3.2.2 were used for data analysis. Chi-square and P-value techniques were used to assess factors associated with nutritional status of children.

A total of 128 children, 22.7%, 36.7% and 35.2% were wasted, stunted and underweight respectively, out of them 4.7%, 18% and 15.6% were severely wasted, severely stunted and severely underweight respectively. According to MUAC based on WHO classification, wasting was found to be 43%. MUAC on the basis of age group the highest percentage of wasting was found to be 53.3% in 36 to 47 months of children. On the basis of MUAC 0.78% were severely malnourished and 17.19% children were moderately malnourished. The children who had low BMI for age were 18.8%. All types of undernutrition were prevalence among 5% of total children. The study found significant association between stunting and consumption of meat per week ($P=0.01$). There was significant association of wasting with mother occupation ($P= 0.001$), consumption of pulses per week ($P= 0.011$), order of breastfeeding ($P=0.012$), introduction of supplementary feeding ($P=0.026$) and birth order ($P=0.001$). The result has shown that underweight is associated with birth weight ($P=0.022$) and father occupation ($P=0.042$).

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Abbreviations

Abbreviations	Full Form
CBS	Central Bureau of Statistics
DoHS	Department of Health Services
FCHV	Female Community Health Volunteer
HAZ	Height For Age
IDA	Iron Deficiency Anaemia
IDD	Iodine Deficiency Disorder
MoHP	Ministry of Health and Population
MUAC	Mid Upper Arm Circumference
NCHS	National Centre for Health Statistics
NDHS	Nepal Demographic Health Survey
PEM	Protein Energy Malnutrition
SAM	Severe Acute Malnutrition
SCN	Standing Committee for Nutrition
UNICEF	United Nations International Children Emergency Fund
VAD	Vitamin A Deficiency
VDC	Village Development Committee
WAZ	Weight For Age
WFP	World Food Programme
WHO	World Health Organization
WHZ	Weight for Height

Part I

Introduction

1.1 Background to the study

Nepal, characterised as an agriculture country has population of 26,494,504 (CBS, 2011a) is one of least develop country in world that is known for its low per capital income of \$ 472 (IMF, 2013). Low level of literacy rate, high mortality rate, high birth rate, and pervasive poverty are its characteristics. The large proportion of its population is under poverty line. The population under poverty line is 25.16 % (CBS, 2011a). Income inequality is the main feature of the country that effects on the consumption pattern of the people. This raises the gap between the poor and the rich in the country.

Nepal is a landlocked country of extreme diversity in terms of ethnicity, language, religion, society, culture and economic developed as well as topography. According to 2011 census record more than 126 cast ethnic groups and 123 languages are found. *Chhetri* is the largest caste/ethnic groups having 16.6% (4,398,053) of the total population followed by *Brahman-Hill* (12.2% ; 3,226,903), *Magar* (7.1% ; 1,887,733), *Tharu* (6.6% ; 1,737,470), *Tamang* (5.8% ; 1,539,830), *Newar* (5% ; 1,321,933), *Kami* (4.8% ; 1,258,554), *Musalman* (4.4% ; 1,164,255), *Yadav* (4% ; 1,054,458), *Satar* (0.2% ; 42,698) and *Rai* (2.3% ; 620,004)(CBS, 2011b).

Nepal covers 0.03 Percent area of World and 0.3 percent of Asia. That is on the southern region surrounded by two giant countries; India and China. The total area of Nepal is 147181sq.km that is located between 26⁰ 22' to 30⁰ 27' north latitude and 84⁰ 4' to 88⁰ 12' east longitude(Samyak, 2017). The average length from east to west is 885 km and its average breadth is 193 km. All societies are characterized by inequality, Nepal is no exception. So it is a nation of village inhabited by diverse ethnic groups, speaking different langue, holding different faiths and having different culture, different economic system. Apparently, Nepalese society is a mosaic society and it is rich in its culture diversity. So the entire ethnic groups of Nepal can be divided into three communities as: original Nepalese, Tibeto-Nepalese and Indo-Nepalese races. The original Nepalese tribes include several ethnic groups that have existed in the country from ancient period. The other two groups infiltrated into the country later. The original Nepalese community constitutes to

major sub-groups such as *Satar*, *Danuwar*, *Rajbanshi*, *Sunwar*, *Kusunda* and *Majhi* (Visitnepal.com, 2012).

Nepali is least developed nations in South-East Asia Region (SEAR), which was ranked 157 among 187 countries in the Human Development Index (UNDP, 2012). According to 2011 census, the total population of Nepal is 26.6 million. More than 83% of population resides in rural area. The infant and under five mortality rates are 64.2 and 91 per 1000 respectively. The population growth rate in 2011 is 1.41 % (CBS, 2011a).

Nutritional status is defined as the condition of the body resulting from the intake, absorption and utilization of food. It is determined by a complex interaction between internal/constitutional factors and external environmental factors: Internal or constitutional factors like: age, sex, nutrition, behaviour, physical activity and diseases. External environmental factors like: food safety, cultural, social and economic circumstances (Joshi, 2012).

Adequate Nutrition is the fundamental right of every human being. Poor nutrition is cited as the major factor in more than half of all child deaths in Nepal - a significantly higher proportion than those claimed by other infectious diseases. Malnutrition is not just a stark manifestation of poverty, it is also the 'non-income face of poverty' and it helps perpetuate poverty (WorldBank, 2012).

As the Nepal Demographic health survey 2006, (NDHS) 49% of children below 5 years of age are stunted and 20% are severely stunted. The survey also showed that 13% of the children are wasted and 3% are severely wasted and 39% of children below 5 year of age underweight and 11% are severely underweight. Similarly NDHS 2011 shows that 41% of the children under 5 year of age are stunted 16% are severely stunted. The surveys also showed that 11% of the children are wasted and 3% are severely wasted and 29% of the children below 5 years of age are underweight 8% are severely underweight.

Kankai Municipality lies in Terai region of Jhapa district. This Municipality consists of people of different ethnic group and different economic status.

Satar are one of the most backward and uneducated ethnic groups of Nepal. They are called "*Santhal*" in India and "*Sauntar*" in some places. But they are known by *Satar/Santhal* in Nepal. Major subclans of the *Satar* are *Kisku*, *Murmu*, *Hemram*, *Mardi*,

Soren, Hasda, Tudu, Baske, Besra etc. They live in the district of Jhapa, Morang and Sunsari, the largest number of *Satar* are living in Jhapa district. They have their own unique religion and culture. Bows and Arrows are their traditional weapons. They generally consume rat as their traditional food. They belongs to Austroasiatic group of human families (Subedi, 2014).

The problems of poverty, safe drinking water, environmental hygiene and poor literacy generally contribute to the problem of nutrition in *Satar* family. Kankai municipality is located on the eastern part of Nepal in Jhapa district, Mechi zone. The western boundary is Kankai River and eastern is Saniarjun and Birtamod Municipality. The northern border is Ilam and southern is Sharanamati VDC. Kankai municipality is made up by combination of Surunga VDC and Ghailadubba VDC in May 2014, according to census 2011 there was 1149 *Satar* in Surunga VDC (538 male and 611 female) and 1144 *Satar* in Ghailadubba VDC (560 male and 584 female), so the total number of *Satar* in Kankai municipality was 2293. Total population of Kankai municipality is 45174 in which 18536 are male and 21605 are female. There are 9426 households and the total area of this municipality is 79.10 sq. km.

1.2 Problem Statement and Justification

It has been shown that *Satar* community is suffering from the extreme nutritional problem. Their nutrition status directly affects the health status of the country. There is lack of accessibility for foods consumption and health facilities. The economic condition is not so good. There is lack of accessibility for foods consumption and health facilities. They are not aware of food habits and the nutrition. Their hygiene and sanitation behaviour is to be improved so their children are more susceptible to the various communicable diseases. Nutritional status of people of developing countries is significantly poor. Malnutrition, especially under-nutrition and various forms of under-nutrient deficiencies are wide spread and mostly prevalent in rural areas. Major types of nutritional problems in developing countries are under-nutrition and nutritional disorders which are resulting from inadequate food intake both in quality and quantity, particularly of calories, proteins, vitamins and minerals; and parasitic infection and disease (Burk, 1984).

Malnutrition during childhood can lead to a risk of life-style diseases in the future as well as immediate risks of morbidity/mortality, according to a recent study. The World

Health Report 2002 clearly describes how childhood and maternal underweight are the greatest risk factor among several main factors that affect people's health and disease status in the world, particularly in Asia (WHO, 2002). Malnutrition especially lead to the consequences like, falling to grow (underweight, stunted and wasted), reduced learning ability, reduced resistance and immunity against infection and reduced productivity in future (MoHP, 2011). Children are very vulnerable to the malnutrition. The children from the higher rank family mostly provided optimum nutrient from their parents and they often eat much food and become overweight and obese. The child from the low income family could not able to get optimal nutrient because of they started to do job in child age as child labour, in their family there is too frequency of child and had to distribute the food which lead to manage the food as for survive only. Some of the family of low level also conscious on the nutritious health of child and can provide nutritious diet for their child.

It is found that none of the research has been conducted to assess the nutritional status of children in population of *Satar* in kankai municipality. So this survey is undertaken to assess the nutritional status of children and this will help to improve the nutritional status of children living in these areas.

1.3 Significance

The findings of this study helped to

- a) Provide information regarding the nutritional status of children between 6 months–59 months of age to the governmental and non-governmental organizations which was helpful to initiate corrective measures for the problem.
- b) Made *Satar* people aware about the current real situation of nutritional status in their surroundings.
- c) Encouraged people for the improvement of their present status by improving their feeding practices of their children and hygienic condition of their surroundings.
- d) Act as guide for the development of proper nutritional program in this community by undertaking the discovered facts.
- e) Act as tool to discover the problems related to nutrition and feeding practices of this community.

1.4 Objectives

1.4.1 General objectives

The determination of nutritional status of 6-59 months children of Satar community of Kankai Municipality, Jhapa.

1.4.2 Specific objectives

- a) To assess the nutritional status of children between 6–59 months of age in the community.
- b) To gain information on the factors associated with the nutritional status as well as the facts and guidelines that are intended to improve nutritional status.
- c) To suggest appropriate corrective measures to improve nutritional status of under 5 year children in this area.

1.5 Research Questions

What are the contributing factor to determine the nutritional status of children of *satar* community in Kankai municipality, Jhapa district ?

1.6 Limitations of the study

- a) Facts finding information about family income, food patterns, availability of food and there utilization might not be given accurately.
- b) Errors might be included while taking various measurements of the samples.
- c) There may be seasonal variation as the study is cross sectional study done for specific period of time.
- d) Language may be the major problem.

Part II

Literature review

2.1. Nutritional Status

Nutritional status has been defined as the condition of the body resulting from the intake, absorption and utilization of food. Nutritional status is the condition of health of the individual as influenced by the utilization of nutrient. It can be determine through a careful medical and dietary history, thorough physical examination, and appropriate laboratory investigation (Robinson, 1972).

However, when the nutrients provided in the diet are inadequate or not utilised properly, it results in a state of imbalance in the body. If this continues for some time it may develop into a severe problem which may even prove fatal. When there is a lack of or excess intake of one or more nutrients and/or faulty utilisation of nutrients in our body, it leads to the state of imbalance in the body. This condition is known as malnutrition.

There are two types of malnutrition. The condition of health of a person that results due to the lack of one or more nutrients is called undernutrition. However, when there is an excess intake of nutrients, it results in over nutrition. Thus the condition of malnutrition covers both the states of undernutrition and over nutrition. You must have seen people who eat energy rich foods in amounts more than what is required by their bodies become fat/obese. This is the result of over nutrition. This state of being obese is harmful as it may lead to serious health problems. But under nutrition is more common around us. In fact malnutrition has become a synonym of 'under nutrition'.

2.1.1. Factors Affecting the Nutritional Status

A number of factors affect acceptability and utilization of food such as availability, cultural practices, economic condition, familiarity, taste and knowledge about health (Bhatta *et al.*, 1998).

The factors affecting nutritional status are, mother's food security, types of food given to the young children, feeding frequency, poverty, illiteracy, ignorance to the child for care and feeding, status of woman and child nutrition and last but not the least who feed the child and how the child eat (Bhandari and Chhetri, 2013). Also factor influencing the

nutritional status are food availability and its distribution system, consumption, income and purchasing power, price of commodities, illiteracy, family size, socio-culture and religious belief, environmental sanitation and health facility. Some of them are given below

A. Conditioning influences: - Infectious diseases are important conditioning factor responsible for malnutrition, particularly in small children Diarrhoea, Intestinal parasite, Measles, Whooping cough, Malaria, Tuberculosis all contribute to malnutrition. It has been shown that where environmental condition are poor, small children may suffer from some infection or others for almost half of their first three years of life (Amruth, 2012).

B. Cultural influence:- Lack of food is not only cause of malnutrition. Too often there is starvation in the midst of plenty. People choose poor diet when good one are available because of cultural influences which vary wide from country to and from region to region. These may be state as:

I. Food habit:- Custom, Belief, Tradition and Attitude: - Food habits are among the oldest and most deeply entrenched of any culture. They have deeply psychological root and are associated with love, affection, warmth, self-image and social prestige. The family plays an important role in shaping of the food habit, and these habits are passed from one generation to another generation. The crux of the problem is that many customs and belief apply most often the vulnerable group; i.e. in infants, toddlers, expectant and lactating women. Papaya is avoided during pregnancy because it is believed to cause abortion. There is a widespread belief that if the pregnant women eat more, her baby will being and delivery will be difficult. Certain food is “forbidden” as being harmful for the child. In some communities men eat first and women eat last and poorly. Consequently, the health of women in these societies may be adversely affected. Chronic alcoholism is another factor which may lead to serious malnutrition (Amruth, 2012).

II. Religion:- Religion has powerful influences on the food habit of the people. Hindus do not eat beef and Muslim pork. Orthodox Hindu does not eat meat, fish, egg and certain vegetables like onion. These are knows as food taboos which prevent people from consuming nutritious food even these are easily available (Amruth, 2012).

III. Food fads:- In the selection of foods, personal likes and dislike play on important parts. These are called “food fad”. The food fad may stand in the way of correcting nutritional deficiencies (Amruth, 2012).

IV. Cooking practices:- Draining away the rice water at the end of cooking, prolonged boiling in open pans, peeling of vegetables all influences the nutritive value widely from region to region and influence the nutritive value of food (Amruth, 2012).

V. Child rearing practices:- These vary widely from region to region and influence the nutritional status of infants and children. Examples of this situation are premature curtailment of breast feeding, the adoption of bottle feeding and adoption of commercially produced refined food, during eating time the roaming around, active eating and watching television also effect the nutritional status of child (Amruth, 2012).

C. Socio-Economic factor:- Malnutrition is largely the by-product of poverty, ignorance, insufficient education, lack of knowledge regarding the nutritive value of food, inadequate sanitary environment and large family size (Amruth, 2012).

D. Food production:- Increased food production should lead to the increase food consumption. But it will not solve the basic problem of hunger and malnutrition in much of the developing world. Scarcity of food, as a factor responsible for malnutrition may be true at the family level, but it is not true at global basis nor is it true for most of the countries when malnutrition is still a serious problem. It is a problem of uneven distribution between the countries and within the countries (Amruth, 2012).

E. Health education:- It is opined that by appropriate educational action, 50 Percent of nutritional problem can be solved. Health education and nutrition education programme in nutrition is often a week component. Its reinforcement is a key element in all health service development (Amruth, 2012).

F. Occupation:- Occupation is the major factor that enhances to introduce the malnutrition in many habitats. As family is more engaged to earn by implying the occupational activities more chances of having the food intake by purchasing from marked or self-production. Among the group of different occupation mostly wage earner earn by daily purpose they spend all of money on food or daily commodities (Amruth, 2012).

G. Inadequate dietary intake:- This can mean both macro nutrients (fat, protein, and carbohydrate) and micro nutrients (vitamins and minerals). Though insufficient macro nutrient intake has serious implications for health and well-being, micro nutrients also play large role in immune function (Bhatta *et al.*, 1998).

H. Impact on immune function:- Insufficient macro nutrient intake can result in growth stunting (in children) as well as weight loss. Micro nutrients such as vitamin A, zinc and a large number of others are essential to a number of immune responses, and deficiency can lead to suppressed immunity, which in term increases risk of acquiring infection. In addition, in adequate dietary intake can also weaken immune response through changes in mucus membranes of the body (Bhatta *et al.*, 1998).

I. Infection:- Once immune function is lowered, it may lead to infectious disease. Malnutrition not only affects the occurrences infectious diseases, it can also increase the severity of illness, and the length of time they are experienced (Bhatta *et al.*, 1998).

J. Poverty:- At a micro-level, child malnutrition is related to poverty, but at the macro Community level poverty does not appear to be strongly related to child malnutrition in many cases. Other actors are equally important. One of these is related to the intra-household use of resources such as the time management and knowledge of the main caregiver, who is usually the mother (Pena and Bacallao, 2002). For example, how much time is allocated to feeding, caring and ensuring a healthy environment for children?

2.2 Malnutrition

Malnutrition has been defined as a pathological state resulting from relative or absolute deficiency of one or more nutrients. This state is clinically manifested or detected only by biochemical, anthropometric or physiological tests (Jelliffe, 1996). When a person is not getting enough food or not getting the right sort of food, malnutrition is just around the corner. Even if people get enough to eat, they will become malnourished if the food they eat does not provide the proper amounts of micronutrients - vitamins and minerals - to meet daily nutritional requirements. Disease and malnutrition are closely linked. Sometimes disease is the result of malnutrition, sometimes it is a contributing cause. In fact, malnutrition is the largest single contributor to disease in the world, according to the UN's Standing Committee on Nutrition (SCN). Malnutrition at an early age leads to reduced physical and mental development during childhood. Stunting, for example, affects more than 147 million pre-schoolers in developing countries, according to SCN's World Nutrition Situation 5th report. Iodine deficiency, the same report shows, is the world's greatest single cause of mental retardation and brain damage (WFP, 2016).

Malnutrition is one of the biggest health problems that the world currently faces and is associated with more than 41% of the deaths that occur annually in children from 6 to 24 months of age in developing countries which total approximately 2.3 million. World Health Organization in 2001 reported that 54% of all childhood mortality was attributable, directly or indirectly, to malnutrition (Akorede and Abiola, 2013).

2.2.1 Causes of malnutrition

1. Lowered intake of food due to:
 - Increase in population (many mouths to feed).
 - Low food production.
2. Ignorance: Wrong infant feeding practices, inability to make correct choice of food resulting in over/undernutrition.
3. Economic conditions: Lowered purchasing power causing undernutrition/higher purchasing power causing over-nutrition.
4. Stress conditions Inability to meet the increased nutrient needs during periods of rapid physical growth, e.g. in young children, adolescents, pregnant woman and lactating mothers; Nutrient demands also increases during illnesses.
5. Poor personal Increased susceptibility to infections hygiene and and thereby illnesses environmental sanitation.

2.2.2 Conceptual framework:

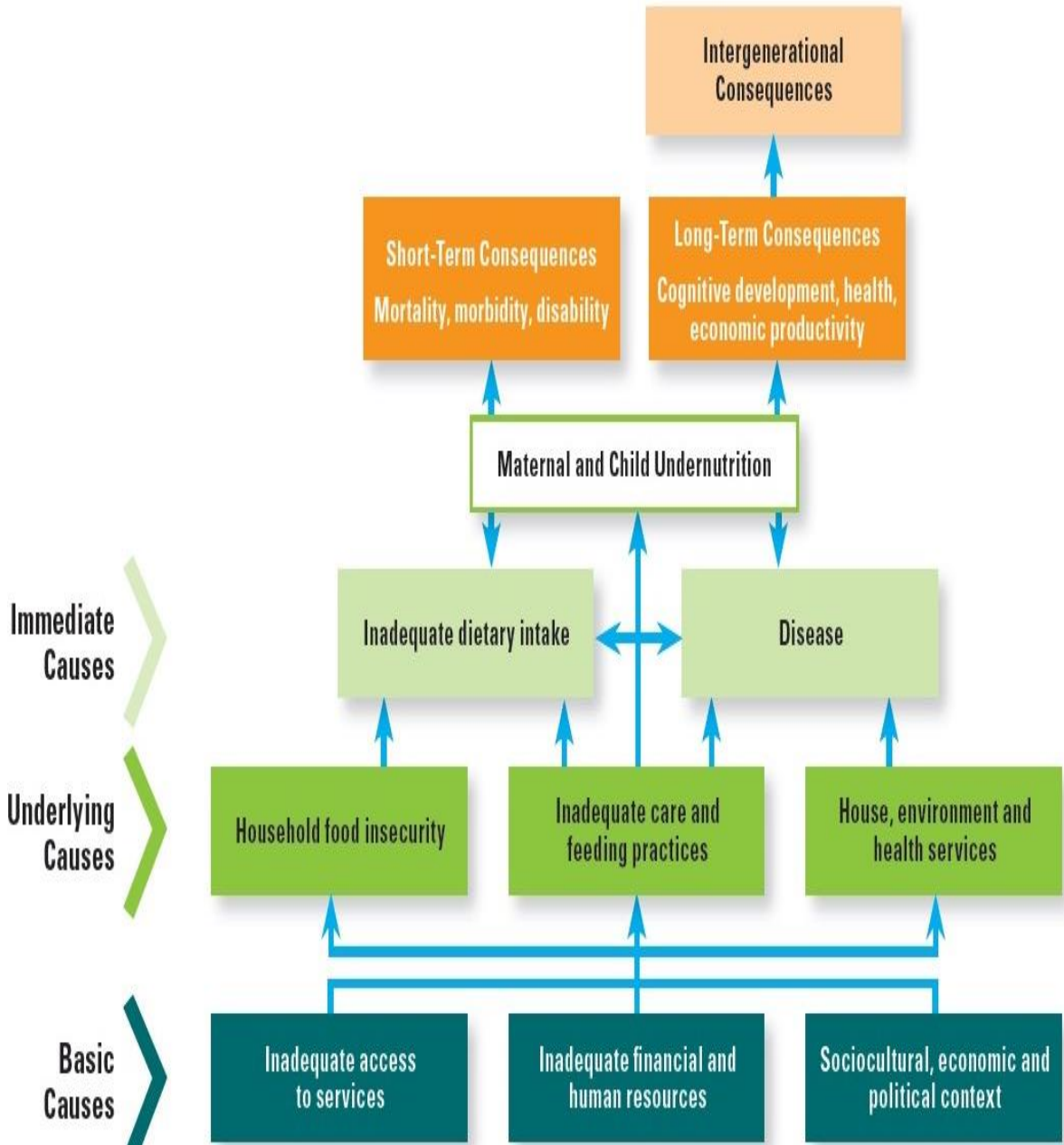


Fig 2.1 UNICEF conceptual framework on causes of malnutrition

2.2.2.1 Immediate causes of malnutrition

Lack of food intake and disease are immediate cause of malnutrition and create a vicious cycle in which disease and malnutrition exacerbate each other. It is known as the Malnutrition Infection Complex. Thus, lack of food intake and disease must both be addressed to support recovery from malnutrition (Reinhardt and Franzo, 2014).

2.2.2.2 Underlying causes of malnutrition

Three major underlying causes of malnutrition include (Veghari, 2013):

1. Food: Inadequate household food security (limited access or availability of food).
2. Health: Limited access to adequate health services and/or inadequate environmental health conditions.
3. Care: Inadequate social and care environment in the household and local community, especially with regard to women and children.

2.2.2.3 Basic causes of malnutrition

The basic causes of malnutrition in a community originate at the regional and national level, where strategies and policies that affect the allocation of resources (human, economic, political and cultural) influence what happens at community level. Geographical isolation and lack of access to markets due to poor infrastructure can have a huge negative impact on food security. When conducting an assessment to determine the causes of malnutrition in a community, it is important to research the actions at each level and how these actions, or inactions, influence malnutrition rates (Gillespie and Haddad, 2003).

2.2.3 Forms of malnutrition

a) Under nutrition

Under nutrition is the pathological state resulting from the consumption of an inadequate quantity of food over an extended period of time (Jelliffe, 1996).

b) Over nutrition

It is the pathological state resulting from the consumption of an excessive quantity of food and hence a calorie excess, over an extended period of time (Jelliffe, 1996).

c) Specific deficiency

It is the pathological state resulting from a relative or absolute lack of an individual nutrient (Jelliffe, 1996).

d) Imbalance

The pathological state results from a disproportionate consumption of essential nutrients with or without the absolute deficiency of any nutrients as determined by the requirements of a balanced diet (Jelliffe, 1996).

2.2.4 Nutrition deficiency disorder

2.2.4.1 Protein energy malnutrition

Protein energy malnutrition, also known as starvation, is defined as a diet with insufficient amounts of all the major macronutrients: proteins, carbohydrates and fats. A starving person becomes skeletally thin and weak and is in danger of death. Protein energy malnutrition usually is seen during famines in Third-World countries and in eating disorders in Western societies (WFP, 2016).

PEM is a range of pathological condition arising out of coincident lack of protein and energy in varying proportion, most frequently seen in infants and young children and usually associated with infections (WHO, 1996). According to a survey protein energy malnutrition in Nepal is 43% (DoHS, 2015).

2.2.4.1.1 Kwashiorkor

Dr. Ciceley Millons (1953) first introduced the word Kwashiorkor, given to the disease by people of gold coast in Africa in 1935. The term Kwashiorkor means, the disease which the child gets when the next baby is born i.e. sickness of the disposal child (Jelliffe, 1996).

2.2.4.1.2 Marasmus

This is a common form of PEM. It is a child version to starvation. It usually occurs in a second six months of life. The cause is the diet very low in calories and incidentally in protein and other essential nutrients. The symptoms include, severe wasting of muscle mass, shrunken eyeball, depressed cheeks, and ribs become prominent etc. It mainly occurs 6 to 18 months of age (Davidson, 1992).

2.2.4.1.3 Marasmic kwashiorkor

When the incidence of PEM is high, a large number of cases show some of the features of both marasmus and kwashiorkor (Passmore, 1986).

2.2.4.2 Vitamin A deficiency disorder

Vitamin A deficiency (VAD) has been recognized as a public-health issue in developing countries (Akthar *et al.*, 2013). More than 250 million of the world's children suffer from vitamin A deficiency. Sixty-nine percentage of children in southeast Asia have vitamin A deficiency. Nepal is one of 60 countries in which this deficiency constitutes a significant public health problem. Each year vitamin A deficiency (VAD) claims the lives of almost 670,000 children under five in the world and precipitates the deaths of approximately 6,900 children in Nepal (WorldBank, 2012).

Nepal Micronutrient Status Surveys 1998 has revealed that 32% children below 5 years of age and 17% women are being affected by vitamin A deficiency. Only forty-seven Percent of children age 6-23 months consumed foods rich in vitamin A daily. The 2011 NDHS data reveals that almost 90% of 6-59 months children received vitamin A supplements.

The proportion of children receiving a vitamin A supplement increases with age from 70% at 6-8 months to 93% at 24-35 months before declining to 91% at 48-59 months. Children in rural areas are more likely to receive vitamin A supplements (91%) than those in urban areas (86%) (MoHP, 2011).

2.2.4.3 Iron deficiency anemia

Iron deficiency is the world's most common nutritional disorder. An estimated 2 billion people are anaemic, with nearly 3.6 billion iron deficient. IDA leads to impaired work performance and deficits in learning ability. Although, not confirmed by research in Nepal, IDA likely affects children's level of participation in school and recreation. It is possible that children with iron deficiency are most susceptible to infections, since impairment is present (UNICEF, 1996).

According to the report of the WHO, approximately 60% of the pregnant women in developing countries were anaemic, and iron deficiency anaemia (IDA) was associated with about 20% of premature births, low birth weights, and maternal deaths (World Health Organization, 2011). The situation in Nepal is also not good. A recent widespread study in Nepal revealed that nearly half (46.2%) of children aged 6-59 months, two thirds (69%) of young children aged 6-23 months, 35% of women aged 15-49 years, and 47.6% of pregnant women were found to be anaemic (MoHP, 2011).

2.2.4.4 Iodine deficiency disorder

“Iodine Deficiency Disorders (IDD) refers to all of the adverse effects and consequences of iodine deficiency in a population that can be prevented by ensuring an adequate intake of iodine” (UNICEF, 2009). Worldwide, IDD is the most common preventable cause of mental impairment. The World Health Organization estimated in 2007 that 2 billion people around the world live in areas at risk of insufficient intake of iodine (Debenoist *et al.*, 2007).

A deficiency of iodine leads to hypothyroidism, impaired mental and physical development in infants, children and adolescents, goitre, impaired mental function and reduced productivity in adults and an increased risk of spontaneous abortion, stillbirths, and congenital abnormalities in pregnancy. According to Nepal Micronutrient Survey 1998 Iodine deficiency is seen in almost 40% of women and school going children and only 63% of households use adequately iodized salt. Similarly 27% population of Nepal are still are in risk of developing iodine deficiency disorders because iodized salt hasn't been reached to those population (DoHS, 2015).

2.2.5 Nutritional status of children below 5 years in Nepal

Children's nutritional status is a reflection of their overall health. When children have access to an adequate and nutritious food supply, are not exposed to repeated illness, and are well cared for, they reach their growth potential and are considered well nourished. Undernutrition is associated with more than half of all child deaths worldwide. Undernourished children are more likely to die from common childhood disorders, and for those who survive, have recurring sicknesses and faltering growth. Three-quarters of children who die from causes related to malnutrition were only mildly or moderately malnourished showing no outward sign of their vulnerability. The MDG target is to reduce by half the proportion of people who suffer from hunger between 1990 and 2015. A reduction in the prevalence of malnutrition will also assist in the goal to reduce child mortality (CBS, 2011a).

Sixty percent of new-borns were weighed at birth. For all births, 24 percent of infants were estimated to weigh less than 2.5 kilograms. There was some regional variation, ranging from 20 percent in the Eastern Terai to 33 percent in the Mid-Western Mountains (CBS, 2015).

Study indicated that on increase in age, risk of stunting also increases. Socioeconomic status was most important factors associated with stunting, underweight and wasting. Meeting the minimum dietary diversity, minimum meal frequency and minimum acceptable diet was associated with better nutritional status of children (Ruwali, 2012). Children in rural areas were more likely than those in urban areas to be underweight, stunted or wasted. Those children whose mother has secondary or higher education were the least likely to be underweight, stunted or wasted compared to children of mothers with no education. Older children were more likely than younger children to be underweight and/or stunted but less likely to be wasted (CBS, 2015).

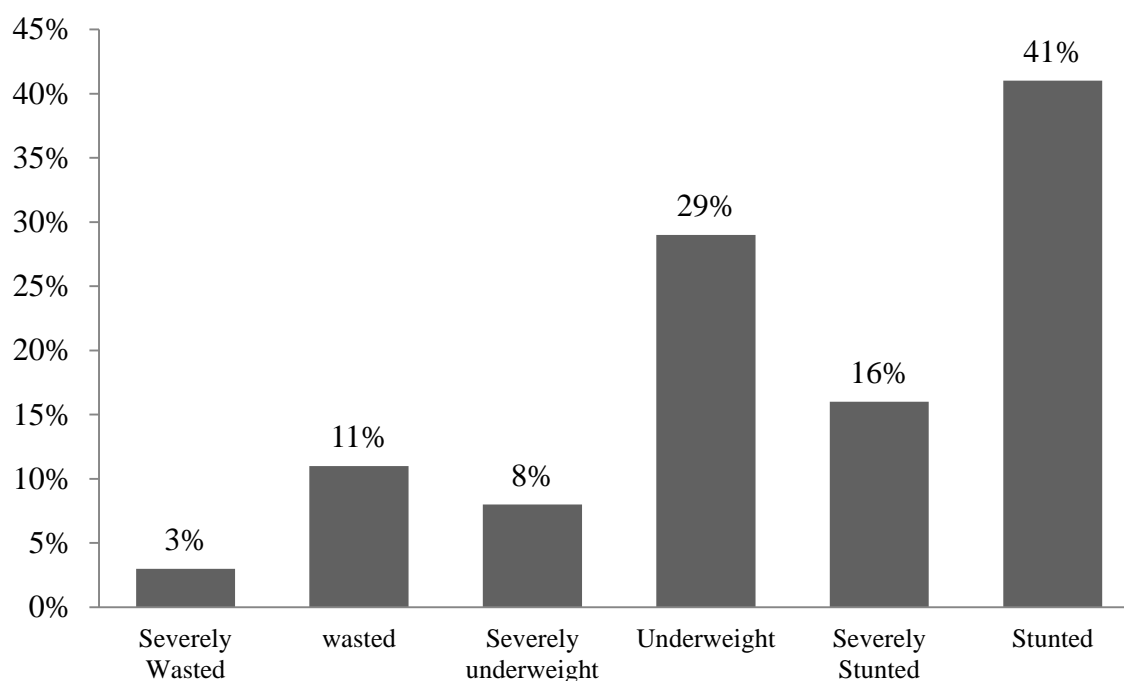


Fig 2.2 Prevalence of different forms of malnutrition in Nepal (MoHP, 2011)

According to Nepal Demographic and Health Survey 2011, 41% of under five children are stunted and 16% are severely stunted, 11% are wasted and 3% are severely wasted and 29% are underweight and 8% are severely underweight which is shown in above figure Fig.2.2 (MoHP, 2011).

Analysis of NDHS data by age shows that stunting is highest (53%) in children age 36–47 months and lowest (14%) in 9–11 months, wasting is found to be highest (25%) in children age 9–11 months and lowest (7%) in children age 36–47 months and proportion of underweight children is highest (37%) among age 18–23 months and lowest (18%) among

under 6 months children. Male children are more likely to be stunted, wasted and underweight as compared to female children (MoHP, 2011).

2.3 Breastfeeding status of Nepal

In Nepal, every year 57,000 under-five children lose their lives, among which 54 percent 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 (UNICEF, 2016). The World Health Organization recommends initiating breastfeeding within the first hour of birth (Edmond *et al.*, 2006).

Almost all (97 percent) newborns in Nepal were breastfed at some point after birth. However, only 49 percent started breastfeeding at the recommended time (i.e., within one hour of birth). 57 percent of infants below six months of age were exclusively breastfed and 75 percent received breast milk as the predominant source of nourishment during the day prior to the survey. Boys were more likely than girls to be exclusively breastfed. A cultural dimension partially explains this difference, as boys are usually introduced to semi-solid food at six months as compared to girls at five months (CBS, 2015).

Mother's education level was negatively associated with exclusive breastfeeding. Some 94 percent of children aged 12–15 months and 87 percent of children aged 20–23 months were still being breastfed. Approximately 79 percent of all children aged 0–23 months were receiving age-appropriate breastfeeding. Some 12 percent of children aged 0–23 months in Nepal were fed using a bottle with a nipple. Urban children were much more likely than rural children to be bottle fed, and bottle feeding was positively correlated with mother's education level and household wealth status (CBS, 2015).

Maternal education was associated with a higher likelihood of early initiation of breastfeeding in each survey. Pooled data analysis revealed higher odds of early initiation of breastfeeding among the mothers with primary education and secondary or higher education. As the association between a mother's educational status and her likelihood of early initiation of breastfeeding increases, long-term approaches to prioritizing education for women and girls should be explored. In the short term, uneducated mothers should be targeted with breastfeeding promotion strategies such as counseling and peer education (Acharya and Khanal, 2015).

2.4 Weaning and complementary feeding status

After six months, complementary food should be introduced and it is important to continue breastfeeding the children at least up to the age of two years (UNICEF, 2016). Overall, 74 percent of infants aged 6–8 months had received solid, semi-solid or soft foods at least once during the previous day. Boys were more likely than girls to receive solid, semi-solid or soft foods. Of children aged 6–23 months, 74 percent had adequate meal frequency and 37 percent had adequate dietary diversity. Overall, 32 percent received a minimum acceptable diet (CBS, 2015). Undesirable cultural practices such as giving pre-lacteal feeds, late initiation of breastfeeding after birth, delay in introduction of weaning foods and avoiding exclusive breastfeeding are still prevalent among the mothers. The maternal knowledge towards breast feeding was inadequate and there was a big gap between actual and desired practices (Chaudhary *et al.*, 2011).

2.5 Use of iodized salt

Adequately iodized salt, defined as containing 15 or more parts per million (15+ ppm), is used in 82 percent of households, with considerably higher consumption in urban areas (96 %) and among the richest households (98%) than in rural areas (78%) and among the poorest households (64%). Use of iodized salt was lowest in the Far Western Hills (54%) and highest in the Central Hills (92%) (CBS, 2015).

A study done in topic “Iodized Salt Use and Salt Iodine Content among Household Salts from Six Districts of Eastern Nepal” showed that 85% of Nepalese households were found to use iodized salt whereas 15% used non iodized crystal salt. The mean iodine content in iodized and crystal salt was 40.8 ± 12.35 ppm and 18.43 ± 11.49 ppm respectively (S. Khatiwada *et al.*, 2014).

2.6 Assessment of nutritional status

The assessment of the Nutritional status of an individual member of a community is accomplished by carrying out clinical biochemical anthropometric and biophysical examination (WHO, 1963). The nutritional assessment may require encompassing nations, communities, vulnerable segments of communities or individuals. It may be done as a part of an exercise to document current status as compared with past status or as specific attempt to evaluate the, impact of an intervention program.

The assessment of nutritional status can be done using the following information (WHO and Fund, 2009).

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

2.7 Indicator in nutritional status

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

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

Weight is the measure of total body mass but gives no indication of its structure; a tall thin child may have same mass as a short, well-proportioned one, a fact that introduces a considerable error in to the classification of malnutrition by weight for age particularly in the categories of “mild” and “moderate” malnutrition. Therefore, a refinement that has long been used by anthropologist was introduced into the nutritional anthropometry of children (Scoane and Lathan, 1971). By relating the weight to the attained height a distinction was made between chronic and acute malnutrition (Scoane and Lathan, 1971) or

between “stunting” (low-height-for-age), and “wasting” (low-weight-for – height),(Waterlow and Rutishauser, 1974). The three indicators weight-for-age , height-for-age, and weight-for-height have since found wide acceptance and application and probably more is known today about these indicators in different population and different health situations than any of other indicators that have been prepared in the past (Keller, 1982).

An essential component of these indicators and their use is the reference population. It provide the indicator value of the population that are considered normal i.e, healthy and without significant deficiencies, and against which measured indicator value are compared while the indicator weight-for-height is apparently independent of age during childhood (Waterlow and Rutishauser, 1974). In the case of dependent indicators weight-for-age and height-for age, it has been argued the major difference in growth potential between ethnic groups would require local references population. It has however, been shown (Bondal, 1996) that with few exception growth of different ethnic groups under favorable conditions is almost identical (Hiernaux, 1964).

2.7.1 Anthropometric assessment

It is the physical measurement of the human body and is commonly used to estimate the nutritional status of children. Anthropometry measures have been extensively used for identification and classification of children suffering from protein-energy malnutrition (PEM). Different anthropometric measurements are combined as ratios or indices such as weight-for-age, weight for height and height for age (Pietsch, 2000).

2.7.1.1 Height-for-Age (HFA)

HFA is an indicator of past or chronic malnutrition. HFA cannot be used to measure short term changes in malnutrition. Deficits in HFA are signs of stunting. Stunting, usually results from extended periods of inadequate food intake, disease or a combination of both, especially during the periods of greatest growth for children when the slowing of skeletal growth results in reduced stature or length (Pietsch, 2000). Stunting begins in utero; therefore, the pro-pregnancy health and nutritional status of women and the nutrition and health of mothers during pregnancy is critical. Stunting is a result of a process over time; most of the damage occurs before 2 years of age. Emphasis should be on prevention.

Children whose height for age Z – score is below minus two standard deviations (-2SD) from the median of the WHO reference population are considered short for age (stunted),

or chronically malnourished. Children who are below minus three standard deviations (3SD) are considered severely stunted (De Onis and Blössner, 2003).

Stunted growth is a reduced growth rate in human development. It is a primary manifestation of malnutrition in early childhood, including malnutrition during fetal development brought on by the malnourished mother. In developing countries, stunted growth is a common problem affecting a large percentage of children. Once established, stunting and its effects typically become permanent. Stunted children may never regain the height lost as a result of stunting, and most children will never gain the corresponding body weight. It also leads to premature death later in life because vital organs never fully developed during childhood (Badrialaily, 2008).

2.7.1.2 Weight-for-Height (WFH)

Weight-for-Height (WFH) helps to identify children suffering from current or acute malnutrition. It is used to examine short term effects, i.e. recent rapid weight loss associated with a period of starvation and/or severe disease(Chase and Martin, 1970).

Children with Z – scores below minus two standard deviations (-2SD) are considered thin (wasted) or acutely malnourished. Children with weight for height index below minus three standard deviations (-3SD) are considered severely wasted and children with more than two standard deviations (+2SD) above the median weight for height are considered overweight or obese (De Onis and Blössner, 2003).

Wasting results from weight falling significantly below the weight expected of a child of the same length or height. Wasting indicates current acute malnutrition resulting from feeding practices, diseases and infection, or, more frequently, a combination of these factors. Wasting in individual children and population groups can change rapidly and shows marked seasonal patterns associated with change in food availability or disease prevalence (Smith and Haddad, 2000).

WHO and UNICEF recommend the use of a cut-off for weight-for height of below -3 standard deviations (SD) of the WHO standards to identify infants and children as having SAM. The reasons for the choice of this cut-off are as follows:

- 1) Children below this cut-off have a highly elevated risk of death compared to those who are above

- 2) These children have a higher weight gain when receiving a therapeutic diet compared to other diets, which results in faster recovery.
- 3) In a well-nourished population there are virtually no children below -3 SD (<1%).
- 4) There are no known risks or negative effects associated with therapeutic feeding of these children applying recommended protocols and appropriate therapeutic foods (WHO and Fund, 2009).

2.7.1.3 Weight-for-Age (WFA)

Low weight-for-age identifies the condition of being underweight at a specific age. WFA may reflect both past (chronic) and present (acute) under nutrition; however, it is unable to distinguish between the two (Smith and Haddad, 2000).

Children whose weight for age Z – score is below minus two standard deviations (2SD) are classified as underweight while children whose weight for age Z – score is below minus three standard deviation (-3SD) are considered severely underweight (De Onis and Blössner, 2003).

W/A is used to identify the nutritional condition underweight, which is a composite measure of stunting and wasting. Just over 15% of the study children were severely malnourished, having a z score ≤ -3 standard deviations (SD) for any index (TD, 2005).

2.7.1.4 Mid-Upper-Arm Circumference (MUAC)

Measurement of the mid-upper arm appears to be most useful in practice. This reason is easily accessible, even with a young child sitting in front of the examiner on his mother's lap. The arm circumference is measured to the nearest 0.1 cm with a flexible steel or fibre-tape, which must be placed gently, but firmly, round the limb to avoid compression of the soft tissue. MUAC should then be measured on the left upper arm while the arm is hanging down the side of the body and relaxed (UNICEF. and ENN., 2010).

MUAC-for-age show that in a well-nourished population there are very few children aged 6–60 months with a MUAC less than 115 mm. Children with a MUAC less than 115 mm have a highly elevated risk of death compared to those who are above. Thus it is recommended to increase the cut-off point from 110 to 115 mm to define SAM with MUAC. When using the WHO child growth standards to identify the severely malnourished among 6–60 month old children, the below -3SD cut-off for weight-for-

height classifies two to four times as many children compared with the NCHS reference. The prevalence of SAM, i.e. numbers of children with SAM, based on weight-for height below -3 SD of the WHO standards and those based on a MUAC cut-off of 115 mm, are very similar. The shift from NCHS to WHO child growth standards or the adoption of the new cut-off for MUAC will therefore sharply increase caseloads. This has programmatic implications (WHO and Fund, 2009).

Part III

Materials and method

3.1 Research design

A community based cross-sectional survey was conducted to assess the nutritional status and associated factor among children age 6-59 months which includes:

1. Anthropometric measurements of 6-59 months children in *Satar* community of kankai municipality.
2. Household interview with the help of questionnaire.
3. Dietary assessment of children of 6-59 months age in selected area.

3.2 Measurements method

1. Height measurements
2. Weight measurements
3. Mid upper arm circumference (MUAC)

3.3 Data collection tools

It consists of:

- A. Weighing machine: Weighing machine of capacity 150 kg and having the least count of 0.1 kg.(1 piece)
- B. Height measuring scale (Stadiometer).(1 piece)
- C. MUAC tape: For measuring mid upper arm circumference.(1 piece)
- D. Questionnaire: A well designed and pretested questionnaire to collect nutritional knowledge of parents.

3.4 Study variables

The variables of the study were divided into two categories they are:

1. Dependent variables: nutritional status of 6-59 months children
2. Independent variables

- a) Socio-economic and demographic variables: ethnicity, family size, income, occupation, education.
- b) Maternal characteristics: age, no. of children born, birth order of children
- c) Child characteristics
- d) Child care practices
- e) Environmental and hygienic characteristics

3.5 Study site and its justification

Census was conducted in *satar* children, Kankai municipality situated in jhapa district.

3.6 Pre testing the data collection tools:

The prepared sets of questionnaire and anthropometric instruments were pre-tested among few parents/caretakers of 6-59 months of children. Pre-testing was conducted in order to maintain accuracy and clarity of questionnaire, to check the consistency in interpretation of questions by respondents and to identify ambiguous item. 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.

3.7 Validity and Reliability

The degree to which a measurement technique can be depended upon to secure consistent results upon repeated application is defined as reliability. The degree to which any measurement approach or instrument succeeds in describing or quantifying what it is designed to measure and reflects those errors in measurement that are systematic or constant is defined as validity. Validity and reliability are closely inter-related and there cannot be validity without reliability but there can be reliability without validity.(R. khatiwada *et al.*, 2014)

Reliability of the instruments will be tested by the test retest method. Two consecutive measurements will be made at a short time difference by the same observer and compared.

3.8 Data collection techniques

Data was collected using semi-structured questionnaire and anthropometric measurement. Interview was conducted with parents/care takers of the children to fill the questionnaire.

Secondary data was obtained from Village Development Committee office, Nepal Demographic Health Survey (MoHP, 2012), Central Bureau of Statistics, and key informants like Female Community Health Volunteers (FCHV), local leaders etc.

There were two sets of tools to gather the information. Part I is the structured interview schedule to generate data pertinent to factors associated with nutritional status of children and Part II is a form, consisting of child information anthropometric measurements was recorded in it. Form was developed to record the measurements of height, weight, Mid Upper Arm Circumference and structured pre-tested interview schedule was used to collect information from the respondents. The questionnaires comprised mainly of details on household profiles like age, sex, education level and occupation of household members and household size. Data on sources of income was also collected. Anthropometric measurements and haemoglobin assessment taken for children aged (6-59) months included:

3.8.1 Date of birth

The date of birth of the child was asked and its reliability was checked with supportive questions like age of mother at pregnancy, birth order of child and age of mother at marriage and the reliability of the data was checked.

3.8.2 Length/height

Stadiometer was used to measure the height of children. The length of children below 2 years was measured by recombinant method i.e. the length of each child aged 6-24 months was measured lying flat and centrally on measuring boards placed on a hard flat surface on the ground. The length was read to the nearest 0.1 cm (head and feet against the base of the board and foot piece respectively) (Rockenbach *et al.*, 2011). The height of children aged above 24 months was measured standing straight on measuring board placed on hard flat surface with line of sight perpendicular to the horizontal surface. Children were made to stand bare foot on height board and with feet parallel and joined together and with heels and buttock touching the wall. It was made sure that that head was held erect and hands were hung closely at the sides. The child's height was measured to the nearest one decimal place.

3.8.3 Weight

Firstly, the clothes and shoes worn by child were removed and Weight was measured by electronic digital weight scale and read to the nearest 0.1 Kg. Calibration was done before and after weighing every child by setting it to zero. For the children age below two years and are unable to stand by them, their weight was obtained from the difference between weights of mother as she/he holds the child and the weight of the mother alone

3.8.4 MUAC

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.

Part IV

Results and Discussion

Survey was conducted in *Satar* community of Kankai municipality to find the prevalence and the factors associated with their nutritional status. The study area is located in Jhapa district, near Birtamod bazar. The sample was collected using census method of data collection, where a total of 128 under-five children were included with a response rate of 100%. The result of the survey was presented in the following headings:

4.1 Socio-economic and Demographic Characteristics

The participants were from marginalised community of Terai region of Nepal. Among the respondents, 96 (75%) were Hindu and 32 (25%) were Christian. Study had shown that 81 (63.3%) were living in nuclear family, followed by joint family 47 (36.7%). Among the fathers of 128 children, 1(0.8%) were jobless and remaining engaged in Agriculture, Government job, Foreign employment, Private job and Labour, were 11 (8.6%), 1 (0.8%), 12 (9.4%), 13 (10.2%) and 90 (70.3%) respectively.

The families with annual income less than 1 lakh, 1 to 2 lakh and more than 2 lakh were 18 (14.1%), 80 (62.5%) and 30 (23.4%) respectively. Forty-seven (36.7%) father were illiterate, 55 (43%) had primary education, 22 (17.2%) were SLC passed and 4 (3.1%) were having higher education.

Table 4.1 Socio-economic and Demographic Characteristics

Variables	Frequency	percent
Religion		
Hindu	96	75
Christian	32	25
Father's occupation		
Jobless	1	0.8
Agriculture	11	8.6
Government job	1	0.8
Foreign employment	12	9.4
Private job	13	10.2
Labour	90	70.3
Annual income		
<1 Lakh	18	14.1
1 to2 lakh	80	62.5

>2 lakh	30	23.4
Family type		
Single	81	63.3
Joint	47	36.7
Father's level of education		
Primary	55	43
illiterate	47	36.7
SLC	22	17.2
Higher secondary	4	3.1

4.2 Maternal Characteristics

Out of all mothers, 11 (8.6%) were engaged in agriculture, 4 (3.1%) in foreign employment, 1 (0.8%) was a private job holder, 39 (30.5%) were engaged in labour and 73 (57%) were housewife. Maximum of them were 60 (46.9%) illiterate, while 52 (40.6%) had acquired primary level of education and 16 (12.5%) passed SLC level.

Fifteen (15, 11.7%) mothers had knowledge about supplementary feeding, while 113 (88.3%) had no knowledge about it. Only 38 (29.7%) mothers had married after year of 20 and remaining 90 (70.3%) had married before 20. The number of mother others who had given birth to their baby before 20, from 20 to 25 years and after 25 were 86 (67.2%), 41 (32%) and 1 (0.8%) respectively. Maximum mothers 115 (89.8%) had knowledge about balance diet, but 13 (10.2%) were unknown about balance diet.

Among the mothers of 128 respondents, 104 (81.25%) had knowledge about additional nutrition during pregnancy and the rest 24 (18.75%) had no knowledge. Maximum 112 (95.3%) consumed iodised salt and 6 (4.7%) consumed non iodised salt. The number of healthy mothers was 119 (93%) and ones who were suffering from chronic diseases were 9 (7%).

The number of mothers who had knowledge about malnutrition was 23 (18%) and 105 (82%) had no knowledge about it. The number of mothers who consumed and did not consume iron and folate tablets during pregnancy was 100 (78.1%) and 28 (21.9%) respectively. The number of mother who had taken vaccine on time was 112 (87.5%) and the rest 16 (12.5%) had not done so. The number of mothers who thought malnutrition occurred due to the lack of hygiene and balance diet, lack of vaccine and due to supernatural power was 117 (91.4%), 8 (6.3%) and 3 (2.3%) respectively.

Table 4.2 Maternal Characteristics

Variables	Frequency	Percent
Mother's Occupation		
Agriculture	11	8.6
Foreign employment	4	3.1
Private job	1	0.8
Labour	39	30.5
Housewife	73	57
Mother's Level Of Education		
Primary	52	40.6
illiterate	60	46.9
SLC	16	12.5
Knowledge about supplementary feeding		
yes	15	11.7
no	113	88.3
Age at Marriage		
<20 years	90	70.3
20 to 25 years	38	29.7
Age at first child		
<20 years	86	67.2
20 to 25 years	41	32
>25 years	1	0.8
Knowledge about balance diet		
yes	13	10.2
no	115	89.8
Additional nutrition during pregnancy		
yes	104	81.25
no	24	18.75
Consumption of iodised salt		
yes	122	95.3
no	6	4.7
Chronic health problem to mother		
yes	9	7
no	119	93
Knowledge about malnutrition		
yes	23	18
no	105	82
Causes of malnutrition and disease		
lack of hygiene and balance diet	117	91.4
lack of vaccine	8	6.3
Supernatural power	3	2.3

Consumption of iron and folate tablets during pregnancy		
yes	100	78.1
no	28	21.9
Vaccination during pregnancy		
yes	112	87.5
no	16	12.5

4.3 Child Characteristics

Out of 128 children, 64 (50%) were male and 64 (50%) were female. The number of children whose birth weight was below 2.5 kg, 2.5 kg, above 2.5 kg and unknown were 16 (12.5%), 1 (0.8%), 43 (33.6%) and 68 (53.1%) respectively. The number of first, second, third, fourth, fifth, sixth and seventh child were 60 (46.9%), 36 (28.1%), 15 (11.7%), 13 (10.2%), 2 (1.6%), 1 (0.8%) and 1 (0.8%) respectively. The numbers of children who attended school was 53 (41.4%) and who did not were 75 (58.6%). Study showed that number of children of age group 6 to 11 months, 12 to 23 months, 24 to 35 months, 36 to 47 months and 48 to 60 months were 17 (13.3%), 28 (21.9%), 23 (18%), 30 (23.4%) and 30 (23.4%) respectively.

Table 4.3 Child Characteristics

Variables	Frequency	Percent
Sex of Child		
Female	64	50
Male	64	50
Birth weight		
<2.5 kg	16	12.5
2.5 kg	1	0.8
>2.5 kg	43	33.6
Unknown	68	53.1
birth order		
First	60	46.9
Second	36	28.1
Third	15	11.7
Fourth	13	10.2
Fifth	2	1.6

Sixth	1	0.8
Seventh	1	0.8
School going children		
Yes	53	41.4
No	75	58.6
Age Group		
(6-11)	17	13.3
(12-23)	28	21.9
(24-35)	23	18
(36-47)	30	23.4
(48-60)	30	23.4

4.4 Child Caring Practices

The family of each of 12 (9.4%) children had experienced a death of infant. The number of children who had natural birth was 11 (86.7%) and 17 (13.3%) were born by surgical method. Out of total children, 113 (88.3%) were initiated for breastfeeding during the first day of birth and 15 (11.7%) were breastfed after 1 day. Children benefitted from extended breastfeeding were 68 (53.1%) and 60 (46.9%) were not fed up to 2 years.

There was 13 (10.2%) children who were introduced to supplementary food before 6 months and 115 (89.8%) took it after 6 months. *Lito* was used as a supplementary food for 18 (14.1%) children, *Jaulo* for 23 (18%) and Simple food for 87 (67.9%) children. Out of all children 59 (46.1%) ate their supplementary food less than 4 times a day, 65 (50.8%) ate 4 to 6 times a day and 4 (3.1%) ate more than 6 times a day. Vitamin A and Deworming tablets had not been taken by 16 (12.5%) children but 112 (87.5%) took these tablets in time.

Children who were vaccinated were 122 (95.3%) and 6 (4.7%) were not vaccinated for different diseases. The preference of health services for treatment of children during acute illness was highest 104 (81.2%) to medical followed by 20 (15.7%) to Hospital and 4 (3.12%) by *Dhamijhakri*. The number of children who had suffered from chronic health problems was 11 (8.6%) and those had no health problems was 117 (91.4%). There were 73 (57%) children who did not consume milk per week, children who consumed milk 1 times, 2 to 4 times, 5 to 7 times and every day per week were 1 (0.8%), 2 (1.6%), 14

(10.9%) and 38 (29.7%) respectively. Maximum children had received treatment from health professionals because it may be due to short distance of hospital and medical hall from their home and availability of vehicles.

Two children (1.6%) consumed meat every day while 17 (13.3%) children did not consume meat. Among the rest, 50 (39.1%) consumed 1 time per week, 54 (42.2%) consumed 2 to 4 times per week and 5 (3.9%) consumed 5 to 7 times per week.

The number of children who did not consume pulses in a week was 2 (1.6%) while the number of children who consumed pulses 1 times, 2 to 4 times, 5 to 7 times and always per week were 5 (3.9%), 56 (43.8%), 24 (18.8%) and 41 (32%) respectively.

The result showed that, in a week 3 (2.3%) children did not consume green leafy vegetables whereas 77 (60.2%), 35 (27.3%), 9 (7%) and 4 (3.2%) children consumed green leafy vegetables 1 times, 2 to 4 times, 5 to 7 times and always in a week respectively.

The number of children who were not breastfed was 79 (61.7%) whereas children who were breastfed less than 6 times, 6 to 8 times and more than 8 times a day were 30 (23.4%), 9 (7%) and 10 (7.8%) respectively.

Table 4.4 Child Caring Practices

Variables	Frequency	Percent
Mortality		
Yes	12	9.4
No	116	90.6
Type of birth		
Natural	111	86.7
Surgical	17	13.3
Breast feeding on first day		
Yes	113	88.3
No	15	11.7
Extended Breastfeeding		
Yes	68	53.1
No	60	46.9

Introduction of Supplementary Feeding		
before 6 months	13	10.2
After 6 months	115	89.8
Type of Supplementary feeding		
Lito	18	14.1
Jaulo	23	18
simple food	87	67.9
Order of Supplementary feeding per day		
less than 4 times	59	46.1
4 to 6 times	65	50.8
more than 6 times	4	3.1
Vitamin A and Deworming tablets to child		
Yes	112	87.5
No	16	12.5
Vaccination to Child		
Yes	122	95.3
No	6	4.7
Medicine against Polio		
Yes	120	93.7
No	8	6.3
Treatment centre		
Hospital	20	15.7
Medical	104	81.2
Dhami Jhakri	4	3.1
chronic health problem to child		
Yes	11	8.6
No	117	91.4
Consumption of milk per week		
no consumption	73	57
1 times	1	0.8
2 to 4 times	2	1.6
5 to 7 times	14	10.9

Always	38	29.7
Consumption of meat per week		
no consumption	17	13.3
1 times	50	39.1
2 to 4 times	54	42.2
5 to 7 times	5	3.9
Always	2	1.6
Consumption of pulses per week		
no consumption	2	1.6
1 time	5	3.9
2 to 4 times	56	43.8
5 to 7 times	24	18.8
Always	41	32
Consumption of green leafy vegetables per week		
no consumption	3	2.3
1 times	77	60.2
2 to 4 times	35	27.3
5 to 7 times	9	7
Always	4	3.2
Order of breastfeeding per day		
no breastfeeding	79	61.7
less than 6 times	30	23.4
6 to 8 times	9	7
more than 8 times	10	7.8

4.5 Environmental Characteristics

Survey had shown that 115 (89.8%) children used tube well water for drinking and 13 (10.2%) used tap water for drinking purpose. Only 47 (36.7%) children drank purified water. Only 49 (38.3%) children were using toilet and remaining 79 (61.7%) were defecating in the open area.

Firewood was used by 110 (85.9%) families of children for cooking food whereas 13 (10.2%) and 5 (3.9%) families used L.P. gas and *Guitha* for cooking food respectively.

Most of the children 126 (98.4%) used soap for washing hand and remaining 2 (1.6%) were using ash for washing hands.

Table 4.5 Environmental Characteristics

Variables	Frequency	Percent
Source of drinking Water		
tube well	115	89.8
tap	13	10.2
Uses of Toilet		
Yes	49	38.3
No	79	61.7
Purification of Water		
Yes	47	36.7188
No	81	63.2813
Sources of cooking Fuel		
Firewood	110	85.9375
L.P.gas	13	10.1563
Guitha	5	3.90625
Things used for Washing Hands		
Soap	126	98.4375
Ash	2	1.5625

4.6 Factors associated with Stunting

Consumption of meat per week had significant association ($P=0.01$) with stunting, whereas consumption of green leafy vegetables, mother's level of education, sex, religion, family type, father occupation, mother's occupation, father's level of education, school going children, annual income, annual saving, annual expenditure on food, birth order, type of birth, birth weight, source of drinking water, purification of water, uses of toilet, source of cooking fuel, things for washing hands, chronic health problem to mother, colostrum feeding, extended breastfeeding, age at marriage, age at first child, knowledge about balance diet, knowledge about supplementary feeding, additional nutrition during pregnancy, introduction of supplementary feeding, type of supplementary feeding, consuming order of supplementary feeding per day, consumption of iodised salt, consumption of pulses per week, order of breastfeeding per day, consumption of milk per week, chronic health problems to child, causes of malnutrition and disease, treatment

centre, knowledge about malnutrition, consumption of iron and folic acid tablets during pregnancy, vaccination during pregnancy, vaccination to child, consumption of vitamin A, deworming tablets, medicine against polio had no any association with stunting.

A study conducted in Congo, Zambia, Guatemala, and Pakistan had shown that eating meat per week was associated with reduced likelihood of wasting (P=0.002) but there was no significant relation between stunting and consumption of meat (Krebs *et al.*, 2014). The children who consumed meat 5 to 7 times per week were more stunted than other children; it may be due to inadequate protein calorie ratio.

Table 4.6 Factors associated with Stunting (n=128).

Factors	HAZ		χ^2	P-Value	
	Stunted	Normal			
Consumption of meat per week	No consumption	2(11.8%)	15(88.2%)	20.123	0.01*
	1 times	18(36%)	32(64%)		
	2 to 4 times	24(44.5%)	30(55.5%)		
	5 to 7 times	4(80%)	1(20%)		
	Always	0(0%)	2(100%)		
Type of birth	Natural	43(38.7%)	68(61.3%)	1.959	0.375
	Surgical	5(29.4%)	12(70.6%)		
Birth weight	Less than 2.5 kg	6(37.5%)	10(62.5%)	10.1	0.12
	2.5 kg	1(100%)	0(0%)		
	More than 2.5 kg	13(30.2%)	30(69.8%)		
	unknown	28(41.2%)	40(58.8%)		
Mother's level of education	Illiterate	25(41.7%)	35(58.3%)	8.023	0.091
	Primary	22(42.3%)	30(57.7%)		
	SLC	1(6.2%)	15(93.8%)		
Annual income	less than 1 lakh	5(27.8%)	13(72.2%)	3.246	0.518
	1 to 2 lakh	30(37.5%)	50(62.5%)		
	More than 2 lakh	13(43.4%)	17(56.6%)		
Birth order	First	24(40%)	36(60%)	16.122	0.186
	Second	13(36.1%)	23(63.9%)		
	Third	3(20%)	12(80%)		
	Fourth	5(38.5%)	8(61.5%)		
	Fifth	1(50%)	1(50%)		
	Sixth	1(100%)	0(0%)		
	Seventh	1(100%)	0(0%)		

* Statistically significant (P < 0.05)

4.7 Factors associated with wasting

Mother's occupation (P=0.001), consumption of pulses per week (P=0.011), order of breastfeeding (P=0.012), introduction of supplementary feeding (P=0.026) and birth order (P=0.001) had significant association with wasting whereas consumption of green leafy vegetables per week, consumption of meat per week, mother's level of education, where sex, religion, family type, father's occupation, father level of education, school going children, annual income, annual saving, annual expenditure on food, type of birth, birth weight, source of drinking water, purification of water, uses of toilet, source of cooking fuel, things for washing hands, chronic health problem to mother, colostrum feeding, extended breastfeeding, age at marriage, age at first child, knowledge about balance diet, knowledge about supplementary feeding, additional nutrition during pregnancy, type of supplementary feeding, consuming order of supplementary feeding per day, consumption of iodised salt, consumption of milk per week, chronic health problems to child, causes of malnutrition and disease, treatment centre, knowledge about malnutrition, consumption of iron and folic acid tablets during pregnancy, vaccination during pregnancy, vaccination to child, consumption of vitamin A, deworming tablets, medicine against polio had no any association with wasting.

Children who had introduced supplementary food before 6 months were prone to become wasted than the children who ate supplementary food after 6 months. Children whose mothers were engaged in private had more chance to become wasted than other children; similarly children who did not consume pulses were more wasted than other. Children who consumed mother milk 6 to 8 times a day were more wasted than other, it may be due to low consumption of supplementary food and the prevalence of wasting was more in sixth and seventh offspring's than other.

Similar study conducted by WHO had shown that there was association between (P=0.04) wasting and low consumption of pulses (Rivera and Habicht, 2002).

Table 4.7 Factors associated with wasting (n=128).

Factors	WHZ		χ^2	P-Value	
	Wasted	Normal			
Mother's Occupation	Agriculture	1(9.1%)	10(90.9%)	31.30	0.001*
	Foreign employment	2(50%)	2(50%)		
	Private job	1(100%)	0(0%)		
	Labour	9(23.7%)	29(76.3%)		
	housewife	16(21.9%)	57(78.1%)		
Consumption of Pulses per week	No consumption	2(100%)	0(0%)	19.95	0.011*
	1 time	0(0%)	5(100%)		
	2 to 4 times	17(30.4%)	39(69.6%)		
	5 to 7 times	3(12.5%)	21(87.5%)		
	Always	7(17.1%)	34(82.9%)		
Order of Breastfeeding	No breastfeeding	15(19%)	64(81%)	16.32	0.012*
	Less than 6 times	7(23.3%)	23(76.7%)		
	6 to 8 times	6(66.6%)	3(33.3%)		
	More than 8 times	1(10%)	9(90%)		
Introduction of supplementary feeding	Before 6 months	6(46.2%)	7(53.8%)	7.28	0.026*
	After 6 months	23(20%)	92(80%)		
Birth Order	First	10(16.7%)	50(83.3%)	49.40	0.001*
	Second	6(16.7%)	30(83.3%)		
	Third	6(40%)	9(60%)		
	Fourth	5(38.5%)	8(61.5%)		
	Fifth	0(0%)	2(100%)		
	Sixth	1(100%)	0(0%)		
	Seventh	1(100%)	0(0%)		
	Less than 2.5 kg	7(43.7%)	9(56.2%)		
Birth weight	2.5 kg	0(0%)	1(100%)	6.98	0.323
	More than 2.5 kg	6(14%)	37(86%)		
	unknown	16(23.5%)	52(76.5%)		
Type of birth	Natural	25(22.5%)	86(77.5%)	0.063	0.969
	Surgical	4(23.5%)	13(76.5%)		

* Statistically significant (P < 0.05)

4.8 Factors associated with Underweight

Birth weight (P=0.022) and father's occupation (P=0.042) were associated with underweight whereas consumption of green leafy vegetables per week, type of birth, consumption of meat per week, mother's level of education sex, religion, family type, mother's occupation, father's level of education, school going children, annual income, annual saving, annual expenditure on food, birth order, source of drinking water, purification of water, uses of toilet, source of cooking fuel, things for washing hands, chronic health problem to mother, colostrum feeding, extended breastfeeding, age at marriage, age at first child, knowledge about balance diet, knowledge about supplementary feeding, additional nutrition during pregnancy, introduction of supplementary feeding, type of supplementary feeding, consuming order of supplementary feeding per day, consumption of iodised salt, consumption of pulses per week, order of breastfeeding per day, consumption of milk per week, chronic health problems to child, causes of malnutrition and disease, treatment centre, knowledge about malnutrition, consumption of iron and folic acid tablets during pregnancy, vaccination during pregnancy, vaccination to child, consumption of vitamin A, deworming tablets, medicine against polio had no any association with underweight

Similar study that had been conducted in Rio de Janeiro shown that the association between (P=0.001) underweight and low birth weight of child (Romao *et al.*, 2013). A study done by Mawlana Bhashani Science and Technology University, Tangail-1902, Bangladesh had shown that there was association between (P=0.019) father occupation and underweight (Hoque *et al.*, 2016).

Table 4.8 Factors associated with Underweight (n=128).

Factors	WAZ		χ^2	P-Value	
	Underweight	Normal			
Type of Birth	Natural	39(35.1%)	72(64.9%)	5.557	0.062
	Surgical	6(35.3%)	11(64.7%)		
Birth Weight	Less than 2.5 kg	9(56.3%)	7(43.8%)	14.762	0.022*
	2.5 kg	0(0%)	1(100%)		
	more than 2.5 kg	9(20.1%)	34(79.9%)		
	Unknown	27(39.7%)	41(60.3%)		
Father's					
Occupation	Jobless	1(100%)	0(0%)	18.867	0.042*
	Agriculture	0(0%)	11(100%)		
	government job	1(100%)	0(0%)		
	Foreign				
	employment	6(50%)	6(50%)		
	Private job	5(38.5%)	8(61.5%)		
	Labour	32(36.6%)	58(64.4%)		
Annual income	Less than 1 lakh	5(27.8%)	13(72.2%)	1.121	0.891
	1 to 2 lakh	29(36.2%)	51(63.8%)		
	More than 2 lakh	11(36.7%)	19(63.3%)		
Birth order	First	23(38.4%)	37(61.6%)	14.275	0.283
	Second	11(30.5%)	25(69.5%)		
	third	5(33.3%)	10(66.7%)		
	Fourth	4(30.8%)	9(69.2%)		
	Fifth	0(0%)	2(100%)		
	Sixth	1(100%)	0(0%)		
	Seventh	1(100%)	0(0%)		

* Statistically significant (P < 0.05)

4.9 Prevalence of malnutrition

Out of 128 children 36.7 percent were stunted among them 18 percent were severely stunted. Similarly 35.2 percent were underweight and 15.6 percent were severely underweight. Likewise 22.7 percent children were wasted among them 4.7 percent were severely wasted.

These values had shown that the nutritional status of *Satar* children was poor and percentage of severely malnourished children was higher than national data i.e. 3% severely wasted, 11% severely underweight and 16% severely stunted (MoHP, 2011).

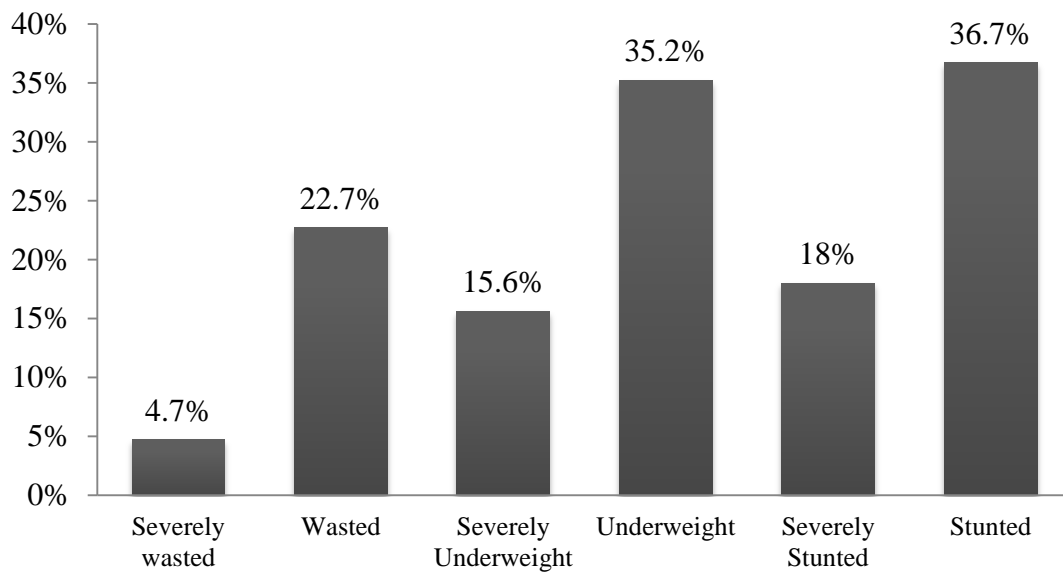


Fig 4.1 Prevalence of malnutrition

4.10 Distribution of weight for height according to age group

Result showed that severe wasting was found highest (17.6%) in age group of 6 to 11 month and wasting was found highest (41.2%) in same age group.

Table 4.9 Distribution of weight for height according to age group (n=128).

Age Group (months)	N	WHZ	
		<-3SD (%)	<-2SD (%)
(6-11)	17	17.6	41.2
(12-23)	28	Nil	17.9
(24-35)	23	Nil	21.7
(36-47)	30	3.3	23.3
(48-60)	30	6.7	16.7

4.11 Weight-for-height graph

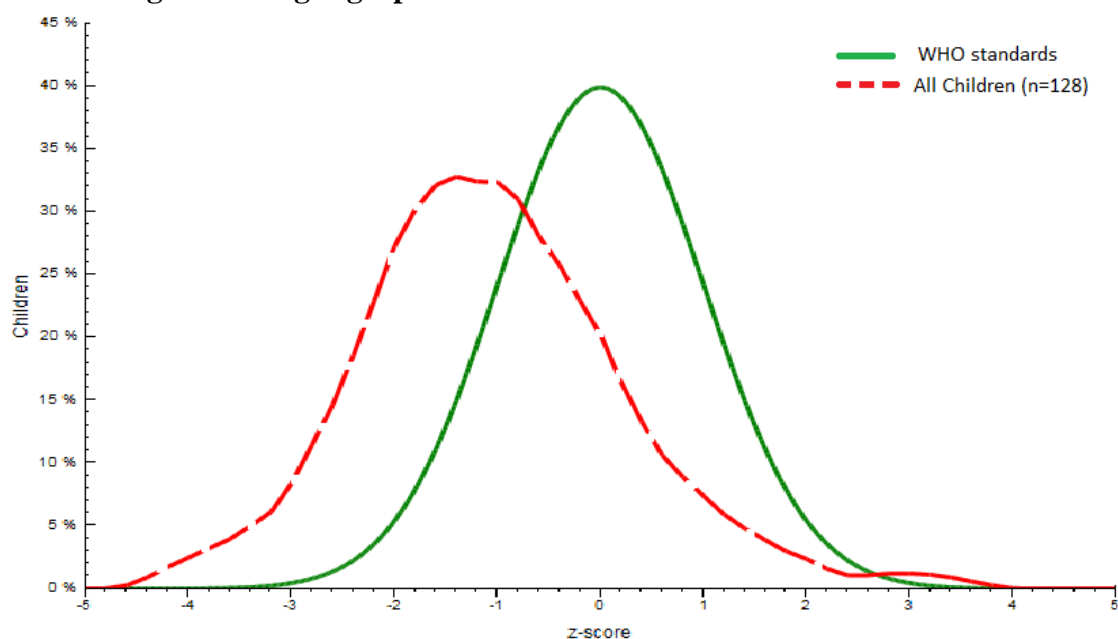


Fig 4.2 Distribution of wasting among survey children based on WHO standard (n=128)

The median Weight for Height Z-score of survey children was found to be -1.195 which is less by 1.195 with reference to WHO standard. This cause the curve slightly skewed to the left side of WHO standard, curve showing the prevalence of wasting among study population as shown as in above figure.

4.12 Distribution of weight for age according to age group

The result showed that highest percentage (21.7%) of severely underweight child was 24 to 35 months old and highest percentage (46.7%) of underweight child was 36 to 47 months old.

Table 4.10 Distribution of weight for age according to age group (n=128).

Age Group (months)	N	WAZ	
		<-3SD (%)	<-2SD (%)
(6-11)	17	5.9	29.4
(12-23)	28	10.7	25
(24-35)	23	21.7	30.4
(36-47)	30	16.7	46.7
(48-60)	30	20	40

4.13 Weight-for-age graph

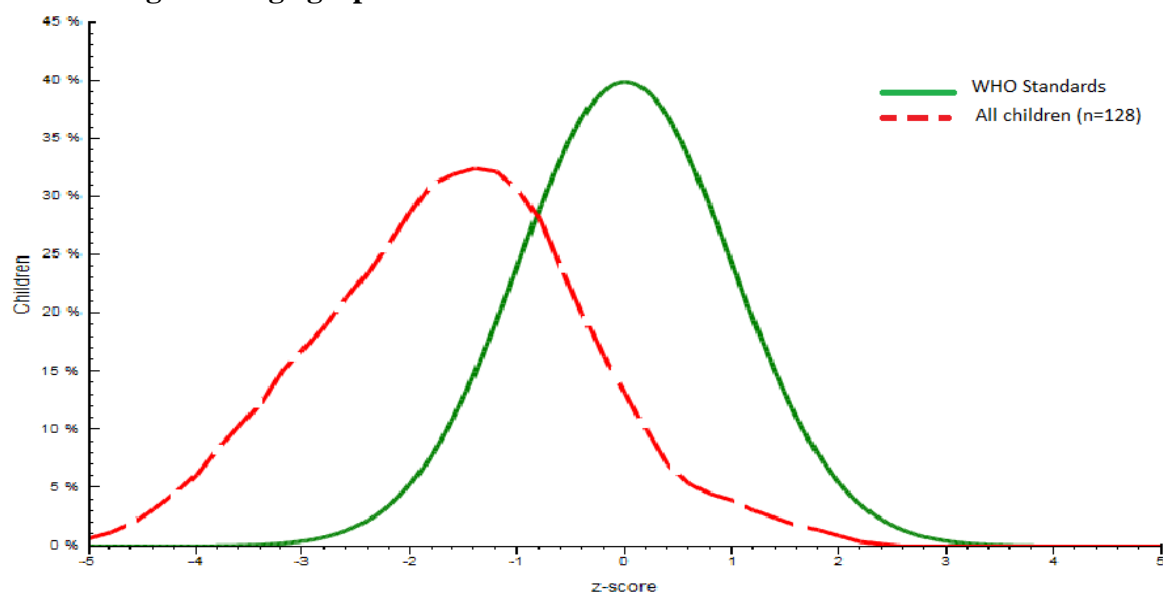


Fig 4.3 Distribution of underweight among survey children based on WHO standard (n=128)

The median Weight for Age Z-score of survey children was found to be -1.58 which is less by 1.58 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 as in above figure.

4.14 Distribution of height for age according to age group

The result showed that highest percentage (30%) children were severely stunted at the age of 48 to 60 months such as same children were stunted.

Table 4.11 Distribution of height for age according to age group (n=128)

Age group (months)	N	HAZ	
		<-3SD (%)	<-2SD (%)
(6-11)	17	5.9	5.9
(12-23)	28	10.7	32.1
(24-35)	23	17.4	39.1
(36-47)	30	20	46.7
(48-60)	30	30	46.7

4.15 Height-for-age graph

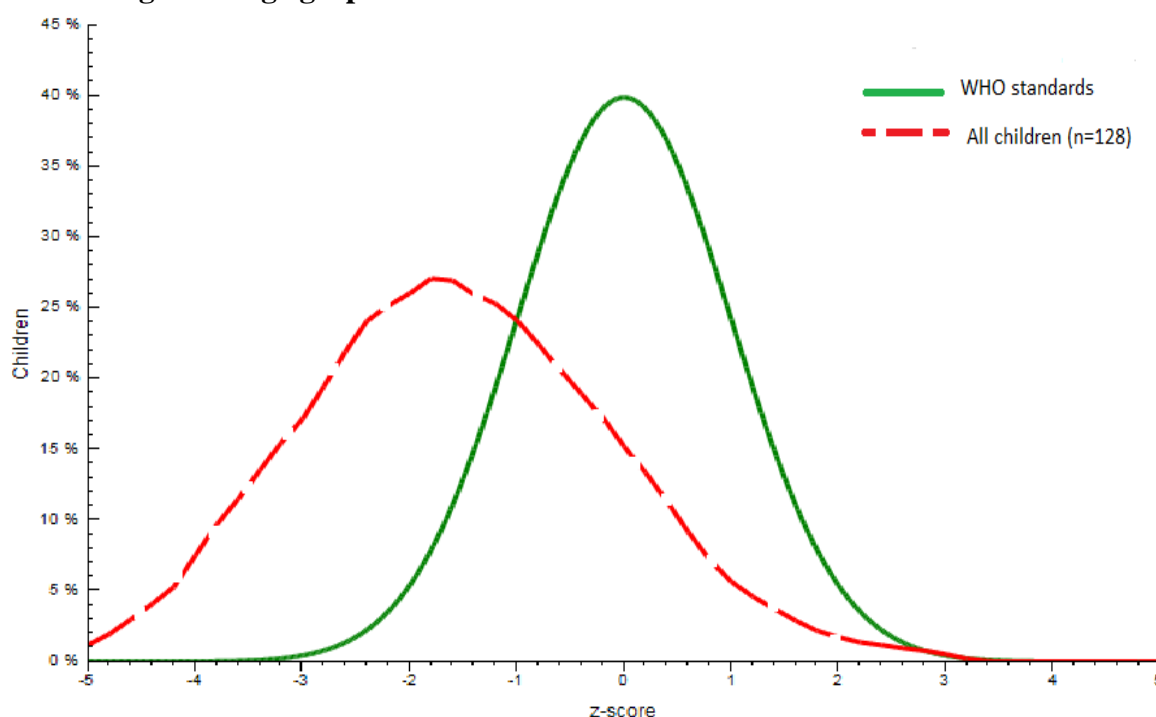


Fig 4.4 Distribution of stunting among survey children based on WHO standard (n=128)

The median Height for Age Z-score of survey children was found to be -1.67 which is less by 1.67 with reference to WHO standard. This cause the curve slightly skewed to the left side of WHO standard, curve showing the prevalence of stunting among study population as shown as in above figure.

4.16 Distribution of malnutrition based on MUAC

The result had shown that one child was severely malnourished followed by 22 and 105 children for moderately malnourished and normal.

Table 4.12 Distribution of malnutrition based on MUAC

Class	MUAC reading	Frequency	Percent
Severe acute malnutrition	<115 mm	1	0.78
Moderate acute malnutrition	≥115mm-<125 mm	22	17.19
Normal	≥ 125 mm	105	82.03

4.17 MUAC for age graph

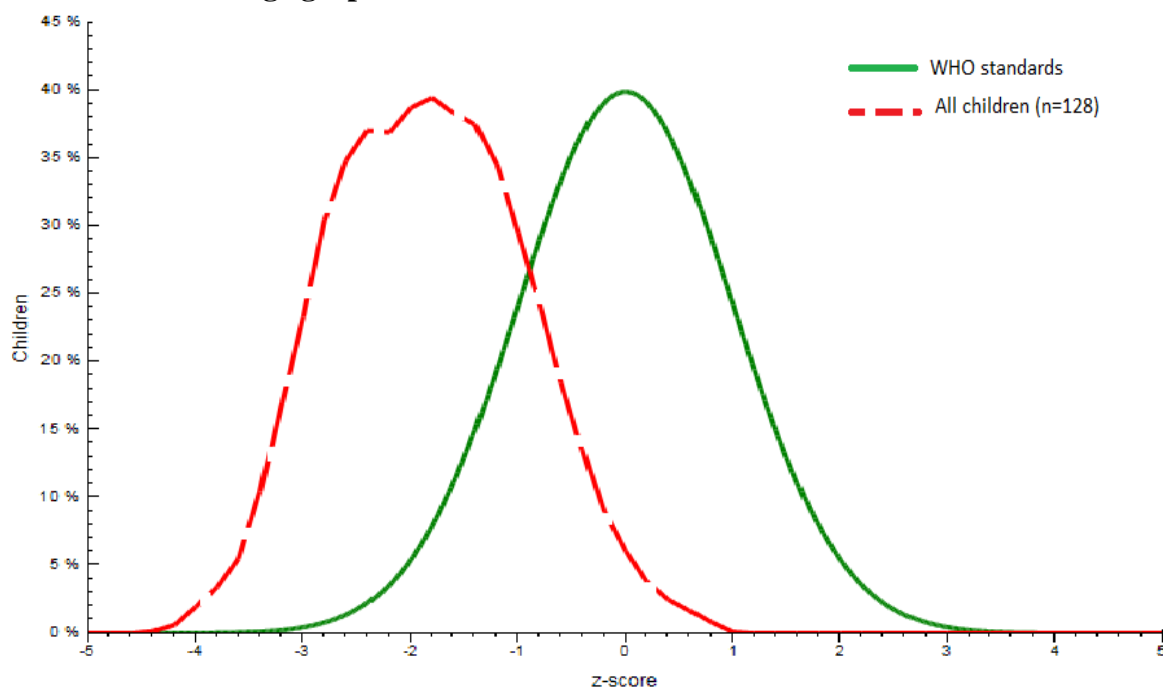


Fig 4.5 Distribution of MUAC among survey children based on WHO standard (n=128)

The median value for MUAC was found to be 13.3 cm; this value had shown that maximum children were healthy on the basis of Mid Upper Arm Circumference.

Part V

Conclusion and Recommendations

5.1 Conclusion

The study was conducted to assess the prevalence of malnutrition and identifying causes of malnutrition among children of 6 to 59 months in *Satar* community of Kankai Municipality, Jhapa. The nutritional status of *Satar* children in Kankai Municipality is comparatively worse than national nutritional status. The overall magnitude of malnutrition among those children in Kankai Municipality was 36.6%, 22.7% and 35.2% for stunting, wasting and underweight respectively. Among them 18%, 4.7% and 15.6% were severely stunted, wasted and underweight child. The highest percentage stunting was found in children of age 48 to 60 months i.e. 46.7% of the children. Similarly, the highest percentage of wasting was found in children of age 6 to 11 months i.e. 41.2%. Likewise, the highest percentage of underweight was found in children of age 36 to 47 months i.e. 46.7%. According to MUAC based on WHO classification wasting was found to be 43%. MUAC on the basis of age group the highest percentage of wasting was found to be 53.3% in 36 to 47 months. On the basis of MUAC 0.78% and 17.19% children were severely and moderately malnourished. Consumption of meat per week was the factor for stunting. Mother's occupation, consumption of pulses per week, order of breastfeeding per day, introduction of supplementary feeding and birth order were the factors for wasting. Birth weight and father's occupation were associated with underweight. Due to worse nutritional status of children many nutritional interventions and programs are required to improve their nutritional status.

5.2 Recommendations

Based on the result from the thesis, following are the recommended points to improve the nutritional status of children of *Satar* community of Kankai Municipality, Jhapa.

1. Nutrition education by focal person, health workers, FCHV, should be provided to improve the feeding practices of parents on appropriate child feeding and care practices.
2. All household should purify their drinking water to improve the nutritional status of children and family

3. Use of family planning should be encouraged at community level and household level.
4. Dietary pattern of family should be changed to overcome the prevalence of malnutrition.
5. Uses of toilets should be encouraged to overcome the occurrence of diseases.
6. All parents should be encouraged to participate in the vaccination program from time to time, to minimize the occurrence of diseases like polio, measles, diphtheria, tetanus.
7. Consumption of Green Leafy vegetable should be increase to prevent night blindness and VAD.

Part VI

Summary

Nutritional status of children is a proxy indicator for assessing the nutritional status of entire population and one of the major predictor of child survival. A cross-sectional discrete study was conducted among 128 children of age 6 to 59 months of *Satar* community in Kankai Municipality, Jhapa. The main objective of the study was the identification of nutritional status of children and factors associated with it. According to census 2011 there was 2293 *Satar* people in Kankai Municipality (Surunga VDC + Gailadubba VDC). The data collected was analysed by using SPSS version 20 and WHO anthro version 2.2.2 and Chi-square test was used to identify the association of stunting, wasting and underweight with other factors.

Out of 128 children, 36.7% were stunted where 18% were severely stunted. 22.7% children were wasted i.e. thinner where 4.7% were severely wasted. The percentage of underweight child was 35.2% and percentage of severely underweight child was 15.6%. Among 128 children, 50% were male and the rest were female. On the basis of WHO growth curve, 42.2%, 23.4% and 31.3% boys were stunted, wasted and underweight. Similarly 31.3%, 21.9% and 39.1% girls were stunted, wasted and underweight. The results shows that boys were more stunted and wasted compared to girls and girls were more underweight comparatively to boys.

Seventy-five percent children were Hindu and the remaining was Christian. Children who were living in a family having annual income 1 lakhs, 1 to 2 lakhs and more than 2 lakhs were 14.1%, 62.5% and 23.4% respectively. Out of 128 children, 95.3% consumed iodised salt and rest consumed non iodised salt. Mother of children who received vaccines during pregnancy were 87.5% and remaining did not receive vaccine in their pregnancy. The percentage of mother, who took iron and folate tablets during pregnancy, was 78.1% and those who did not take it was 21.9%.

The result showed that 46.9% of the children were the first offspring, 28.1% the second offspring, 11.7% the third offspring, 10.2% fourth, 1.6% fifth, 0.8% sixth and 0.8% seventh. Out of total children 41.4% attended school and the remaining did not. The

children of age groups 6 to 11 months, 12 to 23 months, 24 to 35 months, 36 to 47 months and 48 to 60 months were 13.3%, 21.9%, 18%, 23.4% and 23.4% respectively.

The percentage of children who had natural birth was 86.7% and who had surgical birth was 13.3%. The children who took Vitamin A and Deworming tablets were 87.5%, and those who received vaccines was 95.3%. Children who had chronic health problem were 8.6% of total children. Out of total children, 14.1% ate *Lito* as a supplementary food whereas 18% and 67.9% ate *Jaulo* and simple food as their supplementary food.

Survey showed that 89.8% drank water straight from tube well, and remaining drank tap water, whereas 36.7% drank purified water and remaining drank non-purified one. The family of 85.9% children used Firewood, 10.2% used LP gas and 3.9% used *Guitha* as a cooking fuel. Out of total children, 38.3% used toilet and remaining did not. The children who used soap for washing hand were 98.4% and who used ash were 1.6%.

Chi-square test analysis of the determinants of nutritional status indicated that there was significant association between stunting and consumption of meat per week ($P=0.001$). Similarly, there was significant association between wasting with Mother's occupation ($P=0.001$), consumption of pulses per week ($P=0.011$), order of breastfeeding ($P=0.012$), introduction of supplementary feeding ($P=0.026$) and birth order ($P=0.001$). Likewise, there was significant association of underweight with birth weight ($P=0.022$) and father's occupation ($P=0.042$).

All three graphs i.e. weight-for-height, weight-for-age and height-for-age were negatively skewed which showed that the median value for wasting, underweight and stunting were less than WHO standard value.

The result obtained by my dissertation can be used by government as well as other organizations for minimising the prevalence of malnutrition of *Satar* community of Nepal and it also helps to improve their existing feeding and health practices.

References:

- Acharya, P. and Khanal, V. (2015). The effect of mother's educational status on early initiation of breastfeeding: further analysis of three consecutive Nepal Demographic and Health Surveys [Report].
- Akorede, Q. J. and Abiola, Q. M. (2013). Assessment of nutritional status of under five children in akure south local government, ondo state, Nigeria. 14 (3), 1-11.
- Akthar, S., Ahmed, A., Randhawa, M. A., Atukorala, S., Arlappa, N., ismail, T. and Ali, Z. (2013). Prevalence of Vitamin A Deficiency in South Asia: Causes, Outcomes, and Possible Remedies. *Health population and Nutrition*. 413-423.
- Amruth, M. (2012). A study on Nutritional status and risk factors for malnutrition among primary school children in sullia, Karnataka. M.D. Rajiv Gandhi University of Health Science,
- Badrialaily. (2008). Nutritional Status and Related Factors Among Elementary School Students in Banda Aceh Municipality Nanggroe Darussal Province, Indonesia. .
- Bhandari, T. R. and Chhetri, M. (2013). Nutritional status of under five year children and Factors Associated in Kapilvastu District, Nepal.
- Bhatta, K., Mishra, S. and Gurung, G. M. (1998). Nutritional status of Bishanku Narayan village.
- Bondal, M. (1996). A Comparision of the nutritional indices in healthy Africa, Asia and European Children. .
- Burk, M. (1984). Brief introduction for food economics to nutrition problems. Integration Nutrition into Agriculture and Rural Development project., 52-53.
- CBS. (2011a). National population and Housing census [Report]. Central Beraeu of Statistics Retrieved from www.moph.gov.np.
- CBS. (2011b). Nepal Population and Housing Census [Report]. Vol. 02. Kathmandu,
- CBS. (2015). Nepal Multiple Indicator Cluster Survey [Report]. Central Bureau of Statistics and UNICEF Nepal. , . Kathmandu, Nepal,
- Chase, H. P. and Martin, H. P. (1970). Undernutrition and child development. 933-939.
- Chaudhary, R., Shah, T. and Raja, S. (2011). Knowledge and practice of mothers regarding breast feeding: a hospital based study [Report].
- Davidson. (1992). "Malnutrition principle and practice of medicine. A text book for Doctor and students".

- De Onis, M. and Blössner, M. (2003). The World Health Organization global database on child growth and malnutrition: methodology and applications. 518-526.
- Debenoist, B., McLean, E., Andersson, M. and Rogers, L. (2007). Iodine deficiency in 2007: Global progress since 2003. 1-8.
- DoHS. (2015). Annual report [Abstract]. [Accessed
- Edmond, K. M., Zandoh, C., Quigley, M. A., Amenga-Etego, S., Owusu-Agyei, S. and Kirkwood, B. R. (2006). Delayed breastfeeding initiation increases risk of neonatal mortality. *Woman Child First*. 380-386.
- Gillespie, S. and Haddad, L. (2003). "The double burden of malnutrition in Asia: causes, consequences, and solutions".
- Hiernaux, J. (1964). Weight/height relationship during growth in Africans and Europeans. 273-293.
- Hoque, M., Afzal, A., Nasrin, T. and Mafiz, A. (2016). A Study on Understanding the Relationship between Predisposing and Enabling Factors on Nutritional Status among Secondary School Students. *J. Environ. Sci. & Natural Resources*. **9** (1), 47-51.
- IMF. (2013). International Monetary Fund [Report].
- Jelliffe, D. B. (1996). The assessment of nutritional status of community.
- Joshi, P. (2012). Nutrition in children a serious public health in nepa. 61-62.
- Keller, W. (1982). Choice of indicator of Nutritional Status. .
- khatiwada, R., Pradhan, B. and Poudyal, N. (2014). "research methodology". KEC. kathmandu.
- Khatiwada, S., Gelal, B., Tamang, M. K., Kc, R., Singh, S., Lamsal, M. and Baral, N. (2014). Iodized Salt Use and Salt Iodine Content among Household Salts from Six Districts of Eastern Nepal. 191-194.
- Krebs, N., Mazariegos, M., Tshetu, A., Bose, C., Sami, N., Chomba, E., Carlo, W., Goco, N., Kindem, M., Wright, L. and Hambidge, K. (2014). Meat consumption is associated with less stunting among toddlers in four diverse low-income settings. *PMC*. **32** (3).
- MoHP. (2011). Nepal Demographic Health survey. [Report]. Kathmandu, Nepal,
- MoHP. (2012). Nepal Demographic Health Survey [Report].
- Passmore, R. E. (1986). Human Nutrition and Dietetics. Churchill, livingstone, . 279-283.

- Pena, M. and Bacallao, J. (2002). Annual review on malnutrition. *Malnutrition and poverty*. (20), 241-253.
- Pietsch, J. B. (2000). Measurement of Nutritional Status in Children with Cancer. 185-188.
- Reinhardt, K. and Franzo, J. (2014). Addressing chronic malnutrition through multisectorial sustainable approaches: A Review of the Causes and Consequences. *frontiers in nutrition*. 1,13.
- Rivera, J. and Habicht, J. (2002). Effect of supplementary feeding on the prevention of mild-to-moderate wasting in conditions of endemic malnutrition in Guatemala. *Bulletin of the World Health Organization*. **80** (12), 926-932.
- Robinson, C. H. (1972). "“Normal and Therapeutic Nutrition”" (14 ed.). Willy Eastern Pvt. Ltd, New Delhi. New Dehli.
- Rockenbach, A., Smith, P., Green, N., Williams, S., Lindly, C., Baker, T. and Justus, M. (2011). A training manual for height and weight assessment.
- Romao, R., Pereira, L., Hilario, P., Saldiva, N., Pinheiro, P., Braga, A. and Martin, L. (2013). The relationship between low birth weight and exposure to inhalable particulate matter. *Cadernos de Saúde Pública*. **29** (6).
- Ruwali, D. (2012). Nutritional Status of Children Under Five Years of Age and Factors Associated in Padampur VDC, Chitwan.
- Samyak. (2017). Nepal: Geographical Features. Retrieved from nepalhomepage.com.
- Scoane, N. and Lathan, N. C. (1971). Nutritional Anthropometry in identification of Malnutrition in Childhood. .
- Smith, L. C. and Haddad, L. (2000). Overcoming Child Malnutrition in Developing Countries: Past Achievements and Future Choices.
- Subedi, B. P. (2014). Demographic situation of Satar/Santhal in Nepal **20**.
- TD, H. (2005). Nutritional status of childrens victims of the Armed conflict in Nepal [Report].
- UNDP. (2012). Human Development Index [Report].
- UNICEF. (1996). Nepal Multiple Indicator Surveillience, Health and Nutrition [Report].
- UNICEF. (2009). State of world children Report. [Report]. Geneva Switzerland,
- UNICEF. (2016). Breastfeeding Week Promotes Better Nutrition And Child Health In Nepal.
- UNICEF. and ENN. (2010). Nutrition in Emergency.

- Veghari, G. (2013). The relationship of ethnicity, socio-economic factors and malnutrition in primary school children in north of iran: a cross-sectional study.
- Visitnepal.com. (2012). Nepal's People and Ethnic Groups.
- Waterlow, J. and Rutishauser, I. (1974). Malnutrition in man. In: "Early malnutrition and mental development".). 13-26.
- WFP. (2016). Types of Malnutrition [Report]. Retrieved from <https://www.wfp.org/hunger/malnutrition/types>.
- WHO. (1963). Expert Committee on Medical Assessment of Nutritional Status [Report]. World Health Organization. Geneva, Switzerland,
- WHO. (2002). Quantifying the health impact at national and local levels. *Malnutrition* 1-5.
- WHO and Fund, U. N. C. s. (2009). WHO child growth standards and the identification of severe acute malnutrition in infants and children [Report]. WHO.
- WorldBank. (2012). "World Development Indicators 2012" [Report].

APPENDICES

APPENDIX-A

मन्जुरीनामा

केन्द्रिय प्रविधि क्यामपस

मिति.....

हात्तिसार, धरान

पोषण तथा आहार विज्ञान, चौथो वर्ष

नमस्कार,

मेरो नाम **उत्सव ढकाल** हो, म केन्द्रिय प्रविधि क्यामपस, धरानमा पोषण विज्ञान, चौथो वर्षमा अध्ययनरत विद्यार्थी हुँ। यस संकायको चौथो वर्षको पाठ्याक्रम अन्तर्गत म शोधपत्र गरीरहेको छु। मेरो शोधपत्रको विषय “**कन्काई न. पा. को ६ देखी ५९ महिनाका सतार बालबालिकाको पोषण स्थिति**” रहेको छ। यो अध्ययनको उद्देश्य यस आधीवासीको बालबालिकाको पोषण स्थितिको बारे जानकारी संकलन गर्नु रहेको छ। यो जानकारीले हाम्रो अध्ययनलाई सहज बनाई हामीलाई सहयोग गर्नेछ र यसले यस न.पा. को पोषण स्थितिलाई सुधार गर्नका लागि पनि सहयोग गर्न सक्नेछ।

तपाईंको छोरा वा छोरी यस अध्ययनको लागि सहभागी हुन छानिनु भएको छ र म तपाईंलाई यस सर्वेक्षणका प्रश्नहरू गर्ने छु, तपाईंको बच्चाको केही नाप लिने छु। यो सर्वेक्षणले तपाईंको बच्चाको पोषण स्थिति बारे थाहा हुन्छ र बच्चालाई पोषण सम्बन्धी विशेष हेरचाह पर्ने वा नपर्ने पनि थाहा पाउन सक्नु हुनेछ। अध्ययनका केहि प्रश्नहरू नितान्त व्यक्तिगत पनि हुन सक्छन् र तपाईंले दिनु भएको सबै जानकारीहरू महत्त्वपूर्ण हुनेछन् र सो जानकारी एकदम गोप्य राखिनेछ साथै तपाईंले दिनुभएको सुचना तथा तथ्यांकको दुरुपायोग गरिनेछैन। यो अध्ययनमा तपाईंको सहभागिता स्वैच्छुक हुनेछ। यदि तपाईंको 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 अध्ययन सहभागी हुन इच्छुक हुनुहुन्छ ? (इच्छुक भए मात्र, प्रश्न अन्तर्वार्ता टुङ्ग्याउने)म यस अध्ययनमा सहभागी हुन इच्छुक छु र यस अध्ययन लागि आवश्यक पर्ने मेरो बच्चाको तौल लिन अनुमति दिन्छु।

अन्तर्वार्ता लिनेको सही.....

अन्तर्वार्ता दिनेको सही.....

APPENDIX-B

प्रश्नहरू

फारम नं.

खण्ड १ : बच्चाको सामान्य जानकारी

बच्चाको नाम:

लिङ्ग:

जन्ममिति:

उमेर:

बुबाको नाम:

आमाको नाम:

धर्म:

ठेगाना:

पोषण स्थिति

तौल	उचाइ	म्यूरक	इडिमा	दर्घ रोगहरु

खण्ड २: परीवार र बच्चाको विवरण

१। जम्मा परिवार सदस्य

१. पुरुष

२. महिला

३. ६ – ५९ महिनाका बच्चा

२। पेशा

बुबाको

आमाको

३। शिक्षा

बुबाको:

१.निरक्षर

२.प्राथमिक

३.माध्यमिक

४.उ. माध्यमिक

५.उ

शिक्षा

आमाको:

१.निरक्षर

२.प्राथमिक

३.माध्यमिक

४.उ. माध्यमिक

५.उ

शिक्षा

४। बच्चा विद्यालय जान्छ कि जाँदैन ?

१. जान्छ

२. जाँदैन

५। मासिक आम्दानी (परीवाको)

१. ५००० भन्दा कम

२. ५०००-१००००

३. १००००-१५०००

४. १५०००-२००००

५. २०००० माथि

६। मासिक बचत (परीवाको)

१. ५००० भन्दा कम

२. ५०००-१००००

३. १००००-१५०००

४. १५०००-२००००

५. २०००० माथि

७। खानामा खर्च:

८। हालसम्म कुनै बच्चाको मृत्यु भएको छ कि छैन ?

१. छ

२. छैन

९। छ भने कारण

१०। यो बच्चा तपाईंको कतिऔं सन्तान हो ?

११। बच्चाको जन्म कस्तो प्रकारको हो ?

१. प्राकृतिक

२. शल्यक्रिया गरेर

१२। बच्चा जन्मदा को तौल ?

१. २.५केजी भन्दा कम

२. २.५ केजी भन्दा बढी

१३। यो बच्चा जन्मदा अघिल्लो बच्चाको उमेर कति थियो ?

खण्ड ३: व्यक्तित्व तथा वातावरणीय स्वास्थ्य

१४। तपाईंको पिउने पानीको स्रोत के हो ?

१. कल

२. खोला

३. इनार

४. खानेपानीको धारा

५. अन्य

१५। पानी शद्धिकरण गर्नुहुन्छ ?

१. गर्छु

२. गर्दिन

१६। गर्नुहुन्छ भने कसरी ?

१७। घरमा चर्पी छ ?

१. छ

२. छैन

१८। बच्चाले हप्तामा कति पटक नुहाउँछ ?पटक

१९। बच्चालाई नुहाउन प्रयोग गर्ने पानीको स्रोत के हो ?

१. कल

२. खोला

३. इनार

४. खानेपानीको धारा

५. अन्य

२०। परिवारमा दाँत माइन्ड क प्रयोग गर्नु हुन्छ ?

१. खरानी

२. मंजन

३. दतिउन

४. अन्य

२१। घरमा खाना पकाउन के को प्रयोग गर्नुहुन्छ ?

- १.ग्यास २. दाउरा ३.गुईठा ४.गोबर ग्यास ५.बिधुत्त ६.अन्य
 २२। हात धुन के प्रयोग गर्नु हुन्छ ?
 १.साबुन २. खरानी ३.माटो ४.अन्य

खण्ड ४: आमालाई सोधने पोषण र स्तनपान सम्बन्धी प्रश्नहरू

- २३। तपाईंलाई कुनै स्वास्थ्य समस्या छ कि छैन ?
 १. छ २. छैन
- २४। छ भने कस्तो समस्या छ ? (बहु उत्तर आउन सक्छ)
 १. शारिरीक
 २. मानसिक
 ३. दिर्घ रोगहरू
- २५। बच्चालाई जन्मने बित्तिकै आफ्नो विगतो दुध खुवाउनु भएको थियो ?
 १.थियो २.थिएन
- २६। बच्चालाई कहिलेसम्म आफ्नो दुध खुवाउनु भयो ?
 १.हालसम्म २.६ महिनासम्म ३.६महिनाभन्दा कम ४.२ वर्षभन्दाउ
 कम
- २७। तपाईंको विवाह हुँदा कति वर्षको हुनुहुन्थ्यो ?
- २८। पहिलो सन्तान हुँदा कति वर्षको हुनुहुन्थ्यो ?
- २९। गर्भवति आमालाई थप आहार चाहिन्छ कि चाहिँदैन ?
 १. चाहिन्छ २. चाहिँदैन
- ३०। तपाईंले बच्चालाई बाल भिटा (MNP) खुवाउनुभयो ?
 १.खुवार २.खुवाइन
- ३१। तपाईंलाई पुरक आहारबारे थाहा छ ?
 १.छ २.छैन
- ३२। बच्चालाई पुरक आहार कति समय पछि खुवाउनु भयो ?
 १.६ महिना भन्दा अघि २.६ महिना भन्दा पछि
- ३३। कस्तो किसिमको पुरक आहार खुवाउनु भयो ?
 १.सर्वोत्तम पीठो २.लिटो ३.जाउलो ४.साधारण खाना
 ५.अन्य
- ३४। तपाईंको बच्चा कस्तो खानेकुरा खान रुचाउछ ?
 १.घरमै बनाएको २.बजारको
- ३५। तपाईंलाई सर्वोत्तम पीठो बनाउने तरिका थाहा छ ?
 १.छ २.छैन

- ३६। यदि थाहा छ भने काति भाग अन्न र कति भाग गेडागुडि मिसाउनु हुन्छ ?
 १.२:१ २.१:१ ३.१:२ ४.जति मन लाग्छ त्यति
- ३७। बच्चालाई एकदिनमा कति पटक स्तनपान गराउनु हुन्छ ?
 १.६ पटक भन्दा कम २.६-८ पटक ३.८ पटक भन्दा बढि
 ४.गराउँदिन
- ३८। बच्चालाई एक दिनमा कति पटक पुरक आहार खवाहुनु हुन्छ ?
 १.४ पटक भन्दा कम २.४-६ पटक ३.६ पटक भन्दा बढि
- ३९। घरमा खानकालागि कुन नुन प्रयोग गर्नुहुन्छ ?
 १.ढिक्के २.आयोडिन युक्त
- ४०। गर्भवति हुँदा कति खाना खानु हुन्थ्यो ?
 १.अरु बेला भन्दा कम २.अरु बेला भन्दा बढि ३.अरु बेला जत्तिकै
- ४१। बच्चालाई हप्तामा कति पटक गेडागुडि वा दाल खुवाउनु हुन्छ ?
 १.१ पटक २.२-४ पटक ३.५-७ पटक ४.सधैँ
- ४२। बच्चालाई हप्तामा कति पटक हरियो सागपात खुवाउनु हुन्छ ?
 १.१ पटक २.२-४ पटक ३.५-७ पटक ४. सधैँ
- ४३। बच्चाले माछा मासु खान्छ कि खाँदैन ?
 १.खान्छ २.खाँदैन
- ४४। खान्छ भने हप्तामा कति पटक खान्छ ?
 १.१ पटक २.२-४ पटक ३.५-७ पटक ४. सधैँ
- ४५। तपाईंहरू खाने अन्न कस्तो प्रकारको हो ?
 १. आफैँ उत्पादन गरेको २.बजारबाट किनेर ल्याएको
- ४६। बच्चाले हप्तामा कति पटक दुध र त्यसका परिकार खान्छ ?
 १.१ पटक २.२-४ पटक ३.५-७ पटक ४. सधैँ
 ५. खाँदैन

खण्ड ५: रोग र खोप बारे विवरण

- ४७। बच्चालाई कुनै किसिमको स्वास्थ्य समस्या ?
 १.छ २.छैन
- ४८। छ भने कस्तो समस्या ?
- ४९। तपाईंको बिचारमा रोग कसरी लाग्छ ? (बहु उत्तर आउन सक्छ)
 १. सरसफाईको कमिले २. सफा खानाको कमिले ३. खोप
 नलगाउनाले ४. देवी देउताको स्नापले ५. अन्य
- ५०। बच्चा बिरामी हुँदा सर्वप्रथम कहाँ जानुहुन्छ ?
 १. स्वास्थ्य चौकि २. औषधी पसल ३. धामि शक्ति
 ४. अन्य

५१। तपाईंलाइ कुपोषण बारे थाहा छ ?

१. छ २. छैन

५२। तपाईंलाइ पुनर्जलीय शील बनाउले तरिका थाहा छ ?

१. छ २. छैन

५३। तपाईंलाइ सन्तुलित खाना बारे थाहा छ ?

१. छ २. छैन

५४। तपाईं गर्भवति हुँदा आइरन चक्की खानु भएको थियो ?

१. थियो २. थिएन

५५। गर्भवति हुँदा खोप लगाउनु भएको थियो ?

१. थियो २. थिएन

५६। बच्चालाई पोलियो थोपा खुवाउनु भएको छ ?

१. छ २. छैन

५७। बच्चालाई भिटामिन ए र जुकाको औषधि खुवाउनु भएको छ ?

१. छ २. छैन

५८। बच्चालाई खोप लगाउनुभएको छ ?

१. छ २. छैन

५९। छ भने कुन खोप लगाउनु भएको

छ ?

APPENDIX-C

Map of Kankai Municipality



APPENDIX-D

Survey photos

