ASSESSING THE FACTOR ASSOCIATED WITH NUTRITIONAL STATUS OF SUKUMBASI CHILDREN AGED 6-59 MONTHS IN KANAKAI MUNICIPALITY, JHAPA

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Assessing the Factor Associated with Nutritional Status of Sukumbasi Children Aged 6-59 Months in Kanakai Municipality, Jhapa

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

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Approval letter

This *dissertation* entitled *Assessing the Factors Associated with Nutritional Status of Sukumbsi Children Aged 6-59 Months in Kanakai Municipality, Jhapa* presented by Sisir Kumar Timsina has been accepted as the partial fulfillment of the requirements for the Bachelor degree in Nutrition and Dietetics.

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Abstract

Malnutrition is a major health problem in developing countries like Nepal. It may have adverse effects on growth and development of an individual. Therefore, a community based cross-sectional study was conducted on 127 sukumbasi children aged 6-59 months of Kanakai municipality, Jhapa district. Anthropometric measurements (height, weight and MUAC) for children and structured questionnaires for mothers or caretakers were used to collect the data. WHO Anthro version 3.2.2 and statistical package for the social sciences (SPSS) version 20 were used for analyzing the data. Chi-square test was used to assess factor associated with nutritional status of children.

The result revealed that, 45.7%, 16.5% and 31.5%of children were stunted, wasted and underweight respectively. Out of 45.7% stunted children, 16.5% were severely stunted and 29.2% were moderately stunted. Severely and moderately wasted children were 7.1% and 9.4% respectively. Similarly, 10.2% children were severely underweight and 21.3% were moderately underweight. The main associated factors of stunting were found to be mother's education status (P=0.003) and child age group (P=0.002). Similarly, mother's education status was associated with both wasting (P=0.006) and underweight (P=0.001). From the findings of this study, it is concluded that malnutrition is still an important problem among children aged 6-59 months. It suggests implementing a suitable nutritional and health programs such as nutrition awareness program, hygiene and sanitation program, promoting breastfeeding and complementary feeding program. Regular assessing, analyzing and monitoring of nutrition situation should be done on this community for better nutritional status.

Keywords: Malnutrition, Sukumbasi, Nutritional status, Stunting, Wasting, Underweight

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List of Abbreviations

Abbreviations	Full form
MUAC	Mid Upper Arm Circumference
SPSS	Statistical Package for Social Sciences
RDA	Recommended Dietary Allowances
SEAR	South East Asia Region
UNDP	United Nation Development Fund
MoHP	Ministry of Health and Population
PEM	Protein Energy Malnutrition
UNICEF	United Nation International Children Emergency Fund
SCN	Standing Committee on Nutrition
WHO	World Health Organization
NDHS	Nepal Demographic Health Survey
UNNIP	United Nations Nepal Information Platform
VDC	Village Development Committee
MDG	Millennium Development Goal
UNWFP	United Nation World Food Programme
FAO	Food and Agriculture organization
VAD	Vitamin A Deficiency
IDA	Iron Deficiency Anemia
IDD	Iodine Deficiency Disorder

NMICS	Nepal Multiple Indicator Cluster Survey
SD	Standard Deviation
WHZ	Weight for Height Z Score
HAZ	Height for Age Z Score
WAZ	Weight for Age Z Score
SAM	Severe Acute malnutrition
FCHV	Female Community Health Volunteer

Part I

Introduction

1.1 Background

Nepal is one of the least developed countries in the world. More than half of the total population of the country is below poverty line (CBS, 2011). More the percentage of poverty more will be the percentage of illiterate people and may lead to the increased proportion of people with improper or unbalanced nutritional well-being. However along with poverty and illiteracy other certain factors may also effect on it (CBS, 2011).

Nepal is also a least developed nation 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 % (MoHP, 2012).

Nutrition is defined as the science of food and its relationship to health (Park, 2011). Nutritional status is defined as the condition of the body resulting from the intake, absorption and utilization of food. It is determined by a complex interaction between internal/constitutional factors and external environmental factors: Internal or constitutional factors like: age, sex, nutrition, behavior, physical activity and diseases. External environmental factors like: food safety, cultural, social and economic circumstances. Nutritional status of children is important as it determines their health, physical growth and development, academic performance and progress in life. Malnutrition in children and women is a major public health problem in most of the developing countries and Protein Energy Malnutrition (PEM) is more common among under five year children (Ruwali, 2011).

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 is a serious medical condition. It is a poor nutrition due to an insufficient diet, poor balanced diet, faulty digestion or poor utilization of food. Malnutrition is not only insufficient intake of nutrients but also can occur when an individual is getting excessive nutrients as well. Over 10 million children aged less than five years (under-five children) die annually from preventable and treatable illnesses, almost all these deaths occur in poor countries (Black *et al.*, 2003). Malnutrition contributes to more than one-third of all deaths of under-five children (UNICEF, 2009). Currently, 195 million under-five children are affected by malnutrition 90% of them live in sub-Saharan Africa and South Asia. At least 20 million children suffer from severe acute malnutrition (SAM), and another 175 million are undernourished (Black *et al.*, 2008). Malnutrition is the most recognizable and perhaps most untoward consequence of poverty in children (Goel, 2007).

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 study (Healthline, 2016). The World Health Report 2002 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). Children are very vulnerable to the malnutrition. 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, 2006).

Stunting and wasting are common patterns of under-nutrition in children. In children, acute nutritional deficit and/or disease (such as diarrhea) produce wasting, characterized by a reduction in weight-for-height or arm circumference, or both (Acharya *et al.*, 2013). Prolonged nutritional deficit and/or disease result in stunting, characterized by a reduction in height-for-age. As of the Nepal Demographic and Health Survey 2006, 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 the children below 5 years are under weight and 11% are severely underweight. Similarly NDHS 2011 shows that 41%of children under 5 years of age are stunted, and 16% are severely stunted. The survey also shows that 11% of children are wasted and 3% are severely wasted and 29% of children below 5 year of age are underweight and 8% are severely underweight (MoHP, 2012).

Sukumbasi are the people who are landless but not homeless. They are settled down and constructed very simple houses on land that does not belong to them. These people may live on the land for decades, but has no legal title to it. Technically, sukumbasi are people who do not own land anywhere in the country. In the urban context, sukumbasi are squatters unauthorized to reside where they do, while they may still own and elsewhere in the country They live in constant fear of being evicted whenever the government, who owns the land, decides to 'develop' it or to sell it off to private investors. And if that happens, they will lose their homes and everything they have ever invested in them (UNNIP, 2013).

Kanakai Municipality lies at Terai region in Jhapa district. This Municipality consists of people of different ethnic group having different economic status. The western boundary is Kanakai river and eastern is biring River. The northen border is Ilam and southern is Sharnamati VDC. Sukumbasi communities are characterized by poverty, low income, inadequate living conditions and substandard facilities (UNNIP, 2013).

1.2 Justification

Malnutrition remains a serious obstacle to child survival, growth and development in Nepal. Prevalence of malnutrition among under-five children is high with 48.6% in the country. Protein-energy malnutrition (PEM) and micronutrient deficiency are most common types of malnutrition (Acharya *et al.*, 2013). Nepal suffers from extensive malnutrition, ranking in the top 10 countries with the highest prevalence of stunting (less than -2 SD scores) (UNICEF, 2009).

World Health Organization estimates that approximately 150 million children younger than 5 years in developing countries are underweight and an additional 200 million children are stunted. Under nutrition remains a devastating problem in many developing countries affecting over 815 million people causing more than one- half of child death (Laura, 2004).

The prevalence of under nutrition in Eastern Terai is 31.4% stunting, 10.3% wasting and 24% underweight (MoHP, 2012). Prevalence of malnutrition in Sukumbasi basti of Dharan-15 is 42% stunting, 9% wasting and 18% underweight (Adhikari, 2015). The prevalence of malnutrition imposes significant costs on the Nepalese economy as well as society.

Sukumbasi are migrated from different places for different reasons. People of different castes such as Brahmin, Chhetri, Tamang, Magar, Dalit, Rai, Limbu, Newar, Satar, Mushar etc. are living in these areas. Their economic condition is not so good. There is lack of accessibility of food for consumption. They are not aware of food habits and nutrition. Their hygiene and sanitation behavior is to be improved so their children would be less suffered in future (UNNIP, 2013).

It is found that none of the research has been conducted to assess the nutritional status of sukumbasi children of Kanakai municipality. So this survey is undertaken to assess the prevalence of malnutrition and associated factors among 6-59 month aged sukumbasi children which can be used as a reference in priority setting and designing effective nutritional program in Kanakai municipality.

1.3 Objectives of study

1.3.1 General objective

The main objective of this study is to assess factors associated with nutritional status of 6 – 59 months sukumbasi children in Kanakai municipality, Jhapa.

1.3.2 Specific objectives

a) To determine the nutritional status of sukumbasi children aged 6-59 months of Kanakai municipality
b) To identify associated factors of malnutrition among sukumbasi children aged 6-59 months of Kanakai municipality

1.4 Research questions

1. What is the nutritional status of sukumbasi children aged 6-59 months in Kanakai municipality, Jhapa district?

2. What are the factors that are associated with malnutrition in sukumbasi children aged 6-59 months of Kanakai municipality, Jhapa district?

1.5 Significance of the study

The findings of the study will have following implications:

1. Identify individual or group of people who are at the risk of being malnourished and who need special care and attention.
2. Make people aware about the current real situation of nutritional status in their surroundings.
3. Provide information regarding the nutritional status of sukumbasi children between 6 – 59 months of age to the governmental and non-governmental organization which will be helpful to initiate corrective measures for the problem.
4. Serve as helpful guide to plan suitable nutritional and health programs for this community based on the facts and figures discovered from this study.
5. Act as tool to reflect sanitary condition, socio-economic variables, degree and types of malnutrition and condition of 6-59 months age group child.

1.6 Limitations and delimitations

The study had following limitations:

1. Dietary intake during 24 hours of survey, considered as major determinants of nutritional status, was not included in the study
2. Respondents might not have given correct information regarding economic status, age at first pregnancy, child's age etc. due to hesitation.

Part II

Literature review

2.1 Nutritional status

Malnutrition is a condition that results from eating a diet in which nutrients are either not enough or are too much such that the diet causes health problems. The poorly nourished individual, as a rule, suffer from a complexity of deficiencies. The great diversity of body function that may be ill affected by inadequate nutrition complicates the process of assessing nutritional status (Wilson *et al.*, 1971).

The condition of health of a person that is influenced by the intake and utilization of nutrients is called nutritional status. It can be determined only by the correlation of information obtained through a careful medical and dietary history, a through physical examination and appropriate laboratory investigations (Robinson, 1972).

The nutritional status of the children is important as it determines their health, physical growth and development, academic performances and progress in life The immediate determinants of child nutritional status manifest themselves at the level of the individual human being. They are dietary intake (energy, protein, fat, and micronutrients) and health status. These factors themselves are interdependent. A child with inadequate dietary intake is more susceptible to disease. In turn, disease depresses appetite, inhibits the absorption of nutrients in food, and competes for a child's energy (UNICEF, 1998).

The poor nutritional status has both direct and indirect effect on learning skills, mental performance as well as a working capacity (Schmitt, 1979) resistance to disease. Broadly speaking the development of nation depends on the nutritional status of its people (Katwal, 1989).

Malnutrition is associated with more than half of all child deaths worldwide. Undernourished children are more likely to die from common childhood ailments and, for those who survive, have recurring sicknesses and faltering growth. Three quarters of the children who die from causes related to malnutrition are only mildly or moderately malnourished showing no outward sign of their vulnerability. One of the MDGs is to halve the proportion of people who suffer from hunger between 1990 and 2015. A reduction in

the prevalence of malnutrition will also assist the MDG on reducing child mortality (NMICS, 2012).

The major type of nutritional problem in developing countries is under nutrition which results from inadequate food intake both in quality and quantity, particularly calories and protein, specific nutrients (e.g., Vitamin A, Iron, Iodine) and parasitic infectious diseases (Burk, 1984). The vulnerable groups such as babies, adolescent of the poor and uneducated, pregnant and lactating are badly affected. The prevalence of poor nutritional status in developing countries is mainly due to low income, low production of food, low literacy and poor environmental sanitation (Naborro, 1984).

Therefore, the principal aim of assessing the nutritional status of a community is, to map out the magnitude and geographical distribution of malnutrition as a public health problem, to discover and analyze the ecological factors that are directly or indirectly responsible, and, where possible to suggest appropriate corrective measures, preferably capable of being applied with continuing community participation (WHO, 1966).

2.1.1 Factors affecting the nutritional status

Nutrition plays a very important role in the physical, mental and emotional development of a child. The infants and preschool children are most vulnerable to retardation in growth as a result of malnutrition and under-nutrition. The problems get compounded, due to the ignorance and poverty of most of the parents, when they grow rapidly and need the best food and care (Sangwan *et al.*, 1993).

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).

There are many other factors that influence the nutritional status some of which are food availability and its distribution system, consumption of food, income source and purchasing power, family size, illiteracy, sociocultural and religious belief, environmental sanitation and health facility. The major causes of nutritional deficiency in developing country like Nepal is poverty, lack of food security and nutrition education (Devkota *et al.*, 2015).

2.1.2 Food availability and nutritional status

Food availability is a factor of production capacity, amount of imports and amount that is normally used at a given period in time and of the availability of storage. Food availability is also influenced by the availability of seeds, pest infestation, weather condition, and availability of pasture, land acreage under cultivation, labor and insecurity issues. The amount of food used by households, traded or stored all influence availability at the household level. Seasonal variation in food availability has long been recognized as a contribution to nutrition and health problems in many third world countries. The extent and duration of the seasonal hardships has been related to a number of climatic characteristics, such as rainfall modality, the distinctness of the season and length of period (Margarete, 1992).

Food is not just something to eat; it is an integral part of culture of a community, region, or nation. Food is a relative concept. Good health depends on an adequate food supply and this in turn on sound agricultural policy and a good system of food distribution (Hartog *et al.*, 2006). The food distribution determines the state of health and the incidence of disease among population. If the food supply is inadequate than the physiological needs, malnutrition and under nutrition could result (Yadav, 1994). Increased production of food groups making the national diet balance is one of the most important measures of achieving, nutritional adequacy. Where the national diet are deficient in nutrient, adverse consequences manifest themselves, for example, there is high prevalence of anemia due to iron deficiency, blindness among children due to vitamin A deficiency etc. Thus, the real solution to overcome the deficiencies disease is to consume diet rich in these nutrient (Katwal, 1992).

For the achievement of nutrition adequacy, increased production of food groups making the national diet balanced is one of the most important measures. Adverse consequences are manifested themselves if the national diet are deficient in nutrients. Vitamin A deficiency followed by iron deficiency, blindness among children, PEM and so on which could be overcome by supplying or consuming diets rich in these nutrients (Gyawali, 2002).

2.2 Nutritional requirements

Nutritional requirement refers to the amount of food energy and nutrient needed on an average per day by specific age and sex categories to meet the need of individuals for normal functioning of the body for work and growth. The requirement varies with sex, age, activity, physiological state (pregnancy, lactation and old age) and environmental condition. The requirements have generally been stated in term of average, taking such variation into accounts (Burk, 1984). The energy supplies seem to occur important in those developing countries where the staple commodities are either very low in protein content or the protein is of very low quality. Most of the people of developing countries depend upon starchy food and derived their 80% of total calories from them. The people of that country are able to obtain about 87% of calorie intake and 79% of gross protein intake and they receive only 6.4% of their calories and 8.9% of their protein from the consumption of meat, egg, milk and milk fats combined (Yadav, 1994).

Table 2.1 RDA of pre - schoolers children (ICMR, 2010)

Nutrients	**Age in years**		
	6-12months (8.4Kg)	1-3 (12.9kg)	4-6 (18kg)
Calories (Kcal)	672	1060	1350
Protein (g)	14.1	16.7	20.1
Visible fat (g)	19	27	25
Calcium (mg)	500	600	600
Iron (mg)	5	9	13
Vitamin A (µg))	350	400	400
Thiamine (mg)	0.3	0.5	0.7
Riboflavin (mg)	0.4	0.6	0.8
Niacin (mg)	5.4	8	11
Pyridoxine (mg)	0.4	0.9	0.9
Ascorbic acid (mg)	25	40	40
Folic acid (µg)	25	80	100
Vitamin B12 (µg)	0.2	0.2-1	0.2-1

2.3 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, 1966). Malnutrition is a board term commonly used as an alternative to under nutrition but technically it also refers to over nutrition. People are malnourished if their diet does not provide adequate calories and protein for growth and maintenance or they are unable to fully utilize the foods that they eat due to illness (under-nutrition). They are also malnourished if they consume too many calories (over-nutrition) (UNICEF, 2008).

Nepal suffers from extensive malnutrition, ranking in the top 10 countries with the highest prevalence of stunting (less than -2 SD scores) and the top 20 countries by number of stunted children less than five years of age worldwide (UNICEF, 2009).

When the 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 amount of micronutrient vitamins and minerals-to meet the daily nutritional requirement (UNWFP, 2008).

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).

2.3.1 Forms of malnutrition

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

2.3.1.1 Under nutrition

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

2.3.1.2 Over nutrition

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

2.3.1.3 Specific deficiency

It is the pathological state resulting from a relative or absolute lack of an individual nutrient (WHO, 1966).

2.3.1.4 Imbalance

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

2.3.2 Major nutritional problems

There are different types of nutritional problem; the major problems in the developing countries like Nepal are protein energy malnutrition, vitamin A deficiency, anemia & iodine deficiency disorder.

2.3.2.1 PEM (Protein energy malnutrition)

PEM results when the body's needs for energy and protein or both cannot be satisfied by the diet. It has a wide spectrum of manifestations, and its severity ranges from weight loss to growth retardation to distinct clinical syndromes, frequently associated with deficiencies of vitamins and minerals. The most severe clinical manifestations of PEM are kwashiorkor and marasmus (FAO, 1997).

PEM, also known as starvation, is defined as diet with insufficient amounts of all the major macronutrients i.e. carbohydrates, proteins and fats. PEM is a range of pathological condition arising out of coincident lack of protein and energy in varying proportion, most frequently seen in infant and young children and usually associated with infections (WHO, 1966).

2.3.2.1.1 Kwashiorkor

The term Kwashiorkor means, the disease which the child gets when the next baby born i.e. sickness of the disposal child (WHO, 1966). Kwashiorkor usually occurs later than

marasmus and is uncommon under one year of age. It occurs most frequently when children are taken off a diet of breast milk and have to rely only on the starchy staple. The causes of kwashiorkor are still no fully known; however, it has often been found to occur in association with diarrheal infections, which indicates that the causes go beyond nutritional factors (FAO, 1997).

Characteristics of symptoms of kwashiorkor are growth failure, edema, muscle wasting, moon face, apathy and peevishness, crazy pavement dermatitis and fatty liver (Swaminathan, 1991). Symptoms of kwashiorkor includes:

1. Fine, reddish-brown, lusterless hair with loose curls,
2. Apathy; growth failure,
3. With weight usually below 60% of expected weight for age, but this depends on the degree of edema.
4. Edema (excess fluid under the skin, causing puffiness)
5. Blotchy skin
6. Prominent stomach
7. Diarrhea
8. Wasted muscles.

2.3.2.1.2 Marasmus

This is 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. It may occur when there is too long a reliance on breast milk without complementary solid foods. Improper use of bottle-feeding is closely associated with marasmus, especially in urban areas (FAO, 1997)

Symptoms of marasmus includes (FAO, 1997):

1. Apathy, growth failure,
2. With weight below 60% of expected weight for age,
3. Wasted muscles (muscles that are visibly thinner and less developed than normal) and very little fat under skin.
4. Diarrhea

2.3.2.1.3 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).

2.3.2.2 Vitamin A deficiency disorder

Vitamin A deficiency is one of the most common vitamin deficiencies in children throughout the developing world (Mason *et al*., 2001). More than 250 million of the world's children suffer from vitamin A deficiency. Sixty-nine percentage of children in Southeast Asia has vitamin A deficiency (Ramkrishna, 2002).

Nepal is one of 60 countries in which this deficiency constitutes a significant public health problem (Fiedler, 2000). Each year vitamin A deficiency (VAD) claims the lives of almost 670,000 children under five in the world (Black *et al.*, 2008) and precipitates the deaths of approximately 6,900 children in Nepal (World Bank, 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 (ERA, 1998). 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, 2012).

2.3.2.3 Anemia

Anemia, characterized by a low level of hemoglobin in the blood, is a major health problem in Nepal, especially among young children and pregnant women. Anemia may be an underlying cause of maternal mortality, spontaneous abortions, premature births, and low birth weight. The most common cause of anemia is inadequate dietary intake of nutrients necessary for synthesis of hemoglobin, such as iron, folic acid, and vitamin B12 (MoHP, 2012).

An estimated 2 billion people are anemic, with nearly 3.6 billion iron deficient. IDA leads to impaired work performance and deficits in learning ability. NDHS 2011 shows that 46 percent of children in Nepal are anemic; 27 percent are mildly anemic, 18 percent are moderately anemic, and less than 1 percent is severely anemic. The prevalence of anemia among children under age 5 has declined by only 2 percentage points in the past five years (MoHP, 2012).

2.3.2.4 Iodine deficiency disorder

Iodine deficiency disorders (IDD) are the world's leading cause of preventable mental retardation and impaired psychomotor development in young children. The World Health Organization estimated in 2007 that 2 billion people around the world live in areas at risk of insufficient intake of iodine (Benoist *et al.*, 2008). 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, 2012).

2.4 Nutritional situation

2.4.1 Incidence of under-nutrition

Under nutrition is a pathological state arising from an inadequate intake of food, and hence of energy, over a considerable period of time, with reduce body weight as its principal manifestation. Under nutrition is also defined as the outcome of insufficient food intake and repeated infectious diseases. It includes being underweight for one's age, too short for one's age (stunted), dangerously thin for one's height (wasted) and deficient in vitamins and minerals (micronutrient malnutrition) (UNICEF, 2006).

Malnutrition is associated with more than half of all child deaths worldwide. Undernourished children are more likely to die from common childhood ailments and, for those who survive, have recurring sicknesses and faltering growth. Three quarters of the children who die from causes related to malnutrition are only mildly or moderately malnourished showing no outward sign of their vulnerability (UNICEF, 2006).

According to Nepal Demographic and 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 the children below 5 years are under weight and 11% are severely underweight. Similarly (NDHS) 2011 shows that 41%of children under 5 years of age are stunted, and 16% are severely stunted. The survey also shows that 11% of children are wasted and 3% are severely wasted and 29% of children below 5 year of age are underweight and 8% are severely underweight (MoHP, 2012).

2.4.2 Infant mortality, life expectancy and birth weight

Infant mortality rate (IMR) is the number of deaths of children less than one year of age per 1000 live births. The rate for a given region is the number of children dying under one year of age, divided by the number of live births during the year, multiplied by 1,000. Leading causes of congenital infant mortality are malformations, sudden infant death syndrome, maternal complications during pregnancy, and accidents and unintentional injuries. Environmental and social barriers prevent access to basic medical resources and thus contribute to an increasing infant mortality rate; 99% of infant deaths occur in developing countries, and 86% of these deaths are due to infections, premature births, complications during delivery, and perinatal asphyxia and birth injuries (Andrews *et al.*, 2008). Life expectancy is a statistical measure of the average time an organism is expected to live, based on the year of their birth, their current age and other demographic factors including sex (Koontoz, 2004).

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

2.5 Breastfeeding and weaning process in 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).

Breastfeeding in the first years of life protects children from infection, provides an ideal source of nutrients, and is economical and safe. However, many mothers stop breastfeeding too soon and there are often pressures to switch to infant formula, which can contribute to growth faltering and micronutrient malnutrition and is unsafe if clean water is not readily available. WHO/UNICEF provide the following feeding recommendations (NMICS, 2012).

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

Breast-feeding is nearly universal among the Nepalese mothers, but its duration and frequency are not always optional. In most communities, a mother begins feeding their infants almost immediately, but in some parts of the country (UNICEF, 1987) feeding doesn't begin for a two days or after the colostrum has been discarded. Such practice means some new infants are deprived of the immunological qualities of colostrum (Swaminathan, 2008). Breast feeding is usually continued together with the provision of cereal weaning until child is 2-3 years of old or until the mother is pregnant again. In certain communities, children receive only breast milk until they begin to eat adult's food. Mother will generally feed their infants on demand but workloads interfere with the frequency of feeding (Swaminathan, 2008).

According to Nepal Demographic Health Survey 2011, 70% of children under age 6 months are exclusively breastfed, and 66% of children 6-8 months (breastfed and non-breastfed) are introduced to complementary foods at an appropriate time. Ninety- three

percent of all children are still breastfeeding at age 1, and the same proportion are still breastfeeding at age 2. Four of five Nepalese children ages 0-23 months are breastfed appropriately for their age. This includes exclusive breastfeeding for children age 0-5 months and continued breastfeeding along with complementary foods for children age 6-23 months. Four-fifths of children under 6 months are predominantly breastfed. This percentage includes children who are exclusively breastfed and those who receive breast milk and only plain water or non-milk liquids such as juice. Finally, 6% of children under age 2 are bottle fed (MoHP, 2012).

Reasons for breast milk feeding are:-

a) Any milk other than breast milk has no anti-infective properties to protect the infant in the early months.
b) Bottle feeds are often too difficult. The mother makes the expensive milk lost as long as possible and often is unable to follow written instructions on the can or container (Cameron and Hofvander, 1993).

Breast milk contains antibodies that help the baby fight off viruses and bacteria. Breastfeeding lowers baby's risk of having asthma or allergies. Babies who are breastfed exclusively for the first 6 months, without any formula, have fewer ear infections, respiratory illnesses, and bouts of diarrhea. Study found that, United States would save about $13 billion per year in medical costs if 90 percent of U.S. families breastfed their newborns for at least six months (Bartick and Reinhold, 2010).

2.5.1 Weaning pattern

Weaning is the process of gradually introducing an infant to what will be its adult diet. Weaning in human infants is a subject of controversy in terms of its initiation and correct method of doing it. The ideal age of weaning is six months. The desirable weaning food should be inexpensive, home available, clean and easily digestible. It should be rich in calories and protein with adequate amount of trace elements like iron, calcium, vitamins etc. (Siwakoti, 2014).

Weaning is a gradual process starting around the age of 6 months because the mother’s milk alone is not sufficient to sustain growth beyond 6 months. Natural weaning occurs as the infant begins to accept increasing amounts and types of complementary feedings while

still breastfeeding on demand. When natural weaning is practiced, complete weaning usually takes place between two and four years of age. Planned weaning occurs when the mother decides to wean without receiving signals from the infant that he is ready to stop breastfeeding. It should be supplemented by suitable foods rich in proteins and other nutrients. These are also called complementary foods. They vary with socio-economic stratification and are regulated by a variety of factors such as education, customs, beliefs and taboos (Siwakoti, 2014).

Weaning pattern is the process of providing other nutritive food to the child besides mother's milk. Such foods help the child to grow in healthy way and to keep the children away from the malnutrition; growing child cannot only depends on the mother's milk, so other foods should be given to the child on the requirement quantity. Similarly, most of the mother's start to work in the field after one month of their child birth and they have less time to feed their infants. If the baby is hungry when the mother is absent, the baby may be fed with "Jaulo", milk etc. This provides the temporary relief, although it is inappropriate for infants less than four months old (Vaidya, 1987).

Both early and late supplementation is harmful for child health. Weaning that began too early involves the risk of infection, weaning that too late leaves the infants with an inadequate intake of nutrients and, thus is harmful to the growth and development of child (Abbote and Yahannes, 1987). Among many facilities in Nepal, the fifth or sixth months of the life are marked by the rice feeding ceremony i.e. "pasni" in which the baby is offered rice or "kheer" according to the economic condition of the family for the first time. After this ceremony the baby can take complementary foods. But the mother will continue to give breast milk beyond and the first year. This late introduce causes serious under nutrition at this age (NHFS, 1996).

2.5.2 Weaning practice

The children are considered to be the nutritionally most vulnerable member of any community. The period of childhood especially the second year of life is notoriously fraught with risk. The young child is "transitional" as regard diet immunity to infection and psychologically dependence. This is a period of rapid growth with high nutrients needs, particularly of proteins for swiftly increasing muscle tissue. It is a time when several meals a day is required and when foods should be easily digestible (Jelliffe, 1966).

If the baby is to maintain the expected rate of growth, remain healthy and well nourished, complementary feeding has to be restored to around 6th month (Srilakshmi, 2014). During the weaning period good food source of energy, protein calcium and iron are particularly important. On the basis of body weight, children required twice as much as protein calcium and iron as do adults (Vaidya, 1987).

Common traditional weaning foods include (Nidi, 2006):

1. Porridge (lito), made from roasted rice flour (occasionally maize or millet), ghee (clarified butter) and sugar.

2. Jaulo, made from rice and turmeric or rice and salt.

3. Dhindo, made from maize flour (or millet or wheat)

4. Maar, made in lowland areas by cooking rice, cracked maize and soybeans together

5. Khichari, a mix of rice, pulses and vegetables.

Some of these traditional foods are high in energy and nutrients and should be encouraged. These include maar and khichari. Others are poor weaning foods with little protein or nutrients, such as jaulo, so adding pulses, green leafy vegetables or fruit to these foods is encouraged (Nidi, 2006).

In an under developed country like Nepal the average family food, "Dal Bhat" in small quantities and in diluted form is given to the infants child, especially in the hills among low income group families, is "Dhindo". Roasted soybean or corn, flattened rice (chiura) and puffed rice are also given as snacks food (Nidi, 2006).

As mentioned earlier, after pasni the child can take supplementary food and the infants are fed with "Lito". Lito, a traditional blend rice porridge made with green vegetables is also given to infants, but it is specially given to convalescing young children (Vaidya, 1987).

2.6 Assessment of nutritional status

In making an assessment of nutritional status of an individual or a group, various indices give us some idea. These include body build, physical stature, general appearance, feeling of health and well-being, the level of activity etc. A well-built body, a bounce in the step,

sparkling eyes, clear skin and ready smile generally associated with good health (Ramchandran, 1987). The nutritional assessment may require encompassing nations, communities, and vulnerable segments of communities or individuals. It may be done as a part of an exercise to document current status as compared with post status or as specific attempt to evaluate the impact of an intervention program (Ramchandran, 1987).

The assessment of nutritional status can be done using: (WHO, 1966)

1) Direct method: - Deals with the individual and measures objective criteria.eg. Dietary intake, Anthropometric, clinical examination, biochemical and bio- physical parameters.
2) Indirect method: - Use community indices that reflect the community nutritional status or need. E.g., morbidity and mortality rates, as specific mortality and vital statistics.
3) Ecological factors: - E.g. Socio-economic status, housing and environmental hygiene, health and education services, conditioning infection.

Direct methods of nutritional survey (WHO, 1966)

They are summarized as ABCD

a) Anthropometric method
b) Biochemical and laboratory method
c) Clinical examination
d) Dietary evaluation method

Indirect methods of nutritional survey (WHO, 1966)

a) Ecological variables including agricultural crop production, food balance sheet, health and educational services.
b) Socio economic factors e.g. Family sizes, occupation per capita income, population density, education customs and social habits.
c) Vital health statistics particularly infant ,under 5, mortality and morbidity related to PEM, school age child stunting and wasting, anemia, goiter, diarrhea, measles and parasitic infestation.

2.7 Anthropometric measurement

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

Anthropometric Indicators Changes in body dimensions reflect the overall health and welfare of individuals and populations. Anthropometry is used to assess and predict performance, health and survival of individuals and reflect the economic and social well-being of populations. Anthropometry is a widely used, inexpensive and non-invasive measure of the general nutritional status of an individual or a population group. Recent studies have demonstrated the applications of anthropometry to include the prediction of who will benefit from interventions, identifying social and economic inequity and evaluating responses to interventions (Cogill, 2003).

Anthropometry can be used for various purposes, depending on the anthropometric indicators selected. For example, weight for-height (wasting) is useful for screening children at risk and for measuring short-term changes in nutritional status. However, weight for height is usually not appropriate for evaluating changes in a population over longer time periods. A clear understanding of the different uses and interpretations of each anthropometric indicator will help to determine the most appropriate indicator(s) for program evaluation. The anthropometric measurement of infants below six months of age for monitoring and evaluation purposes is not recommended (Cogill, 2003).

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).

Advantages of anthropometry (Jelliffe, 1966).

a) Simple, non-invasive,
b) Some equipment's are inexpensive, portable,
c) Relatively unskilled personnel can perform measurements,
d) Methods are reproducible,

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

Limitation of Anthropometry (Jelliffe, 1966).

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

The commonly used anthropometric measurements to detect malnutrition are briefly discussed below:

2.7.1.1 Height-for-age (H/A)

H/A is an indicator of past or chronic malnutrition. H/A cannot be used to measure short term changes in malnutrition. Deficits in L/A or H/A 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 pre-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 (Pietsch, 2000).

Children whose height for age Z – score is below minus two standard deviations (-2SD) from the median of the WHO reference population are considered short for age (stunted), or chronically malnourished. Children who are below minus three standard deviations (3SD) are considered severely stunted (WHO, 2015).

2.7.1.2 Weight-for-height (W/H)

Weight-for-Height (W/H) 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 (Gomez *et al.*, 2000).

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 (WHO, 2015).

2.7.1.3 Weight-for-age (W/A)

W/A is used to identify the nutritional condition underweight, which is a composite measure of stunting and wasting (Hommes, 2005). Low weight-for-age identifies the condition of being underweight at a specific age. W/A 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 (WHO, 2015).

2.7.1.4 Mid-Upper Arm Circumference (MUAC)

MUAC is the circumference of the left upper arm, measured at the mid-point between the tip of the shoulder and tip of the elbow. 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 fiber- tape, which must be placed gently, but firmly, round the limb to avoid compression of the soft tissue (WHO, 1966).

2.8 Conceptual framework

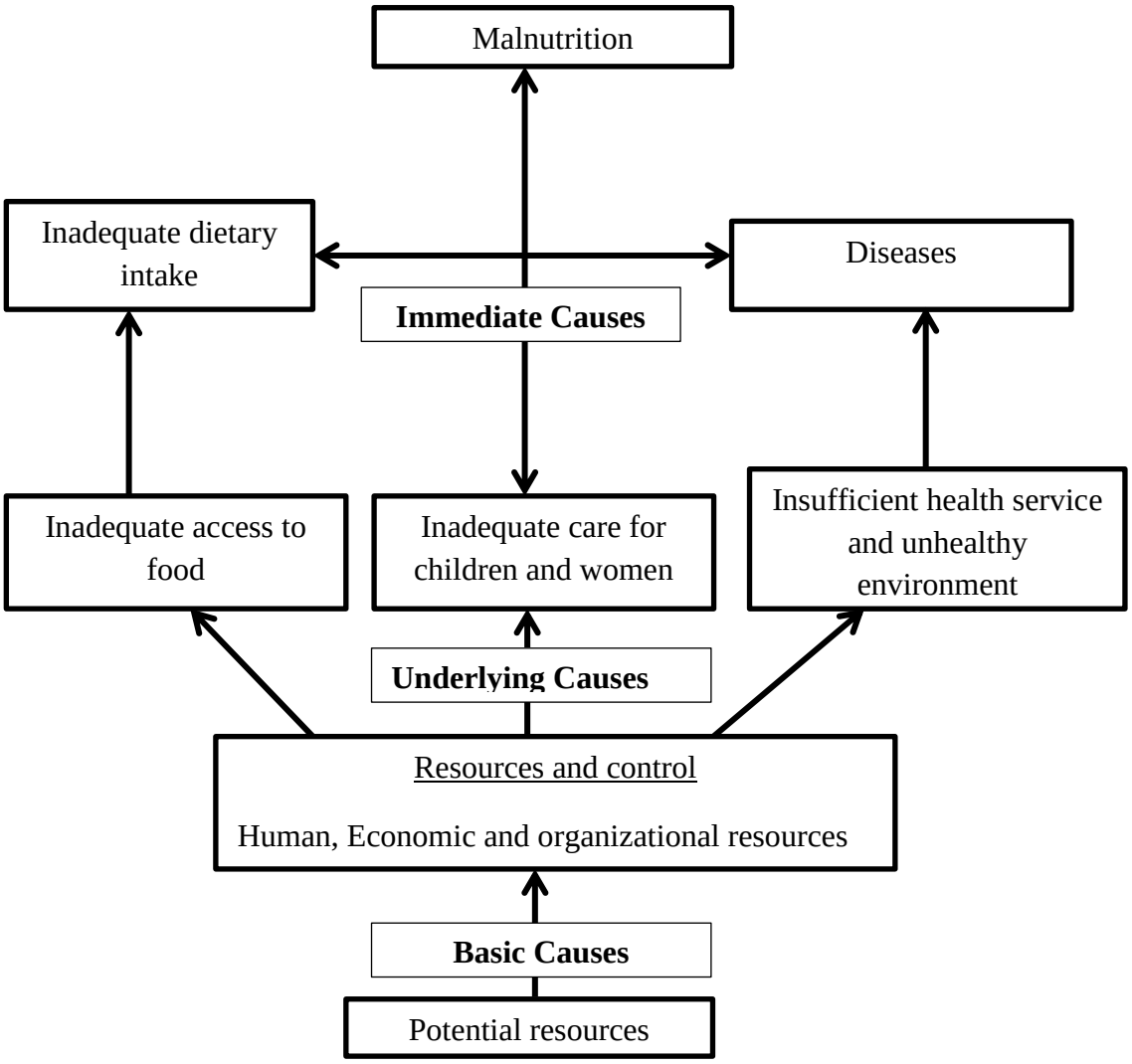

Fig 2.9 Conceptual framework of Malnutrition (UNICEF, 2011)

Control in the resources plays for the distribution of the food in family and the community. Care for women and children, facilities of health services and environmental condition also depends upon the type of community. Inadequacy in food supply, care facilities and the care practices can result inadequate dietary intake and diseases. The insufficient intake means unfulfilled nutritional requirement and this leads to malnutrition. Also, insufficient care leads to diseases. Diseases cause insufficient intake and improper use of nutrients. Thus, causes malnutrition (UNICEF, 2011)

Part – III

Materials and methods

3.1 Research design

A cross - sectional survey of under five year sukumbasi children of Kanakai Municipality of Jhapa district consists of two parts that were likely to be important in field based nutritional survey of designed research.

a) Anthropometric measurement of under-five children
b) Household survey with the help of questionnaires.

3.2 Study area

Study area was Kanakai municipality of Jhapa district, Nepal which is located in the eastern development region. Its western border is Kanakai river and eastern is Birtamod municipality. This municipality consists of people of different ethnic group having different economic status. According to National Population and Housing Census 2011, Kanakai municipality constituted 10566 households with 43019 total populations.

3.3 Study variable

Study variable were categorized into two groups:

a) Dependent variable: Malnutrition indicated by stunting, wasting and underweight.

b) Independent variables: Five categories of factors were assessed;

1. Socio-economic and demographic variables: religion, ethnicity, family size, income, occupation, education
2. Child characteristics: age, sex, birth order, type of birth, breastfeeding status, morbidity status.
3. Child caring practices: feeding, hygiene
4. Maternal characteristics: age, number of children ever born, iron and folate intake, extra food during pregnancy/lactation.
5. Environmental and health condition: water supply, toilet facilities, water purification, fuel for cooking.

3.4 Target population

The target population of the study was 6-59 months sukumbasi children for nutritional status assessment and parents or caretakers were the targets for the assessment of factors associated with nutritional status of children.

Inclusion and Exclusion criteria:

Inclusion criteria: - Sukumbasi children aged 6-59 months living in Kanakai municipality were included in the study.

Exclusion criteria: - The study participants who were ill, disable or who were not available at the household during the survey were not included in the study.

3.5 Sampling technique

Simple random sampling was used to select children from households. From 9 wards (2, 4, 8 and 9) wards are selected by lottery method. Children were selected in the gap of every two households. Sukumbasi households having children below 5 years of age was included in sample.

3.6 Sample size

The sample size was determined using a single proportion formula by assuming the prevalence rate of malnutrition to be 50% in the survey area, 95% confidence level (CI), 9% margin of error and 8% non - response rate was added to the total calculated sample size.

Mathematically,

Sample size (n_o) = $Z^2 \times p\ (1\text{-}p) / d^2$ (www.surveysystem.com, 2012)

Where, Z = Confidence level at 95% (standard value of 1.96)

P = estimated prevalence of malnutrition (50%)

d = margin of error (9%)

Now,

$N_o = (1.96)^2 \times (1\text{-}0.5) / (0.09)^2 \quad = 118$

The calculated sample was adjusted for non – response rate. Thus the actual sample size was determined by adding 8% non-response rate on calculated sample size and was found to be 127.

3.7 Research instruments

Instruments needed for performing the survey were:

a) Weighing machine: weighing machine with the capacity of 100 kg and having the least count of 0.1 kg. (Microlife pvt.ltd)
b) Height measuring stand (Stadiometer): stadiometer with the capacity of 200 cm and having the least count of 0.1 cm.
c) MUAC tape: For measuring mid-upper arm circumference with the capacity of 26.5 cm having the least count of 0.1 cm.
d) Questionnaire: A well designed and pretested set of questionnaire to collect household's information. (Appendix – A)

3.8 Validity and reliability

To ascertain the degree to which the data collection instruments was measured what they purposed to measure, the instruments was validated by a group of professionals from Central Campus of Technology, department of Nutrition and Dietetics. The aspect tested in the questionnaire was also drawn from the available literature in nutrition about the preschool children. The questionnaire was pre-tested prior to data collection to ascertain content and face validity.

Reliability refers to quality control measure of data collected. Before data collection the research assistants were intensively trained on the objectives of the study and on data collection techniques. The process of data collection involved the principal researcher and two research assistants. Questionnaires were checked daily for completeness, consistency and clarity as mentioned earlier. In addition, the academic supervisors visited the research site periodically to monitor the process of data collection.

3.9 Data collection techniques

Data obtained from the respondents was collected on a structured form of questionnaire in which each questionnaire was given a unique identity number for each child. Interview was conducted with parents/care takers of the children to fill the questionnaire. Data collection

was carried out on standardized procedures for obtaining informed consent, conducting interviews and performing anthropometry from guide teacher.

Body weight was measured by using weighing balance of microlife pvt.ltd. Weight was taken in minimum clothes without shoes. The zero error of weighing balance was checked by weighing thrice for five samples. Similarly, for the child below two years who cannot stand properly, recumbent length was taken. The legs were held straight and firm with the feet touching the sliding board. In older children, the subject were asked to stand erect looking straight on a leveled surface with heels together and toes apart, without shoes. The moving piece of stadiometer was lowered to rest flat on the top of the head and the reading was taken. An average of three measurements was taken for the first five samples to check the accuracy. MUAC was taken on the left hand; in the mid-point between the tip of the acromion of scapula and tip of the olecranon of the fore-arm bone.

We also learnt how to tackle the local problem that may arise in the field while conducting survey. These training were given to us during our field study on nutritional survey. All standardization and field work was conducted under the direction and supervision of my guide teacher.

3.10 Data management

Collected data was managed carefully as safety of raw information had a permanent importance. Thus, collected data was coded by giving numbers starting from 1 to 127. They were stored safely. Thus stored data was utilized for the purpose of analysis.

3.11 Data analysis

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

3.12 Logistical and ethical consideration

Permission to conduct study was obtained from Central Campus of Technology, Department of Nutrition and Dietetics and office of the Kanakai Municipality of Jhapa

district. Also clearance to conduct the research was obtained from the parents of respective children who were selected for conducting the research.

The study participants were provided with oral consent prior to the study. Respondents were assured that the data collected was for the purpose of the study.

Part-IV

Results and discussion

The survey was conducted in Kanakai municipality, Jhapa with the objective to find the prevalence and factors associated with nutritional status of sukumbasi children. On this study, 127 children aged 6-59 months were taken as sample for anthropometry and a semi structured questionnaire was set for interviewing the mothers or caretakers to obtain information. Among 127 respondents, all the respondents responded to the study with 100% response rate. The results and findings of the study are expressed into several following headings.

4.1 Demographic and socio-economic characteristics

Table 4.1 Religion and caste distribution of study population (n=127)

Variable	Frequency	Percent
Religion		
Hindu	86	67.7
Buddhist	4	3.1
Christian	17	13.4
Muslim	10	7.9
Others	10	7.9
Caste		
Brahmin	8	6.3
Chhetri	9	7.1
Janajati	40	31.5
Dalit	26	20.5
Madhesi	2	1.6
Satar	29	22.8
Others	13	10.2

Out of 127 households 67.7%, 3.1%, 13.4%, 7.9% and 7.9% families were found to be Hindu, Buddhist, Christian, Muslim and others respectively. Among 127 households, 6.3% were Brahmin, 7.1 % Chhetri, 31.5% Janajati, 20.5% Dalit, 1.6% Madhesi, 22.8% Satar,

and 10.2% were of other castes which is shown in Table 4.1. Speciality of this research is that Janajati is 31.5% and Satar only found in Jhapa and Morang district is 22.8%.

Table 4.2 shows that the major occupation in Sukmbasi people of Kanakai Municipality were labour (42.5%) and foreign employment (22.8%) followed by agriculture (15%), job (15%) and business (6%). Considering the estimated annual income depicted in Table 4.2 of all respondents, those with annual income between NRs one hundred thousand to three hundred thousand had the highest percentage (83.5%) and the household that earn below one hundred thousand and above three hundred thousand annually were 7.9% and 8.7% respectively. Households with low or medium economic status cannot afford same as like households with higher economic status. The result obtained from (Babar *et al.*, 2010) found that children from lower socio economic class is poor as compared to their counter parts in upper socio economic class. Poverty and low literacy rate, large families, food insecurity and food safety appears to be the important underlying factors responsible for poor health status of children from low socioeconomic class (Babar *et al.*, 2010).

Table 4.2 Economic characteristics of population (n = 127)

Variable	Frequency	Percent
Occupation		
Agriculture	19	15
Job	19	15
Labour	54	42.5
Business	6	4.7
Foreign employment	29	22.8
Annual income (NRs.)		
<100,000	10	7.9
100,000 to 300,000	106	83.5
>300,000	11	8.7

People of lower economic status tend to have poorer health outcomes than those with higher economic status. While this may be partly related to a lack of access to health care and other resources due to lower income, other factors such as education level, supportive familial and social networks and personal factors are clearly involved. Health education

and promotion activities aimed at improving health outcomes in the general population may actually exacerbate health inequalities between low and high socioeconomic status groups due to greater uptake of the intervention in the high socioeconomic status group (Koontoz, 2004).

Table 4.3 Socio - demographic characteristics of study population (n=127)

Variable	Frequency	Percent
Family type		
Nuclear	105	82.7
Joint	22	17.3
Family Size		
1 to 4	61	48
5 to 8	61	48
9 to 12	5	3.9
Father's educational status		
Illiterate	32	25.2
Primary	57	44.9
Secondary	33	26
Higher secondary and above	5	3.9

There were 82.7% (105) nuclear families, 17.3% (22) joint families and (Table 4.3). Nuclear families relatively have better advantages than joint ones which include financial stability, consistency in raising children, strong support system and emotional bonding. Although there are 105 nuclear households, their yearly income is not so satisfactory, which may play a vital role in their daily eating pattern. There may be lack of balanced diet. The breakdown for family size of household is as follows, household with 1-4 members (48%) had the highest percentage while 5-8 sized and 9-12 sized household had 48% and 3.9% respectively. The educational status in father of children was superseded by primary level (44.9%) followed by secondary level (25.2%), illiterate (16.5%) and higher secondary level and above (3.9%) (Table 4.3).

The father’s literacy was associated with the nutritional status of children in Delhi (Davey *et al.*, 2015). Father’s education status can influence child nutritional status

significantly. Father can also play an active role for improving the nutritional status of undernourished children.

4.2 Child characteristics

Table 4.4 Child characteristics of study population (n=127)

Variable	Frequency	Percent
Gender		
Male	68	53.5
Female	59	46.5
Weight of child during birth		
Less than 2.5 kg	8	6.3
More than 2.5 kg	73	57.5
Don't know	46	36.2
No of under 5 children		
1	101	79.5
2	26	20.5
Birth order		
1	69	54.3
2	32	25.2
3	14	11
4	10	7.9
5	1	0.8
6	1	0.8
Age group (Months)		
(6-11)	17	13.3
(12-23)	30	23.7
(24-35)	26	20.5
(36-47)	29	22.8
(48-60)	25	19.7

From the total of 127 children included in this study 68 (53.5%) were males and 59 (46.5%) were females. The mean age of children was found to be 32.1±15.8. Majority of

them were in 12-23 months (23.7%) age group followed by 36-47 (22.8%), 24-35 (20.5%), 48-60 (19.7%) and 6-11(13.3%).

The children's whose birth weight below normal (less than 2.5 kg) was 6.3%, 57.5% was above normal (above 2.5 kg), and 36.2% did not know the birth weight of their children. The children who are less than 2.5 kg during birth time may not have proper physical and mental development in future. They are relatively more prone to various diseases. Although, 57.5% children were more than 2.5kg during birth, there may lack proper care, inadequate complementary food after 6 months, may suffer from diseases like diarrhea which results worst nutritional status (MoHP, 2012).

The families who had only one child below 5 years of age was 79.5%, while 20.5% had two under five children. More than half (54.3%) of children under study were eldest child of the household.

4.3 Child caring practices

Out of total respondents, 114 (89.7%) of respondents revealed that breast feeding to their child was initiated from the day of birth. The children who were initiated for breast feeding within the first hour after delivery was 89 (70.1%), 25 (19.7%) within 8 hours and 13 (10.2%) after 24 hour. Among them 78.7% were exclusively breastfed for six months.

All children were fed nothing before initiation of breast milk. None of the children under survey were fed commercial milk. Out of 127 children, 26 (20.4%) children had initiated complementary feeding before 6 months, 81 (63.8%) children had initiated complementary food within the period of 6 months and 7 months and 20 (15.7%) children had initiated complementary food after 7 months. Majority of the children were fed complementary food more than 3 times per day. The age at which complementary diet given was 4 months in 16.5%, 5 months in 3.9%, 6 months in 40.2%, 7 months in 23.6%, more than 7 months in 15.7%. The type of complementary food given to children was same as other family members in 66.9% (85), followed by lito 17.3% (22), jaulo 13.4% (17), sarbattom pitho ko lito 2.4% (3). The distribution of different child caring practices is shown in the table 4.5.

Table 4.5 Distribution of different child caring practices (n=127)

Variable	Frequency	Percent
Breast Feeding Status		
Yes	114	89.7
No	13	10.3
Time of initiation of breast feeding		
Within 1 hour	89	70.1
Within 8 hour	25	19.7
After 24 hour	13	10.2
Exclusive Breastfeeding		
Yes	100	78.7
No	27	21.3
Time for initiation of complementary food		
4 month	21	16.5
5 month	5	3.9
6 month	51	40.2
7 month	30	23.6
> 7 month	20	15.7
Type of complementary food		
Lito	22	17.3
Jaulo	17	13.4
Sarbottam pitho	3	2.4
Similar to other family member	85	66.9

Almost 85% of household use packaged iodized salt. This finding is less than to that of National Demographic and Health Survey 2011 which revealed that more than 95% of households were using iodized salt (MoHP, 2012). Regarding Vitamin A and deworming tablet supplementation, 101 (79.5%) children were supplemented with Vitamin A and deworming tablet while 26 (20.5%) were not. The effectiveness of national vitamin A supplementation program was nearly to that of the country as the national data on vitamin A supplementation revealed that nine in ten children aged 6-59 months received vitamin A supplement (MoHP, 2012). The preference of health services for treatment of children

during acute illness was highest 103 (81.1%) to nearby pharmacy followed by 24 (18.9%) to nearby health center.

Table 4.6 Distribution of health related practices (n=127).

Variable	Frequency	Percent
Iodize salt consumption		
Yes	108	85
No	19	15
Vitamin 'A' and Deworming tablet to child		
Yes	101	79.5
No	26	20.5
Treatment center		
Nearby health center	24	18.9
Pharmacy	103	81.1

Breastfeeding in Nepal is almost universal and 70% of children under six months are exclusively breastfeed (MoHP, 2012). In this survey, 78.7% of children were exclusively breastfed which is higher than the data of NDHS 2011 and almost 89% of children were breastfed. Initiation of complementary food at six month is notably lower (40.2%) than NDHS findings (66%) (MoHP, 2012). While 20.5% of children were fed complementary food at early age and 39.4% of children were fed lately.

4.4 Maternal characteristics

The mean mother's age under the study was found to be 25.6 ± 5.8 years (n=123). Four children did not have their mother. Out of 123 mother's, 31 (24.4%) of mothers had secondary level education while 33 (26%) were illiterate and 50 (39.4%) and 9 (7.1%) with primary and higher secondary and above educational status respectively. Highest percentage (91.3%) of mothers were housewives while 4% were engaged in service and 2.4% were laborer as shown in Table 4.7. The minimum and maximum age of mother at their marriage was 12 and 35 year (n=123) while the mean age of marriage was 18.5±3.5 year. The mother who had their first pregnancy below 18 years of age was 34 (26.8%), while 89 (70.1%) were pregnant for the first time above 18 years of age (n=123). The mean age of mother for first pregnancy was 20.2 ± 4.1 years. Mothers who had taken iron

and folate tablet during pregnancy was 95 (74.8%), while 26 (20.5%) did not take and 2 (1.6%) forget that whether they took or not.

Table 4.7 Distribution of maternal characteristics in study population (n=123)

Variable	Frequency	Percent
Mother's educational status		
Illiterate	33	26
Primary	50	39.4
Secondary	31	24.4
Higher secondary and above	9	7.1
Mother's occupation		
Housewife	116	91.3
Service	4	3.1
Labour	3	2.4
Age at first pregnancy		
Below or equals to 18 years	34	26.8
Above 18 years	89	70.1
Iron and Folate supplementation		
Yes	95	74.8
No	26	20.5
Don't know	2	1.6
Knowledge about sarbottam pitho		
Yes	39	30.7
No	88	69.3
Knowledge about malnutrition		
Yes	33	26
No	94	74

Mothers who were well known about sarbottam pitho are 39 (30.7%). Children are at greatest risk of nutritional deficiency and growth retardation between the age of 6 months and 24 months. At around six months of age, introduction of complementary foods, along with sustained breast-feeding, is required (Taher, 2011). Although 39 mothers were well

known about sarbottam pitho, only 3 of them fed sarbottam pitho to their child as a complementary food. Among 33 mothers who were known about malnutrition, 32 (97%) mentioned that the cause of malnutrition is lack of balanced diet while 1 (3%) reported the cause to be evil eye.

Table 4.8 Distribution of knowledge of mother in study population (n=123).

Variable	Frequency	Percent
Knowledge about sarbottam pitho		
Yes	39	30.7
No	88	69.3
Knowledge about malnutrition		
Yes	33	26
No	94	74
Cause of malnutrition (n=33)		
Lack of balanced diet	32	25.2
Aankha lagnu (Evil eye)	1	0.8
Additional nutrient for pregnant women		
Required	113	89
Not required	10	7.9
Management of food during pregnancy		
Eat more than usual	51	40.2
Eat less than usual	43	33.9
Eat as usual	29	22.8

Mother's education level plays a significant role on the nutritional status of children as well as on the health of family members. The research showed that 26% of the mother's in the survey area are illiterate. Educated mother have more opportunities to be informed and be aware about health care, better nutrition, child development, etc. as compared to uneducated mother.

Among 123 mother respondents, 113 (89%) mentioned that additional nutrients are necessary during pregnancy and 10 (7.9%) mentioned that it can be managed by providing more food than usual. The mother who mentioned that they used to eat more food than

usual during their pregnancy period was 51 (40.2%), 43 (33.9%) said they used to eat less than usual and 29 (22.8%) said they used to eat as like before during their pregnancy period.

The body goes through numerous physical and hormonal changes during pregnancy. The way mother nourish their body during this time will affect the health of both mother and baby. Mother must eat more, healthful, balanced diet to help ensure stay healthy throughout the pregnancy. The food mother eat is the main source of nourishment for her baby, so it's critical to consume foods that are rich in nutrients. Proper nutrition can help promote baby's growth and development (Healthline, 2016).

4.5 Environmental characteristics

Safe drinking water and proper hygiene and sanitation practices are basic necessities for good health. Lack of access to safe, clean drinking-water and basic sanitation, as well as poor hygiene cause nearly 90% of all deaths from diarrhea, mainly in children (WHO, 2009). Lack of access to WASH can affect a child's nutritional status in many ways. Existing evidence supports at least three direct pathways: via diarrheal diseases, intestinal parasite infections and environmental enteropathy. WASH may also impact nutritional status indirectly by necessitating walking long distances in search of water and sanitation facilities and diverting a mother's time away from child care (Fenn *et al.*, 2012).

The main source of drinking water used by household was 126 (99.2%) tube well. Only 1 (0.8%) of household used tap water as source of drinking water. 64 (50.4%) households treated/purified water before they drink while rest of household did not. 42 (33.1%) households under the survey did not have toilet facility and 85 (66.9%) had toilet facility. Major sources of cooking fuel as shown in Table 4.7, indicated that larger percentage of households used firewood 91 (71.7%) as cooking fuel, followed by LPG stoves 33 (26%), 2 (1.6%) used dung gas and 1 (0.8%) used other fuel sources.

Table 4.9 Environmental characteristics of study population (n=127)

Variable	Frequency	Percent
Source of water		
Tube well	126	99.2
Tap water	1	0.8
Water purification		
Yes	64	50.4
No	63	49.6
Toilet facilities		
Yes	85	66.9
No	42	33.1
Cooking fuel		
Fire wood	91	71.7
Dung gas	2	1.6
LPG gas	33	26
Others	1	0.8

Those who lack access to safe drinking-water, sanitation and hygiene (WASH) can be suffered from diarrhea. Diarrhea and under-nutrition form part of a vicious cycle. Diarrhea can impair nutritional status through loss of appetite, mal-absorption of nutrients and increased metabolism (Caulfield *et al.*, 2004). Frequent episodes of diarrhea in the first 2 years of life increase the risk of stunting and can impair cognitive development (Grantham-McGregor *et al.*, 2007). Therefore, access to safe drinking-water, sanitation and hygiene (WASH) services is a fundamental element of healthy communities and has an important positive impact on nutrition.

4.6 Prevalence of malnutrition

Anthropometric indices are the major tool for the assessment of nutritional status of children. Deviation of anthropometric indices from the reference standard of those indices is the evidence of malnutrition. Generally, underweight, stunting and wasting are widely used indicators of malnutrition (Shrestha, 2014).

In survey, among 127 children, the overall magnitude of malnutrition among 6-59 months children in sukumbasi children of Kanakai municipality were 45.7%, 16.5% and 31.5% for stunting, wasting and underweight respectively as shown in Figure 4.1. Moreover, severe and moderate malnutrition was found among the child stunting 16.5% and 29.2%, wasting 7.1% and 9.4% and underweight 10.2% and 21.3% respectively where severe and moderate malnutrition defined as less than minus 3 Z-Score and less than minus 2 and greater than minus 3 Z- Score respectively.

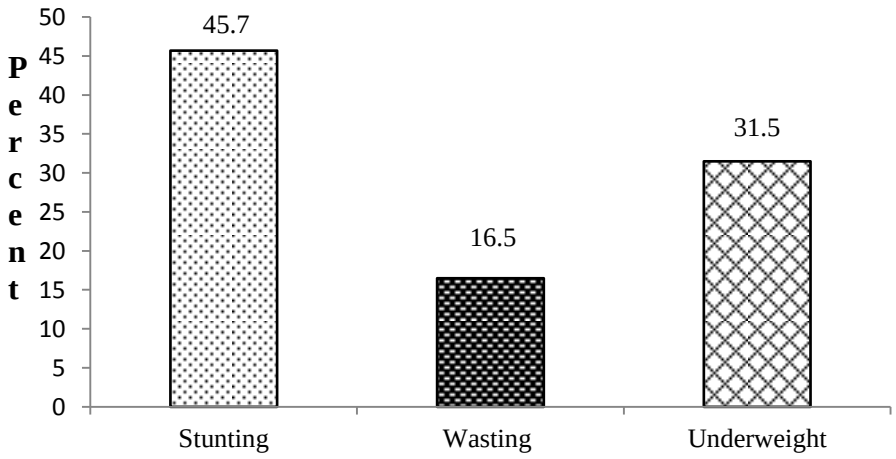

Fig. 4.1 Prevalence of stunting, wasting and underweight in Sukumbasi children of Kanakai municipality

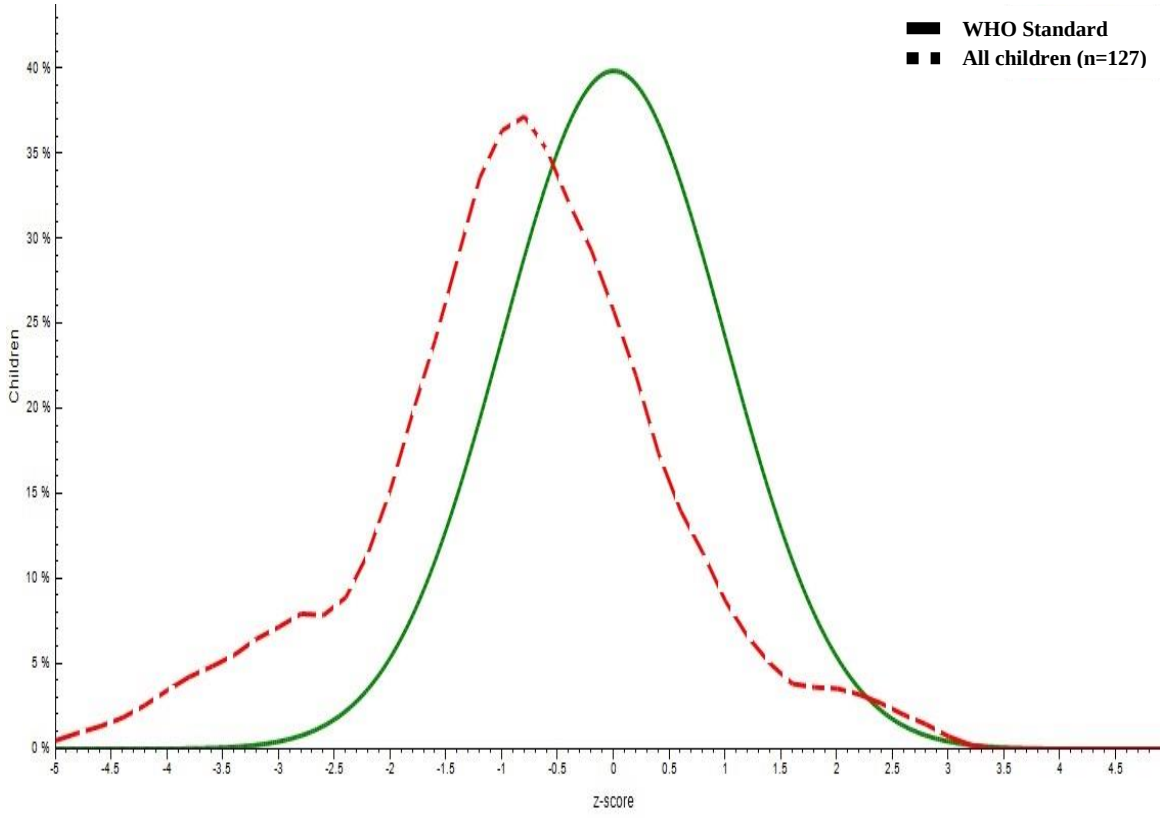

Fig. 4.2 Distribution of wasting among 6 - 59 months Sukumbasi children of Kanakai Municipality (n=127)

Figure 4.2 shows that the median weight for height z-score of survey children was found to be -0.85, which is less than the reference to WHO standard. This cause curve is skewed to the left side of WHO standard curve showing the prevalence of wasting among study population. The prevalance of wasting is higher in the study community than national data. The wasting prevalance rate was high because the education level of mother as well as father was lower in the survey area. The prevelence of wasting is found to be higher in the age group of 6-11 months which may be due to non exclusive breastfeeding, late and poor complementary feeding practices, outbreaks of diarrhea, poor hygiene and sanitation behaviours and inadequate amount of diversified food consumption.

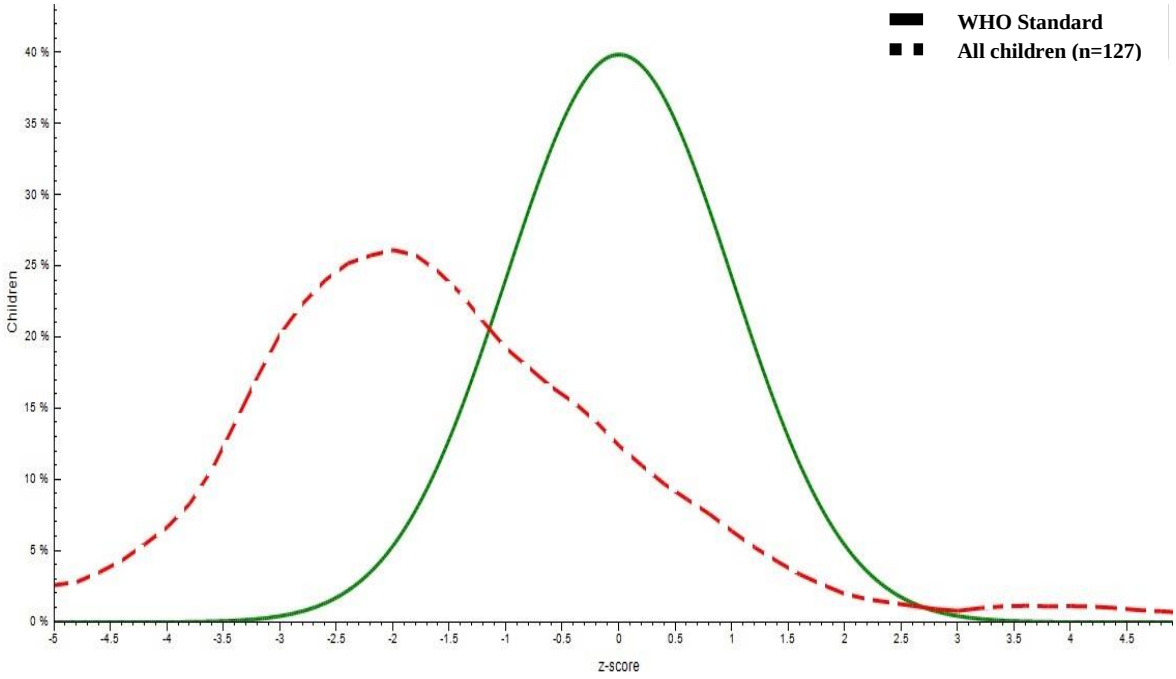

Fig. 4.3 Distribution of stunting among 6 - 59 months Sukumbasi children in Kanakai municipality (n=127)

Figure 4.3 shows that the median height for age z-score of survey children was found to be -1.59 which is less than the reference to WHO standard. This cause curve is skewed to the left side of WHO standard curve showing the prevalence of stunting among study population. The prevalance of stunting is higher in the study community than national data. Stunting is the outcome of failure to receive adequate nutrition over an extended period and is also affected by recurrent or chronic illness. The causes of stunting may be due to the poor maternal nutritional status and poor complementary feeding practices. Undernutrition and weak immunological status can raise the chances of suceptibility and vulnerability to infections.

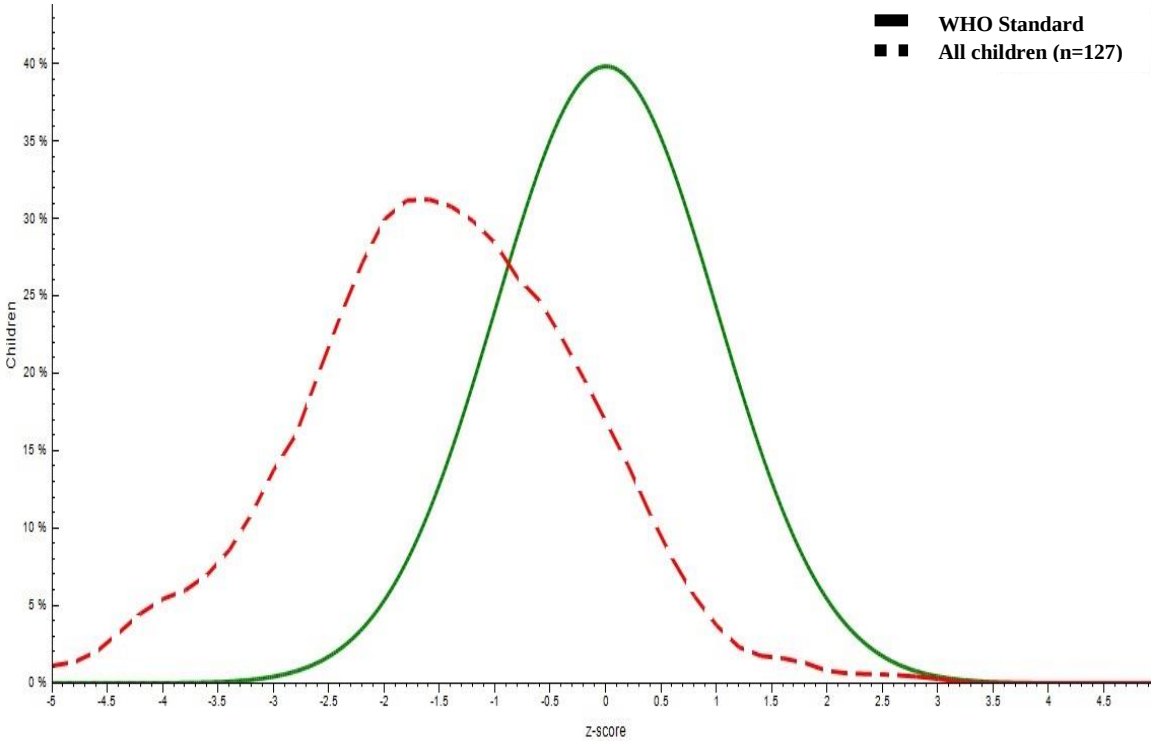

Fig. 4.4 Distribution of underweight among 6 - 59 months sukumbasi children of Kanakai Municipality (n=127)

Figure 4.4 shows that the median weight for age z-score of survey children was found to be -1.5 which is less than the reference to WHO standard. This cause curve is skewed to the left side of WHO standard curve showing the prevalence of underweight among study population. The prevalance of underweight is higher in the study community than national data. The prevalence of underweight is high which may be due to poor mother's education status, consumption of low quality food, infection, poor hygiene and sanitation practices, food insecurity and long term diarrhea.

Table 4.10 Gender wise distribution of wasting, stunting and underweight in sukumbasi children of Kanakai municipality (n=127)

	Characteristics	Male %	Female %	All %
WHZ	Severely wasted(<-3)	10.3	3.4	7.1
	Moderately wasted (>-3 and <-2)	10.3	8.5	9.4
	Normal	79.4	88.1	83.5
HAZ	Severely Stunted(<-3)	19.1	13.6	16.5
	Moderately Stunted(>-3 and <-2)	32.4	25.4	29.2
	Normal	48.5	61	54.3
WAZ	Severely Underweight(<-3)	11.8	8.5	10.2
	Moderately Underweight (>-3 and <-2)	23.5	18.6	21.3
	Normal	64.7	72.9	68.5

The prevalence of wasting was found higher in boys (20.6%) than girls (11.9%) and stunting was higher in boys (51.5%) than girls (39%), while prevalence of underweight was also higher in boys (35.3%) than girls (27.1%) as shown in the above Table 4.10. Based on WHO growth standard of under nutrition indicators, about 51.5% and 39% were stunted, 20.6% and 11.9% were wasted and 35.3% and 27.1% were underweight for males and females respectively, having less than minus two Z-score values.

Table 4.11 Distribution of wasting, stunting and underweight among different age group

Age (Months)	**N**	**WHZ (%)**		**HAZ (%)**		**WAZ (%)**	
		<-3	>-3to<-2	<-3	>-3to<-2	<-3	>-3to<-2
(6-11)	17	17.6	11.8	5.9	5.9	0	23.5
(12-23)	30	10	10	13.3	26.7	6.7	16.6
(24-35)	26	3.8	15.4	15.4	50	11.5	23.1
(36-47)	29	3.4	3.5	17.2	27.6	17.2	17.3
(48-59)	25	4	8	28	28	12	28

The distribution of malnutrition based on age groups of children is shown in the above Table 4.11. Severe form of wasting (17.6%), stunting (17.2%) and underweight (17.2%) was found higher in children aged (6-11), (36-47) and (36-47) months respectively. While, wasting (15.4%), stunting (50%) and underweight (23.5%) had highest percentage in children of age group (24-35), (24-35) and (6-11) month age group respectively. The lowest prevalence of wasting (3.5%), stunting (5.9%) and underweight (16.6%) were seen in age groups (36-47), (6-11) and (12-23) respectively. The pattern of prevalence of stunting among different age groups can be supported with the fact that nursing during early life is protective so there is lesser risk of stunting during early months of life and stunting becomes more likely as the child becomes more dependent for calorie from foods which should be grown or brought by household. Also stunting is the chronic effect of malnutrition which generally predisposes in late childhood. The higher prevalence of wasting in 6 – 11 months Sukumbasi children of Kanakai municipality might be due to early or late initiation of complementary feeding which causes relative protein and calorie deficiency in children resulting wasting.

Table 4.12 Distribution of wasting based of MUAC measurement

MUAC	Frequency	Percent
Severe (<115mm)	2	1.6
Moderate (115mm-125mm)	14	11
Normal (>125mm)	111	87.4

The prevalence of wasting based on MUAC measurements is shown in the above Table 4.12. Based on MUAC measurements 2 (1.6%) child was found to be severely wasted defined as MUAC less than 115 mm. Based on MUAC, 14 (11%) of 6 -59 months aged children were moderately wasted (MUAC greater than 115 mm but less than 125 mm) and 111 (87.4%) were normal (MUAC greater than 125 mm).

In this study, 45.7%, 16.5% and 31.5% of children are stunted, wasted and underweight respectively. NDHS 2011 shows the national data on stunting, wasting and underweight to be 41%, 11% and 29% respectively. The prevalence of malnutrition in Eastern Terai are

31% stunted, 10.3% wasted and 24% underweight (MoHP, 2012). The result of nutritional status of sukumbasi basti of Dharan-15 is 42% stunting, 9% Wasting and 18% underweight (Adhikari, 2015) .While comparing the result of my study with the result of sukumbasi basti, Dharan-15, sukumbasi children of Kanakai municipality have worst nutritional status. Despite, Severe stunting (16.5%), severe wasting (7.1%) and severe underweight (10.2%) in survey children was found nearly to the same of sukumbasi basti of Dharan-15. The cultural belief of Satar and Muslim, that defecating at a particular place i.e. toilet is unhygienic, encourage open defecation which may cause recurrent episodes of hygiene related acute illness such as diarrhea, typhoid etc. Nearly about half of the household's do not purify water before they use. This may be the reason for high prevalence of wasting than Eastern Terai region. Another reason for the higher prevalence of wasting may be due to seasonal variation of data collection.

4.7 Factors associated with under nutrition of children

Under nutrition includes being underweight for one's age, too short for one's age (stunted), dangerously thin (wasted), and deficient in vitamins and minerals (micronutrient malnutrition). Under nutrition was assessed by stunting, wasting and underweight. Chi - square test was used to identify the characteristics that were related to nutritional status of children.

4.7.1 Factors associated with stunting

Table shows that there was significant association of stunting with Mother's education status (P= 0.003) and child age group (P= 0.002). There was no significant association with gender (P=0.159), age at first pregnancy (P=0.676) and water purification (P=0.25).

The finding of the survey shows that the prevalence of stunting was found significant with mother's education status. The highest percentage of stunting i.e. 66.7% was found in children whose mothers were illiterate. Findings of this study was similar with the study conducted by (Pandey, 1999) which revealed that there was a significant association between Mother's education status ($P<0.05$) and stunting.

The finding of the survey also shows that the prevalence of stunting was found significant with Child's age group. Children greater than 24 month (56.4%) are more stunted than children less than or equals to 24 months. Findings of this study was similar with the findings of study conducted by (Olack *et al.*, 2011) Kenya, which revealed that

there was a significant association between Child's age group (P<0.05) and stunting. Infants aged 6-11 months had lower risk of being stunted than older groups.

The predominance of stunting in older children indicates failure in growth and development during the first two years of life. This could be due to many factors including poor care, poor weaning practices, ignorance, poverty, childhood diseases etc. Uneducated mother generally don't know about feeding pattern to their children. Therefore, mother's education status might be the major factor associated with stunting. As the children crosses 2 years, with introduction to the family diet, they become more responsible for feeding themselves but often do not have access to adequate amounts of solid food. At this condition child may completely depend on family eating pattern. If mother is uneducated and lacks caring of her children, there might be deficient of nutrient which results chronic under-nutrition.

Table 4.13 Factors associated with stunting of sukumbasi children aged 6 - 59 months in Kanakai municipality (n=127)

		HFA			
Factors		**Stunted**	**Normal**	**χ2**	**P value**
Gender	Male	35 (51.5%)	33 (48.5%)	1.98	0.159
	Female	23 (39.0%)	36 (61.0%)		
Mother's Education status	Illiterate	22 (66.7%)	11 (33.0%)	8.79	0.003*
	Literate	33 (36.7%)	57 (63.3%)		
Child age group	≤ 24 months	14 (28.6%)	35 (71.4%)	9.4	0.002*
	> than 24 months	44 (56.4%)	34 (43.6%)		
Water purification	Yes	26 (40.6%)	38 (59.4%)	1.3	0.25
	No	32 (50.8%)	31 (49.2%)		
Age at First Pregnancy	≤ 18 years	13 (38.2%)	21 (61.8%)	0.174	0.676
	> 18 years	42 (47.2%)	47 (52.8%)		

*Statistically significant (P < 0.05)

4.7.2 Factors associated with wasting

Wasting is usually due to recent illness and/or insufficient dietary intake caused by food shortages, feeding practices, or other events. There was significant association of wasting with mother's education status (P=0.006). Survey shows that there was no significant association with gender (P=0.187), age at first pregnancy (P=0.734), child age group (P=0.056) and water purification (0.087).

The finding of the survey shows that the prevalence of wasting was found significant with mother's education status. The highest percentage of wasting i.e. 30.3% was found in children whose mothers were illiterate. In this study, children aged 6-11 months are more wasted as compared to other age group and this finding is similar to the finding of result by (Maalin *et al.*, 2016).

Well-educated mothers had efficient management technique with limited sources, more child caring practices, increases their earning income possibility, better health promoting behavior which may reduce the probability of morbidities and improve nutrition status of their children (Meshram *et al.*, 2016) which lacks in uneducated or illiterate mothers.

Table 4.14 Factors associated with wasting of sukumbasi children aged 6 - 59 months in Kanakai municipality (n=127)

Factors		**WFZ**			
		Wasted	**Normal**	**χ 2**	**P value**
Gender	Male	14 (20.6%)	54 (79.4%)	1.7	0.187
	Female	7 (11.9%)	52 (88.1%)		
Mother's education status	Illiterate	10 (30.3%)	23 (69.7%)	7.62	0.006*
	Literate	9 (10%)	81 (90%)		
Child age group	≤ 24 months	12 (24.5%)	37 (75.5%)	3.65	0.056
	> 24 months	9 (11.5%)	69 (88.5%)		
Water purification	Yes	7 (10.9%)	57 (89.1%)	2.92	0.087
	No	14 (22.2%)	49 (77.8%)		
Age at First Pregnancy	≤ 18 years	6 (17.6%)	28 (82.4%)	0.11	0.734
	> 18 years	13 (14.6%)	76 (85.4%)		

*Statistically significant (P < 0.05)

4.7.3 Factors associated with underweight

There was significant association of underweight with mother's education status (P=0.001). Survey shows that there was no significant association with gender (P=0.323), age at first pregnancy (P=0.734), child age group (P=0.178) and water purification (P=0.112).

The finding of the survey shows that the prevalence of underweight is significantly associated with mother's education status. 54.5% of children whose mother is illiterate are found to be underweight. Education is one of the most important resources that enable women to provide appropriate care for their children Findings of this study was similar with the study conducted by (Ali *et al.*, 2005) which revealed that there was a significant association between mother's education status (P<0.05) and underweight. A study conducted in India, Kolkata by (Pandey, 1999) is also similar with the findings of this study (P<0.005).

Table 4.15 Factors associated with underweight of sukumbasi children aged 6 - 59 months in Kanakai municipality (n=127)

Factors		**WFA**			
		Underweight	**Normal**	**χ2**	**P value**
Gender	Male	24 (35.3%)	44 (64.7%)	0.97	0.323
	Female	16 (27.1%)	43 (72.9%)		
Mother's education status	Illiterate	18 (54.5%)	15(45.5%)	7.62	0.001*
	Literate	19 (21.1%)	71 (78.9%)		
Child age group	≤ 24 months	12 (24.5%)	37 (75.5%)	1.8	0.178
	> 24 months	28 (35.9%)	50 (64.1%)		
Water purification	Yes	16 (25.0%)	48 (75.0%)	2.52	0.112
	No	24 (38.1%)	39 (61.9%)		
Age at First Pregnancy	≤ 18 years	11 (32.4%)	23 (67.6%)	0.11	0.734
	> 18 years	26 (29.2%)	63 (70.8%)		

*Statistically significant (P < 0.05)

Part V

Conclusions and recommendations

5.1 Conclusions

The aims of this study were to assess the factor associated with nutritional status of sukumbasi children aged 6-59 months in Kanakai municipality, Jhapa. The results of this study indicate that under nutrition is still an important problem among under-five sukumbasi children in Kanakai municipality, Jhapa. Following points can be concluded from the study.

1. This study concluded that under-nutrition is a serious problem in sukumbasi children of Kanakai municipality. Prevalence of malnutrition was 45.7%, 16.5 % and 31.5% for stunting, wasting and underweight respectively.
2. Mother's education status (P=0.003) and child age group (P=0.002) are associated with stunting. Similarly Mother's education status is associated with both Wasting (P=0.006) and Underweight (P=0.001).
3. Hygienic practices such as water purification and toilet facilities in the households may be the risk elements of malnutrition in the study site.
4. The results of present study will be useful for policy makers in their endeavor to formulate various development and health care programs.
5. This study point out the need of making a comprehensive, integrated and multi – sectorial plan for addressing the problem of malnutrition in long term.

5.2 Recommendations

Based on the results, following are the recommendations to improve the current nutritional status:

1. There is the need of intervening nutritional and health education as educated mother is most likely to provide better care in terms of good nutrition and better hygiene which in turn improve the nutritional status.
2. Almost half of the households drink water without purifying. So, awareness program should be conducted informing the merits of purification of water.
3. Survey of this nature should be carried out at regular intervals so that it will assist the stakeholder to formulate plan and policies for the betterment of nutritional status.

Part VI

Summary

Malnutrition remains a serious obstacle to child survival, growth and development in Nepal. Stunting, wasting and underweight are common patterns of under nutrition in child. So, a community based cross-sectional study was conducted to assess the factor associated with nutritional status of sukumbasi children aged 6-59 months in Kanakai municipality of Jhapa district, Nepal. The study included 127 children selected randomly. A pre-coded questionnaire was used to collect information and was administrated to caretaker. Anthropometric measurement like weight, height/length, MUAC was carried out to determine nutritional status. Data collected was analyzed using WHO Anthro version 3.2.2 and SPSS version 20. Chi-square test was used to analyze the factors associated with nutritional status.

The total populations of the male were 53.5% and 46.5% were female. 67.7% of household were Hindu, followed by 13.4% Christian, 7.9% Muslims, 3.1% Buddhist and 7.9% were others. The caste distribution shows mixed composition with higher percentage of Janajati 31.5%, followed by 20.5% Dalit, 22.8% Satar, 7.1% Chhetri, 6.3% Brahmin and 10.2% others. The major occupation of sukumbasi households was labour 42.5%, followed by foreign employment 22.8%, Agriculture 15%, Job 15% and Business 4.7%. 7.9% of household has annual income less than 1 lakhs, 83.5% of household has annual income in range between 1-3 lakhs whereas 8.7% of household earns more than 3 lakhs annually. The illiterate mother were 26%, 39.4% studied up to primary level, 24.4% secondary level and 7.1% of mother studied up to higher secondary level and above. Mean age of mother for first pregnancy was 20.2±4.1 years. Majority of the household 85% use iodized salt. The children exclusively breastfed were 78.7%. and 79.5% of children were fed with Vitamin ‘A’ and Deworming tablet.

According to length/height for age, 45.7% of children were stunted. Among them 16.5% were severely stunted and 29.2% were moderately stunted. Stunting was found higher in male 51.5% than females 39% and the highest percentage 65.4% of stunting was found in the age group 24-35 months.

According to weight for height, 16.5% children were wasted. Among them 7.1% were severely wasted and 9.4% were moderately wasted. Wasting was found higher in male 20.6% than female 11.9% and the highest percentage 29.4% of wasting was found in age group 6-11 months.

According to weight for age, 31.5% of children were underweight. Among them 10.2% were severely underweight and 21.3% were moderately underweight. Underweight was found higher in male 35.3% than female 27.1% and the highest percentage 40% of underweight was found in the age group 48-59 months.

There was significant association of stunting with mother's education status (P=0.003) and child age group (P=0.002). Mother's education status was significantly associated with wasting (P=0.006) and underweight (P=0.001).

Results of the study indicate that malnutrition among sukumbasi children aged 6-59 months is a serious problem in Kanakai municipality. The result obtained from this work can be utilized by government as well as voluntary organizations to initiate steps to tackle the existing malnutrition problem and encourage the people to improve their existing nutritional problem by improving dietary pattern of under five children as well as pregnant and lactating women.

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Appendices

Appendix - A

Survey Questionnaire

Code no.:- Date of Interview: 2073/ /

A. General Information

1. Name of head of household:

2. Ward No.:

3. Respondent: Mother Father Other Family Members

4. Mother's Name:

5. Mother's Age:

6. Child Name:

B. Family Description

7. No. of total family members:

Female: Male:

No. of children: Boys: Girls:

No. of children below 5 year:

8. Has any children died in your family till now? 1. Yes 2. No

If yes, how many ……

Cause of death…….

9. Type of family?

1. Single 2. Large 3. Extended

10. What is your religion?

1. Hindu 2. Buddhist 3. Christian 4. Muslim 5. Others

11. What is your caste?

1. Brahmin 2. Chhettri 3. Janajati 4. Dalit 5. Madhesi 6. Others

12. What is the main occupation of your family?

1. Agriculture 2. Service 3. Labour 4. Business 5. Foreign employment

13. Annual income of your family

1. < 1 lakh 2. 1 to 3 lakh 3. > 3 lakh

14. Mother's educational qualification

1. Illiterate 2. Primary level 3. Secondary level 4. Higher secondary level and above

15. Father's educational qualification

1. Illiterate 2. Primary level 3. Secondary level 4. Higher secondary level and above

16. What is the occupation of mother?

1. Housewife 2. Service 3. Labour 4. Business 5. Others

C. Personal and environmental hygiene

17. What is your source of drinking water?

1. Tube well 2. River 3. Well 4. Drinking water tap 5. Other

18. Do you purify drinking water?

1. Yes 2. No

19. Do you have toilet facility in your house?

1. Yes 2. No

20. What cooking fuel do you use for cooking?

1. Fire wood 2. Dung gas 3. Dried animal dung 4. Stove 5. LPG 6. Others

D. Questions to be asked for mother of under 5 children

21. No. of under 5 year children:

22. In your absence, who is responsible to take care of your child?

1. Mother/Father in-law 2. Husband 3. Brother/Sister of child 4. Other family member 5. Relatives 6. Neighbour/Friend 7. Leave alone in home 8. Self 9. Others

23. Birth order of child under study: ……

24. Birth spacing: …… months/years

25. Where do you take your children for treatment during illness?

1. Nearby health post 2. Pharmacy 3. FCHV 4.Traditional healer 5. Don‟t take anywhere 6. Others

E. Nutrition and Breast feeding related information

26. Did you breast fed your child on the day of birth?

1. Yes 2. No

27. If not, what is the reason?

1. Lack of tradition 2. It harms 3. It is unhygienic 4. Child cannot swallow 5. Others

28. If yes then when did you initiate breast feeding?

1. Within 1 hour of birth 2. Within 8 hours of birth 3. Within 24 hour of birth 4. Cannot remember 5. Other

29. Did you feed colostrum to your baby?

1. Yes 2. No 3. Cannot remember

30. Did you exclusively breast fed your baby for six months?

1. Yes 2. No

31. Did you feed commercial or formula milk to your baby?

1. Yes 2. No

32. Are you feeding food other than breast milk to your baby?

1. Yes 2. No

33. When did you start giving foods other than breast milk to your child?

1. 4 months 2. 5 months 3. 6 months 4. 7 months 5. More than 7 months

34. What do you feed to your child?

1. Lito 2. Jaulo 3. Supper flour porridge 4. Same as other family members 5. Others

35. Do you know about "supper flour porridge"?

1. Yes 2. No

36. Do you know about malnutrition?

1. Yes 2. No

37. If yes, what is the main cause of malnutrition?

1. Inadequate balanced diet 2. Being touched by pregnant women 3. Curse of god 4. Others

38. What type of salt do you use in your home?

1. Rock Salt 2. Packaged Salt 3. Aayo Nun

F. Child and Maternal Health Related Information

39. Mother's age when she got married? …….. Year

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

41. Type of birth?

1. Natural 2. Caesarian

42. Weight of child during birth?

1. Less than 2.5 Kg 2. More than 2.5 Kg 3. Don't know

43. Do pregnant mother require additional nutrients?

1. Yes 2.No

44. How do you manage food for pregnant women in your family?

1. Give more food than usual 2. Give less food than usual 3. Give same amount of food as before

45. Did you take iron and folate tablet during pregnancy?

1. Yes 2. No

46. Did you give “Vit.A” capsule and “De-worming” tablet to your baby?

1. Yes 2. No

47. Did your child receive vaccination? …….. …….. …….. ……..

G. Anthropometric measurements

Date of birth:	Sex: Male Female	Height (cm):
Weight (kg):	MUAC (cm):	Age in day:

Appendix - B

Consent letter

Namaste!

I Mr. Sisir Kumar Timsina, graduate student in Department of Nutrition and Dietetics conducting a dissertation work for award of bachelor's degree in Nutrition and Dietetics.

The topic for the study is "ASSESSING THE FACTOR ASSOCIATED WITH NUTRITIONAL STATUS OF SUKUMBASI CHILDREN AGED 6-59 MONTHS IN KANAKAI MUNICIPALITY, JHAPA."

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

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

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

Signature of parent/guardian: _____

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

Investigator's sign:

Date:

Appendix - C

Map of Survey Site (Kanakai municipality)

Photo Gallery