**PREVALENCE OF DOUBLE BURDEN OF MALNUTRITION IN HOUSEHOLD LEVEL**

**A Thesis**

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**(Specialization in Food and Nutrition)**

**Submitted By:**

**Rabina Awale**

**T.U Registration No: 5-2-393-8-2011**

**Symbol No: 281352**

**Faculty of Humanities and Social Sciences**

**Central Department of Home Science,**

**Tribhuvan University**

**Bagbazar, Kathmandu.**

**2024**

**Central Department of Home Science**

**Tribhuvan University**

**Bagbazar, Kathmandu**

# LETTER OF RECOMMENDATION

This is certified that Ms Rabina Awale has prepared this thesis entitled “**Prevalence of double burden of malnutrition in household level**” conducted under my guidance and supervision. Therefore, like to recommend this thesis for the final approval and acceptance.

……………………………………

**Supervisor**

**Mrs. Sweta Bade**

**Faculty**

**Central Department of Home Science**

**Tribhuvan University**

**Kathmandu, Nepal**

**Central Department of Home Science**

**Tribhuvan University**

**Bagbazar, Kathmandu**

# LETTER OF APPROVAL

The evaluation committee has approved this thesis entitled **"Prevalence of double** **burden of malnutrition in household** **level"** submitted by Ms. Rabina Awale in faculty of Humanities and Social Sciences, in partial fulfillment of requirement for the Master's Degree in Home Science (Specialization in Food and Nutrition).

**Evaluation Committee:**

**Chairperson…………………………………..**

**Expert…………………………………………**

**Supervisor…………………………………….**

**Member……………………………………….**

**Date…………………………………………...**

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Rabina Awale

# ABSTRACT

**Background**: The double burden of malnutrition is characterized by the coexistence of maternal overweight and obesity along with undernutrition within the same household. Childhood undernutrition increases the risk of childhood mortality and poor cognitive development and over-nutrition is linked with increased risk of various non -communicable diseases like diabetes, hypertension and obesity.

**Objectives**: The objective of this study is to assess the prevalence of double burden of malnutrition in household level.

**Method**: A descriptive cross-sectional study was conducted in Bhindyolachhi Tole of ward no.12 Lalitpur Municipality among 60 mother and children (7-10 years)pair. Data were collected by using structured questionnaire through face to face interview method. Census sampling method was used to collect data from respondents. Statistical Package for the Social Sciences (SPSS) 20 version were used for analyzing the data. Chi-square test was used to identify the associated factors of double burden of malnutrition.

**Major Findings:** The study showed that 30.36% of household had double burden of malnutrition. The study also revealed that 15% of the children were stunted while 12.66% were wasted and 13.33% were underweight. Majority of the mothers (33%) were found to be obese and 3.33% of mother were found to be underweight. 43.33% mothers had the habit of skipping meal and majority of them (46.15%) skipped dinner. Similarly, 21.66% of the children skipped the meal and majority of them (13.33%) skipped breakfast. Majority (91.66%) of children consumed junk food. Factors such as education and occupation of mother, Frequency of meal (P=0.001), Frequency of meat consumption (P=0.007) were found to be statistically significant with Double burden of malnutrition. Also Frequency of meal (P=0.0310) pattern of child, Frequency of meat consumption (P=0.021) and dairy products (P=0.043) statistically significant with Double burden of malnutrition. The study also revealed BMI of mother (P=0.039), stunting (P=0.037) and wasting (P=0.041) of children were found to be statistically significant with Double burden of malnutrition.

**Conclusion:** The prevalence of double burden of malnutrition was found to higher in Bhidyolachhi tole. This increase in double burden of malnutrition in urban area can be associated with change in consumption habit, especially increase in the consumption of processed, high fat and high calorie food among the population living in urban area.

**Keywords**: *Double Burden of malnutrition, nutritional status, Anthropometric measurements.*

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# ABBREVIATION

|  |  |
| --- | --- |
| BMI | Body Mass Index |
| CI | Confidence Interval |
| CVDs | Cardiovascular diseases |
| DBM | Double Burden of Malnutrition |
| HAZ | Height-for-age |
| LMC | Lalitpur Metro-Politian City |
| LMICs | Low and middle-income countries |
| NCDs | Non communicable diseases |
| NDHS | National Demographic Health Survey |
| OWOB | Overweight and obesity |
| PEM | PEM Protein Energy Malnutriton |
| RDA | Recommended Daily Allowances |
| WHO | World health organization |
| HKI  RII  SII | Helen Keller International  Relative Index of inequality  Slope index inequality |

# CHAPTER I

# INTRODUCTION

## 1.1 Background

Nutrition is the science of food and its relationship to health. It concerned primarily with the part played by nutrients in baby growth, development and maintenance. Adequate nutrition is a fundamental right for every human being. If people to consume sufficient quality and quantity of nutrients, they will suffer from hunger or malnutrition. Protein energy malnutrition, iron deficiency, anemia, iodine deficiency disorder and vitamin a deficiency are some of the common types of malnutrition in Nepal (Bharati, *et al.,* 2012).

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. Majority of the ethnic population in Nepal is deprived and lives in condition of extreme poverty and deprivation. Harsh living, poverty and poor socioeconomic condition and infrastructure have increased the health risk of people especially living in rural areas (Bharati *et al.,* 2012).

Malnutrition is define as a pathological state resulting from a relative or absolute deficiency or excess of one or more of the essential nutrients in the diet. It has been categorized into four forms as undernutrition, overnutrition imbalance and specific deficiency. Under nutrition is the condition results from insufficient food intake over an extended time-period while over nutrient is pathological state resulting from excessive consumption of food over an extended period of time. Imbalance is the pathological resulting from disproportion among the essential nutrients with or without absolute deficiency of any one nutrient. Specific deficiency is the pathological state resulting from relative or absolute deficiency of specific nutrient (John *et al*., 2005).

The double burden of malnutrition is characterized by the coexistence of under-nutrition along with overweight and obesity or diet-related non-communicable diseases, within individuals, households and populations, and across the life-course (WHO, 2004).

Globally, the prevalence of undernutrition (stunting, wasting and underweight) in children has declined from an estimated 40% in 1990 to an estimated 26% in 2011, with an average annual rate of reduction of 2.1% per year. At the same time, maternal overweight has increased from an estimated 20% in 1990 to an estimated 30% in 2008, whilst maternal obesity also increased from an estimated 5% in 1990 to an estimated 10% in 2008. Among South and Southeast Asian countries, the prevalence of overweight and obesity among women was estimated to be 21.3% and 8.6% respectively. In context of Nepal, a systematic review based on nationally representative report from 2001 to 2016, showed that the prevalence of stunting, wasting and underweight among children has declined from 57.2% to 35.8%, 11.2% to 9.7% and 42.7% to 27% respectively. However, overweight and obesity among women has increased from 6.5% to 22.1%. Long lasting effects of malnutrition especially double burden of malnutrition increases the risk of non-communicable disease and in women it can increase the risk of childbirth complications. Double burden of malnutrition in women can lead to stunting, obesity, affecting their children, families and society (Delisle, 2008). These effects of double burden of malnutrition can also be affected by societal driving factors like rapidly changing diets, eating pattern, and physical activity (Wells *et al*., 2019). There has been a rise in double burden of malnutrition in low income and middle income countries due to increment in the obesity. Popkin *et al*., (2019) has directly correlated the double burden of malnutrition with change in food pattern of the people living in these countries. It is due to the availability of cheap ultra-processed food and beverages especially in the urban setting of these low income countries. The nutrition deficiencies can be directly addressed by poverty reduction programs and reformation policy targeted specially to these communities while problem of obesity can be tackled by introducing nutrition education and promotion of physical activity along with focus on consumption of locally processed food (Menon *et al.,* 2019).

The double burden of malnutrition (DBM) continues to be a major global public health problem. It is defined as the coexistence of both undernutrition and over nutrition in the same population across the life course. Globally, nearly one- third of the population suffered from at least one form of malnutrition. The double burden of malnutrition is increasing globally, particularly in low and middle income countries (LMICs). Globally, obesity has doubled over the past 30 years, while obesity in LMICs has tripled over the past 20 years (Sunuwar *et al.,* 2019)

Even though underweight among women has been a major public health concern in LMICs for several decades, due to population aging and increased prevalence of risk factors such as unhealthy diets, physical inactivity, and substance used such as alcohol consumption and cigarette smoking led to a significant shift in epidemiological trend from underweight to overweight and nutritional transitions. Nutrition-related diseases and conditions such as nutritional deficiencies, obesity, hypertension, cardiovascular diseases, cancer, and diabetes mellitus are emerging at a faster rate in LMICs than in high-income countries. Overweight/obesity is a major risk for non-communicable diseases (NCDs) morbidity and mortality such as cardiovascular diseases (CVDs), chronic kidney diseases, cancer, musculoskeletal disorders, type 2 diabetes mellitus, and respiratory problems (Sunuwar *et al.,* 2019).

## 1.2 Statement of the problem

Double Burden of malnutrition is a major public health issues now - a -days. It increases the risk of various health problems. Children are suffering from under nutrition while adults are obese. Undernutrition in childhood retards the growth of child, also increase the risk of childhood morality and poor cognitive development. Obesity in childhood is linked with increased risk of adult obesity and chronic disorders such as hypertension, cardiovascular disease and increased risk of morality. In urban areas, due to insufficient time provided for the preparation of homemade healthy food, people are more inclined towards consumption of processed foods which are highly calorie dense and have high trans-fatty acids along with increased level of salt and processed sugars.

In adults, mostly over nutrition is a major public health concern. Non communicable diseases is related to obesity. Along with over nutrition, deficiency of micronutrients also seen in adulthood. Over nutrition is associated with increased risk of various non- communicable diseases such as high blood glucose levels, raised blood pressure, abdominal obesity and high lipid profile.

The studies undertaken in Nepal have shown that although the prevalence of under nutrition in the population has generally decreased over the last decades, it has remained high in mothers. Three national surveys DHS Nepal 2016, Micronutrient Survey 2016 and the STEPS survey 2019), estimated that overall 14.5 - 17% of the Nepalese adult women were underweight, while 22-25% were overweight. The increase in overweight and obesity (OWOB) is an important driver for the increase in the DBM in Nepal.

Nepal is a country with a large diversity in both populations and ecology, and thus nation-wide estimates or even broad comparison groups such as ecological zones will dilute important local differences. It is important to remember that the 2020 Lancet series on the DBM stresses the importance of describing the full distribution of anthropometric status of populations instead of assessing undernutrition and overweight and obesity (OWOB) in their own silos Currently, there are a few local studies on the prevalence of overweight and obesity (OWOB) in Nepal; however, these do not report on the burden of undernutrition in the same population. The study on assessment of nutritional status of the children and mother have been conducted on Lalitpur district previously, however no study has been published on the prevalence of double burden of malnutrition in the household in urban setting of Lalitpur district which can be linked with school going children and their mother. Sarki *et al*., (2016) studied on the prevalence of double burden of malnutrition in the urban setting of Lalitpur district, however the study was done on children below age of five years along with their mother. Similar studies was done by Poudel *et al*.,( 2017) in the Dukuchhap Village, in the rural part of Lalitpur among the adolescent population from the age of 10 to 19 years.

## 1.3 Significance of the study

The study will be helpful to find out the prevalence of double burden of malnutrition among mother and their children aged between 7 to 10 years of Bhindyolachhi tole and may be helpful in generalization at national level. Since it also includes assessment of several factors influencing double burden of malnutrition it would be useful for implementing programmes to modify their lifestyle or diet related habits. This study will also provide information on the factors associated with malnutrition and effect of nutrient and dietary behavior on nutritional status. Thus it can suggest the corrective measure in order to uplift malnutrition considering the gender, caste, family economy basis and dietary behavior. It can also provide information to governmental and non-governmental organizations about the nutrition situation of mother-child pairs, the study may act as guideline for policy makers for making plans on school going children malnutrition.

## 1.4 Research Question

1. What are the food consumption pattern among children and mother in the household?
2. What is the nutritional status of children and mother?
3. What is prevalence of double burden of malnutrition?

## 1.5 Objectives of the study

### 1.5.1 General Objectives

The general objective of the study is to assess the prevalence of double burden of malnutrition in household level.

### 1.5.2 Specific Objectives

* To assess food consumption pattern among children and mother.
* To determine the nutritional status of children and mother.
* To find out the prevalence of double burden of malnutrition.
* To identify factor associated with double burden of malnutrition.

## 1.6 Scope of study

This study help to explore the coexistence of various forms of malnutrition and associated factors among mother-child pairs residing in the same household. Also it helps to fill a gap in knowledge of the coexistence of multiple burdens of malnutrition. The study may be helpful for policy makers for making plans on school going children malnutrition.

# REVIEW OF LITERATURE

# CHAPTER II

## 2.1 Prevalence of double burden of malnutrition in Global Context

A survey based on cross sectional study was done on Double burden of malnutrition among school-aged children and adolescents in Osun & Gombe States of Nigeria. Aged between 6 to 19 years of total 1,200 children were involved in survey. Information were collected through interview on weight, height and data on demographic, socio-economic, household family characteristics of the children using questionnaire. WHO 2007 references values using BMI for age (thinness, overweight/obesity) height for age (stunting) and weight for age (underweight) nutritional status was calculated. The overall prevalence rate of stunting was 34.9%, underweight was 13.5% thinness was 10.3% and overweight/obese was 11.4% and 4.0% had individual level DBM (Adeomi *et al*., 2021).

A cross-sectional quantitative survey was conducted on double burden of malnutrition among school children and their mother in a rural Dikgale Health and Demographic Site in Limpopo Province, South Africa where 508 child-mothers pair selected from primary schools using multistage sampling. Socio-demographic data along with anthropometric measurements and BMI of mothers were calculated. Multivariate logistic regression was used to determine the associate factors of DBM. The results were like 25% of children were thin,4% were overweight and 1% obese, while 27.4%were overweight and 42.3% were obese. Overweight / obese mothers were more likely to have thin children (AOR=1.48, 95% CI:1.01-2.18) & less likely to have overweight/obese children (AOR=0.18,95% CI:0.07-0.46) (Modjadi *et al.,*2019).

A cross-sectional study was done on the household-level double burden for the mother-child pairs in West Java, Indonesia which include 242 mother- child pairs. Questionnaires on socioeconomic factors and anthropometric measurements were administered. Also Food Frequency questionnaires were also completed. This study find out that double burden in mother-child pairs exist in 30.6% of the subject household (Sekiyama *et al*., 2019).

A cross sectional study was done on double burden of malnutrition by National Institute of population research and training and Mitra & Associations between 28 June and 9 November of 2014 where 5951 households were included for analysis. Information were collected through interview on socio-demographic characteristics whereas nutritional status, height and weight of the participants were measured by trained field staff using WHO standardized procedures. Frequency distribution was applied to summarize the categorical variables and descriptive statistics to summarize the continuous variables. The variables found to be statistically significant (P<0.05) in the bivariate analysis were considered for the multivariable analysis (Cehn *et al.,*2001).

A community based cross-sectional study was conducted on Prevalence and associated factors of underweight among children 6-59 months from January to February 2017 at Takusa district, northwest Ethiopia. A total of 645subjects were selected using multi-stage sampling technique. Anthro software version 2.02 was used to determine the nutritional status of children. A multivariable logistic regression analysis was used to investigated factors associated with underweight. In this study, the overall prevalence of underweight was 19.5%( 95% CI: 16.4-22.8). According to the multivariate analysis, urban residence (AOR=0.60; 95% CI: 0.38-0.95), no antenatal care (ANC) follows up (AOR=1.59; CI: 1.01-2.52) and mothers age (over 35 years) (AOR= 0.62; CI: 0.38 - 0.99) were significantly associated with lower odds of underweight. In the study community, the prevalence of underweight was lower than the findings of different studies in Ethiopia (Nigatu *et al.,*2018).

A cross-sectional study was done to investigate the prevalence and associated factors of double burden of malnutrition. The sample analyzed was 24053 South Asian schools adolescents aged 12-15 years that participated in Global School-Based Student Health Survey between 2009 &2016. The prevalence of stunting, thinness and overweight was calculated using the World Health Organization (WHO) Child Growth Reference 2007. Associations between the malnutrition and their possible associated were assessed with binary logistic regression analysis. The overall prevalence of stunting was 13%, thinness was 10.8% and 10.8% was overweight. Factors associated with malnutrition were age, hygiene behaviors, social support and sedentary behavior (Caleyachetty *et al.*, 2018).

The global obesity pandemic is driven by changes in the global food system and local environmental factors, with no exemplar populations where it has been reversed by public health measures. In low-income countries, obesity mostly affects middle-aged adults (especially women) from wealthy, urban environments; whereas in high-income countries it affects both sexes and all ages, but is disproportionately greater in disadvantaged groups. Unlike other major causes of preventable death and disability, such as tobacco use, injuries, and infectious diseases, there are no exemplar populations in which the obesity epidemic has been reversed by public health measures. This absence increases the urgency for evidence-creating policy action, with a priority on reduction of the supply-side drivers (Swinburn *et al*., 2011).

A systematic review study was done on the prevalence of double burden households and associated factors. PubMed and Web of Science were used to identify studies. Total 35 articles were reviewed which were published in 2000 or later. All the studies used BMI as nutritional indicator for adults. For children height-for-age was most frequently used whereas weight for age and weight -for height were also used in multiple studies. The reported national prevalence of double burden households varied from 3.2 to 26.8% by country and year. Although urban residence, income and education were frequently assessed, the role of intermediate factors in nutritional status such as diet remain unclear( Kosaka *et al.,* 2017).

A cross-sectional study was conducted on Double Burden of Malnutrition: Adult Overweight and Child Stunting in Northern Coastal Ecuador to examine the co-occurrence of adult overweight or obesity (OB/OW) and stunting. Total 2053 adults & 4170 children were selected and their anthropometry were collected. To examine the prevalence of OW/OB household level risk factors associated with double burden of malnutrition logistic and mixed- effect Poisson models was used. The prevalence was 52.9%. However the presence of a stunted child under five within the household was not associated with adult overweight or obesity OW/OB (odds ratio 0.87,P=0.1551)(Lee *et al.*, 2019).

The nutrition transition in Sub-Saharan Africa is associated with increased overweight and obesity, with socioeconomic status, gender, age, parity, physical inactivity, and increased energy, fat, and sugar intake as strong predictors. The relationship with the double burden of malnutrition is also explored. Predictors of overweight are described by means of various studies undertaken in SSA, and dietary intakes of numerous countries are presented. Overall, we show that socioeconomic status, gender, age, parity, physical inactivity, and increased energy, fat, and sugar intake are powerful predictors of overweight and/or obesity. The urgency for health interventions in countries in the early stages of the nutrition transition is emphasized, particularly in view of the fact that fat intake is still less than 30% of energy intake in nearly all Sub‐Saharan African countries (Steyn, 2014).

A cross-sectional study was done on nutrient intakes status and physical activity among Overweight and obese school children in Kota Bharu, Kelantan, Malaysia.there were 139 children for the study. Anthropometric measurements: weight, height and and hip circumferences and body fat were taken by a trained researcher.Information on eating habits was obtained using a three-diet record and physical activity assessment was measured using physical activity questionnarire for children completed by the children. The prevalence of obesity was higher among the boys(52.5%). Mean energy intake was significantly higher among boys as compared to the girls (P=0.003) (Dali *et al,* 2018).

A cross sectional survey was done on prevalence and predictors of under-nutrition among school children in a rural South - eastern Nigerian community. Total 450 primary &secondary school children aged 6-15 years was selected using multistage sampling technique. Data were collected through interviewer administered questionnaire, anthropometric measurements of weight and height,3- day weighed food intake, stool microscopy and blood analyses for malaria, zinc and vitamin A. To determine associations of nutritional status with significance accepted at P<0.05 bivariate and multivariate logistic regression analyses were used. The school children were affected by underweight(18.2%), stunting (41.6%), thinness(20%), zinc (43.3%) and vitamin A(51.5%) deficiencies( Aygu *et al*., 2018)

## 2.2 Prevalence of double of malnutrition in South Asian

A cross-sectional analysis was done to investigate the prevalence and socio demographic determinants of household level mother-child double burden (MCDB) of malnutrition in Bangladesh using Bangladesh demographic and health survey 2014 data. To identify the socio demographic factors associated with double burden household's multivariable logistic regression was used. Analysis include a total of 5951 households. 6.3% households was affected with a coexistence of overweight or abuse mother and underweight or stunted or wasted child. The prevalence of overweight or obese mother and underweight child (OWOBM/UWC) was 3·8 %, of overweight or obese mother and stunted child (OWOBM/STC) was 4·7 %, and of overweight or obese mother and wasted child (OWOBM/WSC) was 1·7 %. Mother’s age 21–25 years at first birth, middle wealth index group, having two or three children and having four or more children showed statistically significant (P<0·05) associations with obese mother and underweight child (OWOBM/UWC) (Das *et al*., 2019).

A study was attempted to understand the co-existence of DBM along with to explore various factors associated with DBM in India. This study extract the data from national representative cross-sectional fourth round of National Family Health Survey (NFHS-4) conducted in 2015-16. To examine the nutritional status of children aged 0-59 months anthropometric method was used. Also BMI of women was calculated and classified according to WHO out-off values. To assess the factors associated with DBM the bivariate and multivariate logistic regression were applied. It was found that 4.1 percent, 3.3 percent, and 2.1 percent of mother-child pairs in the same household were a combination of Overweight/Obese women with stunted children (OM/SC),r Overweight/Obese women with underweight children (OM/UC), and Overweight/Obese women with wasted children respectively (OM/WC). Additionally, 6% of mother-child pairs in the same household were suffering from Double burden of malnutrition. Mothers with secondary education were more likely to face risk of Double Burden of Malnutrition as compared to uneducated mothers [OR: 1.17, p < 0.01]. DBM was higher among mother-child pairs, which belong to rich wealth quintile than mother-child pairs from poor wealth quintile [OR: 1.98, p < 0.01] (Patel. *et al.,* 2020).

A comparative study was done among Bangladesh, Nepal, Pakistan and Myanmar on double burden of malnutrition at household level. Data for this survey, latest Demographic and Health Surveys (DHS) datasets were used of the respective countries. For this program, household that have at least a mother- child pair were selected of mother aged between 15-49 years. A logistic regression model was used to identify the signification association of double burden of malnutrition in household level(DBMHL) with socio-demographic characters and for measuring socio-economic inequalitiesin DBMHL prevalence, relative index of inequality(RII) and slope index inequality (SII) were used. The prevalence rates of DBMHL were 4.10%(urban 5.57%,rural3.51%) ,1.54% (urban 1.63%, rural 1.42%), 3.93%(urban 5.62%, rural 3.20%) and 5.54%(urban 6.16%, rural 6.33%) respectively in Bangladesh, Nepal , Pakistan and Myanmar (Anik *et al.*,2019).

A pooled analysis was done on double burden of malnutrition among ever married women in Bangladesh.For this study , data were collected from four consecutive Demographic and Health Surveys conducted in 2004, 2007. 2011 and 2014. To determine association between different socio-demographic predictors with overweight/obesity and under weight among ever-married women of age 15-49 years multinominal logistic regression model was used. The prevalence of underweight decreased by 43.2% and 130.5% increase in overweight/obesity were found over the ten years period (Tanwi *et al.,* 2019).

A cross-sectional study was conducted on determinants of overweight or obesity among ever-married adult women in Bangladesh. In this study, Bangladesh Demographic and Health Survey (BDHS) provides cross-sectional data on a wide range of indicators relating to population, health and nutrition. To identify the factors associated with being overweight or obese among ever-married women aged 18-49 years nutrition-related data was analyzed. About 18% were overweight or obese. Unemployed urban women were at (P<0.001) times higher risk of being overweight or obese than those women who were involved in manual-labored work (Sharma *et al.,* 2016).

A cross-sectional; survey was conducted jointly by HKI and the governments of Indonesia and Bangladesh on maternal and Child double burden of malnutrition. To analysis , total 247,126 rural households from Indonesia and 168,317 household from Bangladesh were included. Information were collected from household s with children aged below 5 years through structured questionnaire and anthropometric measurements. Logistic regression models were used to determine the MCDB and its association with individual & household characteristics. The prevalence of maternal child double burden were found to be 11% and 4% in rural Indonesia and Bangladesh respectively (Oddo *et al.*, 2012).

The cross-sectional study was carried out in Gampaha District of SriLanka in September 2017 to assess the double burden of malnutrition in household level and socioeconomic status. Total 543 primary school children aged 5- 10 years and thir mother were selected through stratified random sampling method. Nutritional status of child and mothers calculated according to WHO growth references & body mass index. As socioeconomic status indicators maternal education, household equivalent income and maternal employment were used. A multivariate stepwise logistic regression analysis were used to find out associated factor with DBM.19.3% amd 13.4% were thinness and overweight. BMI of mother was 36.5%. mothers with overweight and obesity were less likely to have a child with thinness (0.30.95% CI 0.16-0.58). Maternal employment and household equivalent income were not significantly associated (Shinsugic *et al,* 2020).

A survey was conducted on the coexistence of undernutrition and over nutrition in the same household Pakistan. This study unravels the impact of food insecurity on the prevalence of double burden of malnutrition among under-five children by employing 2018 Pakistan Demographic Health Survey data and hierarchical mixed effect logistic regression. A sample of 3,625 6-29 months old children was included. The results state that child food insecurity increases the risk of double burden (OR: 1.49, CI: 1.03-2.16) after adjusting for household and community level socioeconomic and demographic factors (Sultan *et al.*, 2023).

## 2.3 Prevalence of double burden of malnutrition in context of Nepal

A nationally representative cross- sectional survey which utilized secondary data from the Nepal Demographic and Health Survey (NDHS) was done to explore the prevalence of double and triple burden of malnutrition and associated factors among mother-child pairs.2261 mother-child pairs were participated in the survey. Hemoglobin levels of children along with anthropometric measurements of children and mothers were measured. To assess the factors associated with the double burden of malnutrition (DBM) and the triple burden of malnutrition (TBM) bivariate and multivariable logistic regression models were used. This study finds the prevalence of DBM and TBM was 6.60%(95% CI: 5.13-8.84) and 7.00%(95% CI:5.42-8.99) respectively in the same households (Sunuwar *et al.*, 2020).

A cross-sectional study was carried out by trained community health volunteers from March 2014 in ward 22 of Lalitpur district. In total 289 mother child were recorded. Statistical analysis of socioeconomic, food safety-related and anthropometric was done. Participants were interviewed for the survey by door-to door contact. Questionnaire included questions on self -assessed food security; food safety; supplement intake; health checkups along with anthropometric measurements of mother and her child. This study finds, 26% of the children, aged 0-59 months were stunted 10% were underweight, and 6.6 % were either overweight or obese. Significantly more boys than girls were underweight (p=0.0004) and stunted (p<0.001). The higher education level of mothers was associated with a higher height-for -age (HAZ) score in girls, but not with HAZ in boys. Irrespective of sex, children of mothers with highest education level had significantly lower BMI-for-age scores (BAZ)than those of mothers with low education levels. None of the food safety indicators were associated with either HAZ or the BAZ (Sarki *et al.,* 2016).

A cross-sectional study was conducted in the peri-urban community of Bhaktapur, Nepal on prevalence of underweight, overweight and obesity in Adults. Total number of respondents were 600 women and 445 men along with their children were enrolled. For socio-demographic details mothers and fathers were interviewed. Also trained field workers measured their height and weight for BMI calculation .To assess associations between BMI and their baseline characteristics linear and multinomial logistic regression models were used. The mean BMI was 23.7 kg/m for both the mothers and fathers with a standard deviation (SD) of 3.6 and 3.7 respectively ( Catherine et al., 2020).

A community based cross-sectional study was conducted on Nutritional assessment and factors associated with nutritional status among the children at brick kilns of Bhaktapur district among 108 children aged 6-59 months. Simple random sampling technique was used to select the children. Anthropometric measurement was done to determine nutritional status of children. Also, semi-structured questionnaire were used to collect information on socio-demography. For analyzing data SPSS version 20 was used and Fisher exact test was used to identify the associated factors of malnutrition. The study revealed that 6.5%, 30.6% and 22.3% of children were wasted, stunted and underweight respectively (Karki *et al.,* 2021).

A secondary data analysis was done on Double Burden of Malnutrition in Nepal: A trend analysis of protein-energy malnutrition and High Body Mass Index. The Institute for Health Metrics and Evaluation's (IHME) Global Burden of diseases (GBD) database was used to download age-standardized data on Protein Energy Malnutrition (PEM) and high Body Mass Index (BMI).This study revealed that between 2010 to 2019, in Nepal the Disability Adjusted Life Years(DALY's) due to PEM were declining while high BMI was in increasing Trend. Rapidly growing prevalence of high BMI and the persistent existence of undernutriton indicate the double burden of malnutrition in Nepal (Pradhananga *et al.*, 2022).

A systematic review was conducted in a study of Change in patterns of the double burden of under nutrition and over nutrition Nepal overtime. For studies PubMed and reports published between January 1, 2000 to June 30, 2018 was used. Publications with a sample size greater than or equal to 500thatreported prevalence of nutritional status were included. Six large national reports and 36studies met study inclusion criteria and were included. The NDHS data from 2001 to 2016showed that the underweight prevalence decreased from 26.7% to 17.2%and prevalence of overweight/obesity increased from 6.5% to 22.1%.This study also conclude that prevalence of overweight/obesity was low among children and was higher in higher socio-economic status(SES) groups (Wei *et al.,*2019).

A cross- section study was conducted on Prevalence and factors affecting underweight, overweight and obesity using Asian and World Health Organization cutoffs among adults in Nepal: Analysis of the Demographic and Health Survey 2016. The study was conducted from June 2016 to January 2017. A multistage cluster sampling design was used to obtain data on major health indicators in Nepal. The overall prevalence of underweight was 16.7% (15.1% among males and 17.1% among females). The Asian-specific BMI cutoffs found the prevalence of overweight and obesity as 26.4% (27.4% among males and 25.6% among females) and 11.0% (7.7% among males and 13.3% among females), respectively. The WHO-recommended BMI cutoffs found 18.2% people overweight (16.7% among males and 19.3% among females) and 4.3% (2.5% among males and 5.6% among females) people obese. The prevalence and odds of extreme body weight categories (i.e., underweight, overweight and obesity) varied according to age, sex, education level, household wealth status, place, ecological zone and provinces of residence as per both recommended cutoffs. Overall, higher education level and wealth status were positively associated with overweight/obesity and inversely associated with underweight as per both cutoffs ( Kibria *et al.,*2019).

# CHAPTER III

# RESEARCH METHODOLOGY

## 3.1. Research Design

The descriptive cross- sectional study was done to assess the prevalence of double burden of malnutrition in the household level.

## 3.2 Study Area

The study area was conducted in Bhindyolacchi tole of ward no.12 of Lalitpur Municipality. Although this ward lies close to the Lalitpur Municipality, it is still one of the most underdeveloped and ignored ward of the Lalitpur Municipality. There is only one primary health center, which is most frequently visited by local children and mothers.

## 3.3 Study Population and Sample Size:

The study population was 7-10 year aged children and their mother. According to the latest census, there are 90 households in this tole. Among those 90 households, 30 households were excluded from the data collection as these 30 households didn’t have any mothers who bored children from 7 to 10 years of age. So in this study 60 household out of total 90 households were taken, excluding 30 households.

## 3.4 Sampling Method

Census sampling method was used to collect data from respondents.

## 3.5 Data Tools & Techniques:

The data collection tool used for the study was structured question. The data was collected through face to face interview with mother. The structured questionnaire was use to collect the information related to nutrition and diet while anthropometric measurement was used to determine the nutritional status of the respondent. Nutritional assessment of children is done with the help of weight for age, weight for height and height for age. Nutritional interpretation was done through Gomez classification and Waterlow classification while the nutritional interpretation of mother was done through BMI calculation.

Table 1: Gomez Classification of malnutrition

|  |  |
| --- | --- |
| Weight for Age | Nutritional Grade |
| >90 | Normal |
| 75-89.9 | Grade I |
| 60-74.9 | Grade II |
| <60 | Grade III |

**Source: WHO, 2006**

Table 2: Water low Classification of Malnutrition

|  |  |  |
| --- | --- | --- |
| Grade of Malnutrition | Weight for Height  (Wasting) | Height for Age  (Stunting) |
| Normal | >90 | >95 |
| Mild | 81-90 | 90-95 |
| Moderate | 70-80 | 85-89 |
| Severe | <70 | <85 |

**Source: WHO, 2006**

Table 3: BMI

|  |  |
| --- | --- |
| Weight Status | BMI(kg/m) |
| Underweight | <18.5 |
| Normal range | 18.5-24.9 |
| Overweight | 25.0-29.9 |
| Obese | >30 |

**Source: WHO, 2006**

## 3.6 Data Analysis:

Data analysis was done by using the SPSS 20. Pearson Chi- Square test was used for comparing categorical variable. P value less than 0.05 was considered as statistically significant. The collected data from respondents were tabulated and kept sequential order according to needs of study. It is presented according to the objectives of the study by using descriptive test (frequency, percentage).

## 3.7 Ethical Consideration

Approval from household was taken. Verbal consent was taken from each respondent. Freedom was given to respondents to give the answers. The purpose and objective of the study was being clearly defined while data collection.

## 3.8 Limitations

There is lack of exact information on micronutrients deficiency among the participants.

Information regarding dietary supplements cannot be accessed.

## 3.9 Operational Terms

**Nutritional Status:** The nutritional status of the mother is define by her BMI measurements while the nutritional status of child is determined according to weight for age, height for age and weight for height.

**Anthropometric Measurement**: In this study the terms refer a series of quantitative measurements in which height and weight will be taken for the determination of nutritional status.

**Double Burden Malnutrition**: The double burden is defined by the coexistence of maternal overweight and obesity along with child (7 to 10 years of age) undernutrition within the same household level.

**Stunting:** Child stunting refers to a child who is too short for his or her age and is result of chronic or recurrent malnutrition.

**Wasting:** Wasting is low weight-for-height. It indicates a deficit in the tissue and fat mass which may result from either failure to gain weight or actual loss of weight. It shows the acute form of malnutrition.

**Obesity:** Obesity is a complex multi factorial chronic disease developing from interactive influences of numerous factors-social, behavioral, psychological, metabolic, cellular and molecular (genetic).

## 3.10 Conceptual Framework of the Study

**Dietary Pattern**

Food Preference

Frequency of meal

Skipping of meal

Food Consumption

**Socio-Demography**

Religion

Ethnicity

Education

Occupation

Age of child

Gender of child

**Nutritional Status**

BMI

Underweight

Stunting

Wasting

Figure 1: Conceptual Framework of DBM

# CHAPTER IV

# DATA PRESENTATION AND ANALYSIS

Data was collected through questionnaire survey which was conducted in the Bhingyolachhi Tole of total 60 sample size. The respondent were mothers. Some of the important findings of the study are listed below.

## 4.1. Socio- demographic Characteristic

### 4.1.1 Socio-demographics characteristics of Mother

Table 4: Socio-demographic Characteristic of the respondent (N=60)

|  |  |  |  |
| --- | --- | --- | --- |
| Variables |  | Frequency | Percentage (%) |
| Religion | Hindu  Buddhists  Christian | 41  14  5 | 68.33  23.33  8.33 |
| Ethnicity | Newar  Tamang  Chettri | 44  8  8 | 73.33  13.33  13.33 |
| Education | S.L.C  +2  Bachelor  Masters  Illiterate | 14  21  15  8  2 | 23.33  35  25  13.33  3.33 |
| Types of family | Joint  Nuclear | 45  15 | 75  25 |

**Source: Field data, 2023**

The above table, shows Socio-demographic variation among the respondents. Majority of the respondents were Hindus (68.33%), followed by Buddhists (23.33%) and Christian (8.33%). It is interesting to note that most of the families were living in joint family (75%). Only 25% of the respondents were from nuclear family. As the study area chosen in this research is inside the core Newar community, 73.44 % of the respondents were from Newari Ethnicity. However, 26.66% of the respondents were non-newars ( Chettri 13.33% and Tamang 13.33%). Majority of the respondents (35% ) had pass high school followed by 25% passed bachelor's degree and 13.33% have completed their post-graduation. Only 3.33% were found to be illiterate.

### 4.1.2 Gender of Children

Table 5: Gender of children (N=60)

|  |  |  |
| --- | --- | --- |
| **Variable** | **Frequency** | **Percentage** |
| Boys | 34 | 56.66 |
| Girl | 26 | 43.33 |

**Source: Field data, 2023**

The above shows the gender of school going children. Out of total respondents, 56.66% were boys and 43.33% were girls.

### 4.1.3 Occupational distribution of the respondents

Table 6: Occupational distribution of the respondents (N=60)

|  |  |  |  |
| --- | --- | --- | --- |
| Variables |  | Frequency | Percentage |
| Income | Yes  No | 32  28 | 53.33  46.66 |
| Occupation | Housewife  Teacher  Tailoring  Shopkeeper  Services  Knitting  Helper | 28  5  7  3  9  3  5 | 46.66  8.33  11.66  5  15  5  8.33 |

**Source: Field data, 2023**

The above table describes the occupation of the respondents. Majority of the respondents were housewife (46.66%) followed by 25% of the respondents who were self-employed whereas remaining of the 15% were engaged in the services. Also, 13.33% of respondents had engaged in other work such as knitting and helper.

**4.1.4 Expenses on food of mother**

Table 7: Distribution of expenses on food of mother **(N=60)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables** | | **Frequency** | **Percent (%)** |
| **expenditure accounts for food** | Less than 50% total income |  |  |
| 50% to 65% total income | 35 | 58.33 |
| More than 65% total income | 13 | 21.66 |
| Don't know | 12 | 20 |
| **OutSide for meal** | Daily |  |  |
| Once a week | 19 | 31.66 |
| Twice a week | 9 | 15 |
| Thrice a week | 6 | 10 |
| Once in a month | 26 | 43.33 |

**Source: Field data, 2023**

Above table shows, the expense on food of the respondents. More than half respondents (58.33%) expenses their income in food is 50% to 60% followed by 24.66% expenses their income more than 65%.

## 4.2 Food consumption pattern of respondent

### 4.2.1 Food consumption pattern of mothers

**4.2.1.1 Food Preference**

Table 8: Food Preference of mothers (N=60)

|  |  |  |
| --- | --- | --- |
| Food Preference | Frequency | Percentage |
| Non- vegetarian  Vegetarian | 37  23 | 61.66  38.33 |

**Source: Field data, 2023**

The above table shows the food preference of respondents. Majority of the respondents (61.66%) were non-vegetarian and 38.33% were vegetarian.

**4.2.1.2 Frequency of meal**

Table 9: Distribution of frequency of meal (N=60)

|  |  |  |  |
| --- | --- | --- | --- |
| Variables |  | Frequency | Percentage (%) |
| Frequency of meal | Once a day  Twice a day  Thrice a day | 9  26  25 | 15  43.33  41.67 |

**Source: Field data, 2023**

The above shows the frequency of meal pattern of respondents. Majority of the respondents consume 2 times meal (43.33%), followed by 3 times (41.67%).Only 15% respondents consume 1 time meal in a day.

**4.2.1.3 Skipping of meal**

Table 10: Meal Skipping Pattern of mother (N=60)

|  |  |  |  |
| --- | --- | --- | --- |
| Variables |  | Frequency | Percentage (%) |
| Skipping of meal | Yes  No | 26  34 | 43.33  56.66 |
| Meal Skipped | Breakfast  Lunch  Dinner | 8  6  12 | 30.76  23.07  46.15 |
| Reason to skip | Due to busy schedule  Due to loss of appetite  To lose weight | 12  7  7 | 20  11.66  11.66 |

**Source: Field data, 2023**

The above table illustrate the skipping meal habit of mother. Out of total respondents, 56.66% do not skip the meal while 43.33% skip their meal. Reason behind to skip meal were busy schedule (20%), followed by loss of appetite (11.66%) and to lose weight (11.66%). Majority of the respondents skip dinner (46.15%).

**4.2.1.4 Frequency of consumption of different food**

Table 11: Consumption of food consumption of mother (N=60)

|  |  |  |  |
| --- | --- | --- | --- |
| Variables |  | Frequency | Percentage (%) |
| Cereals, Bread &potatoes | Once a day  Twice a day  Thrice a day | 9  49  2 | 15  81.66  3.33 |
| Beans & pluses | Once a day  Twice a day  Thrice a day | 5  49  6 | 8.33  81.66  10.01 |
| Egg, meat & fish | Everyday  Once a week  Twice a week  Thrice a week | 18  3  7  9 | 30  5  11.66  15 |
| Diary product | Everyday  Once a week  Twice a week  Thrice a week | 28  6  10  14 | 46.66  13.33  16.66  23.33 |
| Fruit & Fruit juices | Everyday  Once a week  Twice a week  Thrice a week | 15  20  10  15 | 25  33.33  16.66  25 |
| Vegetables | Once a day  Twice a day  Thrice a day | 10  47  3 | 16.66  78.33  5 |

**Source: Field data, 2023**

The above table shows the food consumption pattern of mothers. Most of the respondents (81.66%) consume cereals and legumes twice a day. Only 15% and 3.33% consume cereals once and thrice a day. About 30% respondents consume meat & meat products daily. Similarly, 15%, 11.66% & 5% of respondents consume meat twice a week and thrice a week. Majority of respondents (46.66%) prefer dairy product every day. More than half (78.33%) of the respondent consume vegetables twice a day.

### 4.2.2 Food consumption pattern of Child

**4.2.2.1 Food Preference**

Table 12: Food Preference of child (N=60)

|  |  |  |  |
| --- | --- | --- | --- |
| Food Preference |  | Frequency | Percentage |
| Non-Vegetarian | Boys  Girl | 26  18 | 43.33  30 |
| Vegetarian | Boys  Girl | 8  8 | 13.33  13.33 |

**Source: Field data, 2023**

The data presented in above table shows, the food preference of the child. More than half of the respondents (73.33%) were non-vegetarian and 26.66% were vegetarian. From this table it can be noted most of the children ate non-vegetarian meal.

**4.2.2.2 Frequency of meal**

Table 13: Distribution of frequency of meal (N=60)

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency of meal |  | Frequency | Percentage |
| 2-3 times/day | Boy  Girl | 6  4 | 10  6.66 |
| 3-4 times/day | Boy  Girl | 16  10 | 26.66  16.66 |
| 4-5 times/day | Boy  Girl | 12  6 | 20  10 |
| More than 5/day | Boy  Girl | 5  1 | 8.33  1.66 |

**Source: Field data, 2023**

The above table shows, frequency of meal by child in a day. Majority of the children (43.33%) eats meal 3-4 times in a day.16.66% and 30% consume 4-5 times in a day and 2-3 times in a day respectively. Only 10% of the respondents eats more than 5 times a day.

**4.2.2.3 Skipping of meal**

Table 14: Meal Skipping Pattern of Children (N=60)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variables |  | Frequency | | Percentage | |
|  |  | Boy | Girl | Boy | Girl |
| Skipping of meal | Yes | 7 | 6 | 11.66 | 10 |
| No | 21 | 26 | 35 | 43.33 |
| Reason to skip | Due to busy schedule | 5 | 5 | 8.33 | 8.33 |
| Due to loss of appetite | 2 | 1 | 3.33 | 1.66 |
| To lose weight | 0 | 0 | 0 | 0 |
| Due to stress | 0 | 0 | 0 | 0 |
| Meal Skipped | Breakfast | 5 | 3 | 8.33 | 5 |
| Lunch | 0 | 0 | 0 | 0 |
| Dinner | 2 | 3 | 3.33 | 4.99 |

**Source: Field** **data, 2023**

The above table illustrate the skipping meal habit of children. Out of 60 respondents, 78.33% do not skip the meal while 21.66% skip their meal. Reason behind to skip meal were busy schedule (16.66%), followed by loss of appetite (5%). Majority of the respondents skip breakfast (13.33%). Only 8.33% respondents skip dinner.

**4.2.2.4 Frequency of different food consumption**

Table 15: Food consumption pattern of children (N=60)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable |  | Frequency | | Percentage (%) | |
|  |  | Boy | Girl | Boy | Girl |
| Cereals, bread &potatoes | Once a day | 1 | 0 | 1.66 | 0 |
| Twice a day | 30 | 22 | 50 | 36.66 |
| Thrice a day | 3 | 2 | 5 | 3.33 |
| Never | 1 | 1 | 1.66 | 1.66 |
| Beans & pluses | Once a day | 2 | 3 | 3.33 | 5 |
| Twice a day | 30 | 18 | 50 | 30 |
| Thrice a day | 5 | 2 | 8.33 | 3.33 |
| Egg, meat &fish | Never | 6 | 7 | 10 | 11.66 |
| Everyday | 15 | 13 | 25 | 21.66 |
| 2-3 times/week | 5 | 4 | 8.33 | 6.66 |
| Sometimes | 5 | 3 | 8.33 | **5** |
| Fruit & Fruit juices | Never | 3 | 3 | 5 | 5 |
| Everyday | 11 | 8 | 18.33 | 13.33 |
| 2-3 times/week | 7 | 6 | 11.66 | 10 |
| Sometimes | 10 | 13 | 16.66 | 21.66 |
| Vegetables | Never | 3 | 3 | 5 | 5 |
| Everyday | 8 | 6 | 13.33 | 10 |
| 2-3 times/week | 9 | 9 | 15 | 15 |
| Sometimes | 11 | 10 | 18.33 | 16.66 |
| Butter, milk ghee | Never | 4 | 2 | 6.66 | 3.33 |
| Everyday | 19 | 18 | 31.66 | 30 |
| 2-3 times/week | 4 | 3 | 6.66 | 5 |
| Sometimes | 5 | 5 | 8.33 | 8.33 |

**Source: Field data, 2023**

Above table shows the food consumption pattern of respondents. Majority of the respondents (86.66%) consumed cereal twice a day followed by 80% consumed beans & pulses twice a day. From this study, it was found that 46.66% of the respondents consumed meat and meat products daily. Above table illustrates that 25% of the respondents consumed fruits and fruits juice every day, 21.66% consumed 2-3 days/week. The study shows 30% of the respondents consumed vegetables daily while 10% of the respondents never consumed vegetables.

**4.2.2.5 Junk food consumption**

Table 16: Distribution of junk food consumption (N=60)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variables |  | Frequency | | Percentage (%) | |
|  |  | Boy | Girl | Boy | Girl |
| Junk food preference | Yes | 28 | 27 | 46.66 | 45 |
| No | 4 | 1 | 6.66 | 1.66 |
| Frequency of junk food consumption | Daily | 4 | 2 | 6.66 | 3.33 |
| 2-3days/week | 14 | 18 | 23.33 | 30 |
| Sometimes | 10 | 7 | 16.66 | 11.66 |

**Source: Field data, 2023**

The data presented in above table shows, the distribution of junk food consumption. Majority of the respondents (91.66%) prefer and 53.33% consume junk food 2-3 days/week while daily consumption of junkfood is 10%.

## 4.3 Nutritional Status of the respondents

### 4.3.1 Nutritional status of mother according to BMI

Table 17: BMI Distribution of mother (N=60)

|  |  |  |
| --- | --- | --- |
| **Nutritional Status** | **Frequency** | **Percentage (%)** |
| Underweight(<18.5) | 2 | 3.33 |
| Normal(18.5-24.9) | 22 | 36.66 |
| Overweight(25-29.9) | 24 | 38.3 |
| Obese(>30) | 12 | 20 |

**Source: Field data, 2023**

The above table shows the variation in BMI of participants. Majority of the respondents (38.3%) were overweight followed by 20% of the respondents were obese. Only 3.33% respondents were underweight.

### 4.3.2 Nutritional Status of Children

#### 4.3.2.1 Nutritional Status of Children According to Weight for age

Table 18: Distribution of weight for age (N=60)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Frequency | | Percentage (%) | |
|  | Boy | Girl | Boy | Girl |
| Normal | 17 | 20 | 28.33 | 33.33 |
| Mild | 5 | 6 | 8.33 | 10 |
| Moderate | 7 | 2 | 11.66 | 3.33 |
| Severe | 2 | 1 | 3.33 | 1.66 |

**Source: Field data, 2023**

The above table shows, out of the total respondents, 61.66% of people are well nourished and have normal weight. But, majority of respondents are slightly underweight (18.33 %) and rest of 15% are moderately underweight. Also, least of the respondents covering 5% of respondents are severely underweight.

#### 4.3.2.2 Nutritional Status of Children according to height for age

Table 19: Distribution of height for age (N=60)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Frequency | | Percentage (%) | |
|  | Boy | Girl | Boy | Girl |
| Normal | 15 | 16 | 25 | 75 |
| Mild | 10 | 10 | 16.66 | 16.66 |
| Moderate | 4 | 2 | 6.66 | 3.33 |
| Severe | 2 | 1 | 3.33 | 1.66 |

**Source: Field data, 2023**

The above table shows the nutritional status of children according to height for age. Majority of respondents (51.66%) are normal followed by 33.33% and 10% are slightly stunted and moderately stunted respectively. Only 5% of respondents are severely stunted.

#### 4.3.2.3 Nutritional Status According to weight for height

Table 20: Distribution of weight for height (N=60)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Frequency | | Percentage (%) | |
|  | Boy | Girl | Boy | Girl |
| Normal | 14 | 19 | 23.33 | 31.66 |
| Mild | 6 | 6 | 10 | 10 |
| Moderate | 7 | 5 | 11.66 | 8.33 |
| Severe | 2 | 1 | 3.33 | 1.66 |

**Source: Field data, 2023**

The above table show, among the total respondents, majority of respondents (55%) had normal weight for height. Around 20% of respondents were slightly wasted and 5% of the respondents were severely wasted.

## 4.4 Prevalence of double burden of malnutrition

Table 21: Prevalence of double burden of malnutrition (N=60)

|  |  |  |
| --- | --- | --- |
| DBM | Frequency | Percentage |
| Yes | 28 | 46.66 |
| No | 32 | 53.33 |

**Source: Field data, 2023**

Above table shows the prevalence of double burden of malnutrition (DBM) reported by the households during the survey. Out of 60 households occurrence of DBM was found in 28 households (46.66%) and 32 households (53.33%) didn’t have any incidences of Double burden of Malnutrition.

## 4.5 Association between different factors and Double Burden of Malnutrition

### 4.5.1 Association between Double Burden of Malnutrition and Socio-Demography

Table 22: Association between Double burden of malnutrition and Socio-Demography (N=60)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variables |  | Yes | No | Chi-Square | P-Value |
| Religion | Hindu  Buddhists  Christian | 16  9  3 | 25  5  2 | 3.065 | 0.2159 |
| Education | S.L.C  +2  Bachelors  Masters  Illiterate | 12  8  5  2  2 | 2  13  10  6  0 | 13.948 | 0.0075\* |
| Ethnicity | Newar  Tamang  Chettri | 18  4  4 | 26  4  4 | 0.3948 | 0.8208 |
| Family | Joint  Nuclear | 9  5 | 25  10 | 0.2401 | 0.6241 |
| Occupation | Housewife  Self-employed  Services  Others | 12  8  5  4 | 16  7  4  4 | 0.6832 | 0.0052\* |

**Source: Field data, 2023**

Factors such as Education (P=0.0075), Occupation (P=0.0052) were found to be significantly associated with double burden of malnutrition. Majority of the respondents are educated and have those kinds of job that are mostly table work. Also they have very busy life style. This could be the reason that education and occupation is associated with Double burden of malnutrition.

### 4.5.2Association between double burden of malnutrition and gender of child

Table 23: Association between double burden of malnutrition and gender of child

(N=60)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable |  | Yes | No | Chi-Square | P-Value |
| Gender | Boy  Girl | 22  9 | 14  7 | 0.1087 | 0.7416 |

**Source: Field data, 2023**

There was no significant association found between gender and double burden of malnutrition.

### 4.5.3 Association between Double burden of malnutrition and Expenses on Food

Table 24: Association between double burden of malnutrition and Expenses on Food

(N=60)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variables |  | Yes | No | Chi-Square | P-Value |
| Expenditure on food | 50% to 65%  More than 65%  Don’t | 23  8  7 | 12  5  5 | 0.232662 | 0.8902 |
| Outside meal | Once  Twice  Thrice  Once a month | 10  7  4  16 | 9  2  2  10 | 1.70802 | 0.6352 |

**Source: Field data, 2023**

No any factors were found to be significantly associated with Double Burden of malnutrition.

### 4.4.4 Association between Double Burden of malnutrition and Food habit of mother

Table 25: Association between Double Burden of malnutrition and Food habit of mother (**N=60)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** |  | **Yes** | **NO** | **Chi-square** | **P-Value** |
| **Food Preference** | Non-vegetarian  Vegetarian | 22  15 | 12  8 | 0.0015 | 0.96 |
| **Frequency of meal** | Once  Twice  Thrice | 2  13  22 | 8  13  2 | 17.9788 | 0.0001\* |
| **Skip breakfast** | YES  NO | 8  28 | 7  19 | 0.1819 | 0.6697 |

**Source: Field data, 2023**

Factor such as frequency of meal (P<0.005) is statistically significance with double burden of malnutrition. Mostly the meal include more portion of rice and pulses which is source of carbohydrates and proteins. This might be the reason that frequency of meal is associated with Double burden of malnutrition.

### 4.4.5 Association between Double burden of malnutrition and Food habits of mother

Table 26: Association between double burden of malnutrition and food habits of mother

(N=60)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable |  | Yes | NO | Chi-square | P-value |
| Rice,bread,cereals &potatoes | Once a day  Twice a day  Thrice a day | 2  10  22 | 7  8  3 | 11.526 | 0.0307\* |
| Pluses & legumes | Once a day  Twice a day  Thrice a day | 2  10  22 | 7  8  3 | 11.526 | 0.0307\* |
| Egg,meat &fish | Everyday  Twice  Thrice  Once a month  Never | 7  3  6  3  18 | 2  10  3  3  5 | 12.2977 | 0.0153\* |
| Fruit & Fruit juices | Everyday  Twice  Thrice  Never | 14  6  10  8 | 6  4  5  7 | 1.1483 | 0.7654 |
| Vegetables | Everyday  Twice  Thrice | 5  10  8 | 10  12  15 | 12.056 | 0.0617 |
| Butter,milk & ghee | Everyday  Twice  Thrice  Never | 22  3  8  5 | 4  7  6  3 | 10.2481 | 0.0166 |

**Source: Field data, 2023**

Factors such as consumption cereals, legumes, meat products and dairy products are significantly associated with double burden of malnutrition. These food groups are high calorie dense food.

### 4.4.6 Association between Double burden of malnutrition and food habits of Child

Table 27: Association between Double burden of malnutrition and food habits of child (N=60)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable |  | Yes | NO | Chi-square | P-Value |
| Food Preference | Non-vegetarian  Vegetarian | 25  18 | 10  7 | 0.0019 | 0.86 |
| Frequency of meal | 2-3 times  3-4 times  4-5 times  More than 5 | 6  10  12  6 | 4  16  6  0 | 8.8757 | 0.0310\* |
| Skip breakfast | YES  NO | 8  28 | 7  19 | 0.1819 | 0.6697 |
| Junk Food | Daily  2/3 days  Sometimes | 6  17  10 | 0  15  12 | 5.7644 | 0.0560 |

**Source: Field data, 2023**

Factors such as frequency of meal (P<0.05) is significantly associated with double burden of malnutrition.

### 4.4.7Association between Double burden of malnutrition and food consumption of Child

Table 29: Association between Double burden of malnutrition and food consumption of child (N=60)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable |  | Yes | No | Chi-square | P-value |
| Rice, bread, cereals & potatoes | Never  Everyday  2-3days/week  Sometimes | 1  25  3  0 | 0  27  2  0 | 1.2769 | 0.5281 |
| Pluses & legumes | Never  Everyday  2-3days/week  Sometimes | 2  28  5  0 | 3  22  2  0 | 1.1933 | 0.5506 |
| Egg, meat & fish | Never  Everyday  2-3days/week  Sometimes | 4  19  4  5 | 4  9  2  6 | 2.1380 | 0.0222\* |
| Fruit & Fruit juices | Never  Everyday  2-3days/week  Sometimes | 1  10  6  1 | 2  12  6  0 | 1.4138 | 0.7023 |
| Vegetables | Never  Everyday  2-3days/week | 2  7  9 | 4  8  9 | 0.5055 | 0.7766 |
| Butter, milk & ghee | Never  Everyday  2-3days/week | 3  22  4 | 3  15  3 | 0.1920 | 0.014\* |

**Source: Field data, 2023**

Factors such as consumption of meat(P=0.022) and dairy products(P=0.014) are associated with the double burden of malnutrition.Meat and Dairy products are good source of protein.

### 4.4.8 Association between double burden of malnutrition and nutritional status of mother

Table 30: Association between double burden of malnutrition and BMI of mother

(N=60)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable |  | Yes | No | Chi-Square | P-value |
| BMI | Underweight(<18.5)  Normal(18.5-24.9)  Overweight{25-29.9)  Obese(>30) | 1  14  18  8 | 1  6  6  6 | 1.6394 | 0.039\* |

**Source: Field data, 2023**

There was a significant association found between Body Mass Index and Prevalence of double burden of malnutrition. Majority of women who were overweight (18) had incidences of double burden on malnutrition associated with their child in their household.

### 4.4.9 Association between double burden of malnutrition and nutritional status of child

Table 31: Association between double burden of malnutrition and nutritional status of child (N=60)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable |  | Yes | No | Chi-square | P-Value |
| Weight for age | Normal  Mild  Moderate  Severe | 18  8  9  1 | 9  7  7  1 | 0.9546 | 0.0421 |
| Height for age | Normal  Mild  Moderate  Severe | 19  10  7  2 | 8  8  6  1 | 1.5171 | 0.03714 |
| Weight for height | Normal  Mild  Moderate  Severe | 18  10  8  2 | **7**  8  6  1 | 1.5229 | 0.0415 |

**Source: Field Source, 2023**

There was significant association found between underweight, stunted and wasted with double budren of malnutrition.

# CHAPTER V

# DISCUSSION AND CONCLUSION

## 5.1 DISCUSSION

In this study, census sampling method was used to find out the prevalence of double burden of malnutrition in the household. This study include total 60 household of bhindyolachhi tole. This section deals with the discussion of the major findings of the study according to the objective of study.

The present study revealed that prevalence of double burden of malnutrition was found to be 30.33% which is higher than that of the neighboring country Bangladesh (Emdadul et al., 2018). A study by Emdadul found that the prevalence of double burden was 13.33%.Likewise a study done by Kosaka et al., 2017 revealed the prevalence of double burden of malnutrition was 11% in Indonesia which was higher than the present study. The prevalence of double burden of malnutrition in this study area is high as respondents living a sedentary lifestyle with less exercise and they consume high calorie diet. A similar study done by Popkin et al., 2012 revealed that tendency to consume calorie-dense food with more saturated fat results in weight gaining. A data shows that prevalence of DBM among household has increased from an estimated 6.5% in 2001 to 22.1% in 2016(Wei *et al*, 2019).

The study also revealed that the the prevalence of underweight, stunted and wasting are 12.77%,16.1% and 15% respectively. Around 38.3% mothers are overweight and 20% mothers are obese. Only 1.33% of mothers are underweight. Overweight/obese of mothers is associated with the nutritive transition situation that contributes to a positive energy balance which means higher intake of energy-dense food and less energy expenditure. This is explained by the suvery done by Popkin *et al.*,2012 which suggests the tendency to consume calorie –dense food with more saturated fat, trans fat and a sedentary lifestyle results in women gaining weight. In this study, it also found that majority of respondents skip their meal due to busy schedule such as children who have go to school by bus and they consume more junk food rather than home cooked food.

According to the study, food groups also association with DBM. It was found out that person whose diet include food consumption of cereals, pluses n legumes also meat and dairy products are obese. This may be due to these food groups are high calorie dense food. This is supported by the survey (Kosaka *et al*, 2017) which revealed that obesity is associated with the higher intake of energy dense food and less energy expenditure. Also this study find out that there is no significant relationship between skipping of meals with DBM and consumption of fruits with DBM. It is logical to anticipate that fruits consumption contribute to obesity rather than weight loss given the amount of simple sugars they contain. (Sharma *et al.,* 2016).

In this study, the prevalence of double burden of malnutrition among the household level along with its associated factors at Bhindyolachhi.. One of the key finding of this study is that education is that one factor that is associate with DBM. This finding has also been supported by Sunuwar *et al*.,(2020) who revealed that women who had high level of education, as compared to females who went to university, were more prone to obesity. This might be due to the reason that mother who have their job and are literate are more used to table work and sedentary life style, which affects their body mass index. Various previous studies done also linked the education with double burden of malnutrition. Some study explain that mother who attend lower education level had stunting child (Sunuwar *et al*, 2019). This is due to nutritional knowledge gap. Another survey done in Pakistan finds that mother who are illiterate have mostly malnourished children, which is partly explained by the introduction of complementary foods at an inappropriate age (Liaqat *et al.*, 2007).

Similarly, cross sectional survey done in Lalitpur district also suggest mother who have a higher education had children who were significantly less frequently overweight and on average had a lower BAZ, compared to mothers who went to elementary class. This is due to educated mother may have more knowledge about nutrition and be able to prevent nutritional related problems (Sarki *et al.*, 2016).

Another finding suggests the occupation of mother is associated with double burden of malnutrition. Mother with high paying job is suffering from obesity while there is also overweight. This may be due to the easy assessable of food in the house and dietary habit in family where family members prefers more fast food and processed food. This finding is supported by Rai *et al* 2019, who revealed that mothers could be attribute to shifting of Nepalese diet away from locally available staple foods, to modern fast food and processed food which contribute highest prevalence. Similarly, mother having low income had undernourished child. This is in accordance with several studies from South Asia and other developing countries, which report that children of employed mothers are less likely to be stunted (Keino *et al*., 2014).

## 5.2 CONCLUSION

This study revealed the higher prevalence of double burden of malnutrition is evidently prevailing among household in Bhidyolachhi tole. Majority the mothers are prone to obesity/overweight. From this study, it is found that there are incidences of wasted, stunted and underweight among the children, from this tole. The education level of mothers seem to be relevant to double burden of malnutrition. The other factors that are associated with Double burden of malnutrition are occupation of mother and also dietary patterns which include more cereals and legumes rather than vegetables.

## 5.3 RECOMMENDATION

Recommendation based on this study are as follows:

* Bio-chemical test of respondents can be done to find out micronutrient deficiency.
* Nutritional assessment can be done of all the members of house for more accurate result.
* 24 hour recall can be done to find out the dietary associated with double burden of malnutrition.
* The nutritional awareness among mother may to reduce the prevalence of double burden of malnutrition.

# REFERENCES

Adeomi A, Fatusi A, Klipstein-Grobusch K.(2021). Double burden of malnutrition among school-aged children and adolescents: evidence from a community-based cross-sectional survey in two Nigerian States. *AAS Open Res.* Jul 21;4:38.

Akombi, B., Chitekwe, S., Sahle, B., & Renzaho, A. (2019). Estimating the Double Burden of Malnutrition among 595,975 Children in 65 Low- and Middle-Income Countries: A Meta-Analysis of Demographic and Health Surveys. *International Journal of Environmental Research and Public Health,* 16.

Anik, A., Rahman, M., Rahman, M., Tareque, M., Khan, M., & Alam, M. (2019). Double burden of malnutrition at household level: A comparative study among Bangladesh, Nepal, Pakistan, and Myanmar*. PLoS ONE*, 14.

Asim, M., & Nawaz, Y. (2018). Child Malnutrition in Pakistan: Evidence from Literature. Children, 5.

Ayogu, R., Afiaenyi, I., Madukwe, E., & Udenta, E. (2018). Prevalence and predictors of under-nutrition among school children in a rural South-eastern Nigerian community: a cross sectional *study. BMC Public Health*, 18.

Bharati M, Metha R. (2018). Nutrition & Dietary management, 136.

Caleyachetty, R., Caleyachetty, R., Thomas, G., Kengne, A., Kengne, A., Echouffo-Tcheugui, J., Schilsky, S., Khodabocus, J., Uauy, R., & Uauy, R. (2018). The double burden of malnutrition among adolescents: analysis of data from the Global School-Based Student Health and Health Behavior in School-Aged Children surveys in 57 low- and middle-income countries. *The American journal of clinical* *nutrition,* 108 2, 414-424 .

Catherine S, Chandyo R., Ulak M., Hysing M, Shresth M., Ranjittkar S & Strand T.(2020). Prevalence of underweight,overweight and obesity in Adults in Bhaktapur, Nepal in 2015-2017. *Froniters in Nurtition.*7:567164.doi:10.3389/fnut.2020.567164.

Chen, C., Schilling, L., & Lyder, C. (2001). A concept analysis of malnutrition in the elderly.. *Journal of advanced nursing,* 36 1, 131-42 .

Dali, W., Mohamed, H., & Yusoff, H. (2018). Nutrient Intakes Status and Physical Inactivity among Overweight and Obese School Children in Kota Bharu, Kelantan, Malaysia. *Iranian Journal of Public Health*, 47, 1098 - 1107.

Das, S., Fahim, S. M., Islam, M. S., Biswas, T., Mahfuz, M., & Ahmed, T. (2019). Prevalence and sociodemographic determinants of household-level double burden of malnutrition in Bangladesh. *Public health nutrition,* 22(8), 1425–1432.

Davis, J., Oaks, B., & Engle-Stone, R. (2020). The Double Burden of Malnutrition: A Systematic Review of Operational Definitions. Current Developments in Nutrition, 4.

Delisle, H. (2008). Poverty: the double burden of malnutrition in mothers and the intergenerational impact.. *Annals of the New York Academy of Sciences*, 1136, 172-84 .

Karki A.(2018).Nutritional assessment and factors associated with nutritional status among the children (6-59 months) of brick klins workers of bhaktapur district. http://202.45.146.37:8080/jspui/handle/123456789/198

Kibria, G. (2019). Prevalence and factors affecting underweight, overweight and obesity using Asian and World Health Organization cutoffs among adults in Nepal: Analysis of the Demographic and Health Survey 2016*.. Obesity research & clinical practice,* 13 2, 129-136 .

Kosaka, S., & Umezaki, M. (2017). A systematic review of the prevalence and predictors of the double burden of malnutrition within households. *British Journal of Nutrition*, *117*(8), 1118–1127. doi:10.1017/S0007114517000812

Lee, G., Gutierrez, C., Jones, A., Castro, N., Cevallos, W., & Eisenberg, J. (2019). Double Burden of Malnutrition in Rural Ecuador: Adult Overweight and Child Stunting Co-occur at the Community but Not the Household Level (P10-075-19).. Current developments in nutrition, 3 Suppl 1.

Liaqat, P., Rizvi, M. A., Qayyum, A., & Ahmed, H. (2007). Association between complementary feeding practice and mothers education status in Islamabad. Journal of human nutrition and dietetics: *The official journal of the British Dietetic Association,* 20(4), 340–344.

MacCartee, J. (1986). Nutrition. The Lancet, 328. <https://doi.org/10.1016/S0140-6736(86)92184-7>.

Mahmudiono, T., Segalita, C., & Rosenkranz, R. (2019). Socio-Ecological Model of Correlates of Double Burden of Malnutrition in Developing Countries: A Narrative Review. *International Journal of Environmental Research* *and Public Health,* 16.

Menon, S., & Peñalvo, J. (2019). Actions Targeting the Double Burden of Malnutrition: A Scoping Review. Nutrients, 12.

Modjadji, P., Madiba, S. (2019). The double burden of malnutrition in a rural health and demographic surveillance system site in South Africa: a study of primary schoolchildren and their mothers*. BMC Public Health* 19, 1087.

Ngo, J., Ortiz-Andrellucchi, A., & Serra-Majem, L. (2016). Malnutrition: Concept, Classification and Magnitude. , 610-630.

Nigatu, G., Assefa Woreta, S., Akalu, T. Y., & Yenit, M. K. (2018). Prevalence and associated factors of underweight among children 6-59 months of age in Takusa district, Northwest Ethiopia. *International journal for equity in health*, 17(1), 106.

Oddo, V., Rah, J., Semba, R., Sun, K., Akhter, N., Sari, M., Pee, S., Moench-Pfanner, R., Bloem, M., & Kraemer, K. (2012). Predictors of maternal and child double burden of malnutrition in rural Indonesia and Bangladesh.. *The American journal* *of clinical nutrition*, 95 4, 951-8 .

Patel, R., Srivastava, S., Kumar, P., & Chauhan, S. (2020). Factors associated with double burden of malnutrition among mother-child pairs in India: A study based on National Family Health Survey 2015–16. *Children and Youth Services Review,* 116, 105256.

Popkin, B., Corvalán, C., & Grummer-Strawn, L. (2019). Dynamics of the double burden of malnutrition and the changing nutrition reality. *The Lancet*, 395, 65-74.

Pradhananga, P., Shrestha, A., Adhikari, N., Shrestha, N., Adhikari, M., Ide, N., Dhungel, S., Bajracharya, S., & Aryal, A. (2022). Double burden of malnutrition in Nepal: A trend analysis of protein-energy malnutrition and High Body Mass Index using the data from Global Burden of Disease 2010–2019. *PLoS One,* 17.

Rai A,Gurung S., Thapa S., Saville NM (2019). Correlates and inequality of underweight and overweight among women of reproductive age: Evidence from the 2016 Nepal Demographic Health Survry. *PLoS One*.2019:1-16.

Sarki, M., Robertson, A., & Parlesak, A. (2016). Association between socioeconomic status of mothers, food security, food safety practices and the double burden of malnutrition in the Lalitpur district, Nepal. *Archives of public* *health ,*74(1), 35.

Sekiyama, M.; Jiang, H.W.; Gunawan, B.; Dewanti, L.; Honda, R.; Shimizu-Furusawa, H.; Abdoellah, O.S.; Watanabe, C. Double Burden of Malnutrition in Rural West Java: Household-Level Analysis for Father-Child and Mother-Child Pairs and the Association with Dietary Intake. Nutrients 2015, 7, 8376-8391.

Sharma, H., Saquib, N., Hasan, M., Saquib, J., Rahman, A., Khan, J., Uddin, M., Cullen, M., & Ahmed, T. (2016). Determinants of overweight or obesity among ever-married adult women in Bangladesh. *BMC* obesity, 3.

Shimabuku, R., Delgado, C., Nakachi, G., Teruya, A., & Velásquez, P. (2020). Double Burden of Excess Weight and Anemia in Latin American Children up to 2019.. *The Tohoku journal of experimental medicine*, 252 2, 159-168 .

Soeters, P., & Schols, A. (2009). Advances in understanding and assessing malnutrition. Current Opinion in Clinical Nutrition and Metabolic Care, 12, 487–494.

Steyn, N., & Mchiza, Z. (2014). Obesity and the nutrition transition in Sub‐Saharan Africa. Annals of the New York Academy of Sciences, 1311.

Subramanian, S., Perkins, J., Özaltin, E., & Smith, G. (2011). Weight of nations: a socioeconomic analysis of women in low- to middle-income countries*.. The* *American journal of clinical nutrition*, 93 2, 413-21 .

Sultan, R., & Iram, A. (2023). Unravelling the Impact of Food Insecurity on the Prevalence of Double Burden of Malnutrition among Children of Pakistan. iRASD *Journal of Economics.*

Sunuwar, D. R., Sangroula, R. K., Shakya, N. S., Yadav, R., Chaudhary, N. K., & Pradhan, P. M. S. (2019). Effect of nutrition education on hemoglobin level in pregnant women: A quasi-experimental study. *PloS one*, 14(3), e0213982.

Swinburn, B., Sacks, G., Hall, K., McPherson, K., Finegood, D., Moodie, M., & Gortmaker, S. (2011). The global obesity pandemic: shaped by global drivers and local environments. *The Lancet,* 378, 804-814.

Tanwi, T., Chakrabarty, S., & Hasanuzzaman, S. (2019). Double burden of malnutrition among ever-married women in Bangladesh: a pooled analysis. *BMC Women's* *Health,* 19.

Wei, J., Bhurtyal, A., Dhungana, R., Bhattarai, B., Zheng, J., Wang, L., Sun, X., Maskey, M., & Wang, Y. (2019). Changes in patterns of the double burden of undernutrition and overnutrition in Nepal over time. Obesity Reviews, 20, 1321 - 1334.

Wells, J., Sawaya, A., Wibaek, R., Mwangome, M., Poullas, M., Yajnik, C., & Demaio, A. (2019). The double burden of malnutrition: aetiological pathways and consequences for health. *The Lancet*, 395, 75-88

WHO Expert Consultation (2004). Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet* (London, England), 363(9403), 157–163.

# APPENDICES

APPENDIX A: QUESTIONNAIRE

**Part I: Socio-Demographic Information**

1. Name:
2. Age of child:
3. Gender: i)Boy ii)Girl
4. Ethincity: i) Newar ii) Chetteri

(ii) Tamang iv)Others

1. Religion: i)Hindu ii)Buddhist

iii)Christian iv)Muslim

1. Educational Status: i)Illiterate ii)S.L.C

iii)+2 iv)Bachelors

v)Masters

1. Occupation: i)Housewife ii)Business

iii)Services iv)Self-employed

1. Family type: i)Nuclear ii)Joint

**Part II: Food Frequency Questionnarie**

1. Food habit: i)Vegetarian ii)Non-Vegetarian

iii)Ovatorian iv)Others

1. Do you skip meal?

Yes NO

1. If yes, which one you skip?

i)Breakfast ii) Lunch iii)Dinner

1. What is reason behind of skipping meal?
2. Due to busy schedule
3. Due to loss of appetite
4. To lose weight
5. How many time do you take meal a day?
6. Once
7. Twice
8. Thrice
9. More
10. How often do you consume meat and fish?
11. Everyday
12. Once a week
13. Twice a week
14. Thrice a week
15. How often do you consume dairy products?
16. Everyday
17. Once a week
18. Twice a week
19. Thrice a week
20. How often do you eat fruits?
21. Everyday
22. Once a week
23. Twice a week
24. Thrice a week
25. How often do you go to eat outside?
26. Once a week
27. Twice a week
28. Once a month
29. Question for child

Food habit: i) Vegetarian ii) Non-Vegetarian

iii) Ovatorian iv) Others

Does your child skip meal?

Yes NO

If yes, which does he/she skip?

i) Breakfast ii) Lunch iii) Dinner

1. What is reason to skip meal?
2. Due to busy schedule
3. Due to loss of appetite
4. Due to stress
5. How often does your child consume Junk food?
6. Once a week
7. 2-3 days/week
8. Sometimes
9. everyday
10. Please indicate which of any of this food your child eats .

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Food | Never | Sometimes | Everyday | 2-3times/day |
| Bread, cereals, rice |  |  |  |  |
| Pluses and legumes |  |  |  |  |
| Eggs, meat &fish |  |  |  |  |
| Fruit & fruit juice |  |  |  |  |
| Vegetables |  |  |  |  |
| Butter, milk &ghee |  |  |  |  |

**Part III: Anthropometric Measurement**

1. Mother: Height:

Weight:

BMI:

1. Child: Height:

Weight:

1. Stunting Wasting C. Underweight