SOCIO DEMOGRAPHIC DIFFERENTIALS OF MALNUTRITION IN CHILDREN UNDER 5 YEARS OF AGE AND DETERMINE ITS CAUSES IN EARTHQUAKE AFFECTED DISTRICT NUWAKOT

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LETTER OF RECOMMENDATION

This dissertation entitled **"SOCIO DEMOGRAPHIC DIFFERENTIALS OF MALNUTRITION IN CHILDREN UNDER 5 YEARS OF AGE AND DETERMINE ITS CAUSES IN EARTHQUAKE AFFECTED DISTRICT NUWAKOT"** is submitted by Ranjan Kapali for the partial fulfilment of Master of Arts in Sociology completed under my supervision and guidance.

Therefore, I recommend this dissertation for the final approval to the dissertation evaluation committee.

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APPROVAL LETTER

This dissertation entitled **"SOCIO DEMOGRAPHIC DIFFERENTIALS OF MALNUTRITION IN CHILDREN UNDER 5 YEARS OF AGE AND DETERMINE ITS CAUSES IN EARTHQUAKE AFFECTED DISTRICT NUWAKOT"** submitted by Ranjan Kapali has been accepted and approved for the partial fulfilment of Master of Arts in Sociology.

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DECLARATION

I hereby declare that this thesis entitled **SOCIO DEMOGRAPHIC DIFFERENTIALS OF MALNUTRITION IN CHILDREN UNDER 5 YEARS OF AGE AND DETERMINE ITS CAUSES IN EARTHQUAKE AFFECTED DISTRICT NUWAKOT** is my own work submitted to the Central Department of Sociology, Tribhuwan University. This work of mine is an entirely original work prepared under the guidance of Prof. Madhusudan Subedi. I have made due acknowledgements to all ideas and information received from different sources in the course of preparing the report. The findings of this dissertation has not been presented or submitted anywhere in any purpose till date. I am responsible if any evidence is found against my declaration.

_____

Signature

Ranjan Kapali

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CONTENTS

LETTER OF RECOMMENDATION		**II**
APPROVAL LETTER		**III**
DECLARATION		**IV**
ACKNOWLEDGEMENT		**V**
CONTENTS		**VI**
LIST OF TABLES AND FIGURES		**VIII**
CHAPTER I - INTRODUCTION		**1**
1.1	**Background of the Study**	**1**
1.2	**Rationale of the Study**	**5**
1.3	**Objectives**	**8**
1.4	**Research Questions**	**8**
1.5	**Research Hypothesis**	**8**
1.6	**Statement of the Problem**	**9**
1.7	**Conceptual Framework**	**11**
CHAPTER II- LITERATURE REVIEW		**13**
2.1	**Sociology of Malnutrition**	**13**
2.2	**Epidemiology of Malnutrition**	**29**
CHAPTER III- RESEARCH METHODOLOGY		**38**
3.1	**Study Design**	**38**
3.2	**Study Population**	**38**
3.3	**Study Area**	**38**
3.4	**Study Duration**	**39**
3.5	**Sampling Frame**	**39**
3.6	**Estimation of the number of Required Clusters**	**39**

3.7 Sampling Procedure 40

3.8 Sample Size 41

3.9 Inclusion Criteria 42

3.10 Exclusion Criteria 42

3.11 Data Collection Techniques and Tools 42

3.12 Data Processing and Analysis 43

3.13 Validity and Reliability 44

3.14 Ethical Consideration 44

3.15 Possible Biases of the Study 44

CHAPTER IV-FINDINGS AND DISCUSSION 45

4.1 Socio Demographic Characteristics of the Respondents 45

4.2 Anthropometric Measurement Results and Prevalence of Malnutrition in the Household Surveyed 50

4.3 Association between Related Factors and Malnutrition Status of the Children 54

4.4 Results from Focus Group Discussion 63

CHAPTER V: SUMMARY AND CONCLUSION 66

6.1 Summary 66

6.2 Conclusions 67

REFERENCES 68

ANNEXES 72

LIST OF TABLES AND FIGURES

List of Tables

Table 1: Nutritional situation in Nepal 7
Table 2: Event Time allocated 39
Table 3: Type of family distribution among the respondents 45
Table 4: Distribution of Head of household among respondents 46
Table 5: Caste/Ethnicity wise distribution of the respondents 46
Table 6: Religion wise population distribution of respondents 47
Table 7: Monthly income wise distribution of the respondents 47
Table 8: Paternal occupation of the interviewed households with < 5years of age 48
Table 9: Maternal occupation distribution of interviewed < 5 years child household 48
Table 10: Sex wise distribution of the under five years of children included in study 49
Table 11: Distribution of age and sex of sample 50
Table 12: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex 50
Table 13: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema 51
Table 14: Prevalence of acute malnutrition based on MUAC cut-off (and/or oedema) and by sex 52
Table 15: Prevalence of underweight based on weight-for-age z-scores by sex 52
Table 16: Prevalence of Stunting based on height-for-age z-scores 53
Table 17: Association between socio demographic factors and malnutrition status of the children 54
Table 18: Associated Dietary factors and Dietary Diversity characteristics 56
Table 19: Breastfeeding practices and its association with malnutrition status among the children 58
Table 20: Univariate & Multivariate analysis of factor significant from Chi-Square test 59
Table 21: Association between maternal and child related factors/characteristics and nutritional status of the children 60
Table 22: Association between Wash and Sanitation components and Nutritional Status of the children 62

List of Figures

Figure 1: Conceptual Framework 11

Figure 2: Distribution of Education status of parents of surveyed under five year children 49

Figure 3: Dietary diversity and its association with malnutrition status among the children 57

CHAPTER I - INTRODUCTION

1.1 Background of the Study

Malnutrition remains a significant problem in South Asia, affecting more than 80 million children under the age of 5. South Asia has the highest burden of malnutrition than any other region in the world and relatively few services to address this problem. In this region, as in others, malnutrition manifests itself in different forms—chronic malnutrition or stunting (short for age), acute malnutrition or wasting (low weight for height), and micronutrient deficiencies. Each type of malnutrition carries different risks. For example, while chronic malnutrition and acute malnutrition carry a risk of mortality, the risk for chronically malnourished children is different from the risk for acutely malnourished children. The risk of mortality is greatest for children who are severely acutely malnourished; these children are on the brink of death and are 10 times more likely to die than their well-nourished peers (Lenters et al. 2013). Trends in the prevalence of various forms of malnutrition in South Asia are improving but very slowly. So why does it matter? Because 42 percent of all malnourished children in the world reside in South Asia, the global community cannot eradicate all forms of malnutrition until the prevalence of malnutrition in South Asia is significantly reduced.

The world cannot meet its goals for children, such as the Millennium Development Goal (MDG) targets for child under-nutrition and child mortality, without South Asia meeting those goals first. This report presents a review of the evidence and country experiences in the management of acute malnutrition—one of the most severe forms of malnutrition—in South Asia, followed by a recommended approach for the management of acute malnutrition in Bangladesh. This review focuses on 11 countries in South and Southeast Asia: Afghanistan, Bangladesh, India, Nepal, Pakistan, Sri Lanka, Cambodia, Indonesia, Laos, Myanmar, and Vietnam. These countries were identified based on experience with community-based nutrition programs, geographical representation, potential for cross-country learning, and availability of literature. The variety of approaches in the management of moderate and severe Acute malnutrition were included to provide examples of how different countries in the region have tackled this form of under-nutrition among children 6–59 months of age.

1.1.1 Characteristics of Malnutrition

Under nutrition mainly affects children under 5, who require a diet rich in protein, energy, and micronutrients due to their rapid growth. When households cannot access this diet, children under 5 are likely to suffer the most. For this reason, most interventions around under- nutrition target this age group.

Under -nutrition can take different forms represented by specific anthropometric indicators. These indicators are compared with anthropometric standards from a reference population and expressed in z-score values. For each indicator, z-score values <-3 indicate a severe status, while a z-score value <-2 indicates a moderate status. The two main forms of under-nutrition are stunting and wasting.

- **Stunting** represents a low ratio of height divided by age (height for age [HFA] expressed in z-score). Stunted children are shorter than they should be for their age.
- **Wasting** (also referred to as acute malnutrition) represents a low ratio of weight divided by height (weight for height [WFH] expressed in z-score of the reference population) and/or a low circumference of the middle upper arm (middle upper arm circumference [MUAC] expressed in mm).1 Both approaches to measure wasting provide a measure of extreme thinness and have been demonstrated to be closely associated with increased risk of death: When a child reaches WFH of <-3 z-score or a MUAC of <115 mm, his/her body has consumed most of its fat and muscles to produce energy for basic metabolic functions and does not have any more stores of energy for survival.

Stunting and wasting are often seen in the same areas, sometimes in the same households, and even in the same children. They result from deficiencies in essential micronutrients: Wasting is associated with an acute deficiency that occurred during a short period while stunting is the result of a less acute deficiency over a longer period. The amplitude, frequency, and intensity of the gap in his/her intakes in protein, energy, and micronutrients directly determine the form of malnutrition affecting a child. These intakes are determined by context-specific factors and depend on the interactions of a range of factors, such as the household's food security status, morbidity and access to health services, and care and nutrition practices. The acute deficiency seen in wasted children is not only a result of inadequate food intake in the short term but also is often

triggered by a single infection or recurrent infections, such as diarrhoea or acute respiratory infections (Bhaskaram 2002). Malnutrition and infection are highly synergistic and preventing and reducing the risk of further infection is critical for survival, particularly for severely acutely malnourished children.

1.1.2 Breastfeeding and Infant and Young Child Feeding

Proper feeding of infants and young children can increase their chances of survival; it can also promote optimal growth and development, especially in the critical window from conception to two years of age. Breastfeeding for the first few years of life protects children from infection, provides an ideal source of nutrients, and is economical and safe. However, many mothers don't start to breastfeed early enough, and do not breastfeed exclusively for the recommended six months or stop breastfeeding too soon. There are often tendencies to switch to infant formula, which can contribute to growth faltering and micronutrient malnutrition and can be unsafe if hygienic conditions, including safe drinking water, are not readily available. Studies have shown that, in addition to continued breastfeeding, consumption of nutrient dense, adequate and safe solid, semi-solid and soft foods from the age of six months onwards leads to better health and growth outcomes, with potential to reduce stunting during the first two years of life. UNICEF and WHO recommend that infants be breastfed within one hour of birth, are breastfed exclusively for the first six months of life, and continue to be breastfed for up to two years of age and beyond. Starting at six months, breastfeeding should be combined with nutrient dense and diverse, safe, age-appropriate feeding of solid, semi-solid and soft foods. A summary of key guiding principles for feeding 6-23 month olds is provided in the table below along with proximate measures for these guidelines collected in this survey. The guiding principles for which proximate measures and indicators exist are:

- Continued breastfeeding;
- Appropriate frequency of meals; and
- Appropriate dietary diversity and nutrient content of food.

Feeding frequency is used as proxy for energy intake, requiring children to receive a minimum number of meals/snacks (and milk feeds for non-breastfed children) for their

age. Diet diversity is used to ascertain the adequacy of the nutrient content of the food (not including iron) consumed. For diet diversity, seven food groups were created for which a child consuming at least four of these is considered to have a better quality diet. Food groups used for assessment of this indicator are: (1) grains, roots and tubers; (2) legumes and nuts; (3) dairy products (milk, yogurt, cheese); (4) flesh foods (meat, fish, poultry and liver/organ meats); (5) eggs; (6) vitamin-A rich fruits and vegetables; and (7) other fruits and vegetables. In most populations, consumption of at least four food groups means that the child has a high likelihood of consuming at least one animal-source food and at least one fruit or vegetable, in addition to a staple food (grain, root or tuber).

These three dimensions of child feeding are combined into an assessment of the children who received appropriate feeding, using the indicator of 'minimum acceptable diet'. To have a minimum acceptable diet in the previous day, a child must have received:

- The appropriate number of meals/snacks/milk feeds;
- Food items from at least four food groups; and
- Breast milk or at least two milk feeds (for non-breastfed children).

1.1.3 Management of Acute Malnutrition (Wasting)

Wasting is defined by WFH, MUAC, and oedema status. While WFH and MUAC have significant variations in sensitivity and specificity between regions and populations, each of the three indicators has been demonstrated to be independently associated with an increased risk of death, and because of this, any child identified as wasted by any of these three measures needs immediate treatment. Because each indicator carries a different mortality risk, WHO guidelines still recommend measuring both MUAC and WFH and checking for oedema. The MUAC measure is very effective at identifying acute malnutrition in children, and those whose MUAC is less than 11.5 cm (the cut-off for severe wasting) are at more risk of immediate death than children who meet the WFH cut-off for SAM. Updated guidance on the identification of SAM cases based on the new WHO growth standards was also released through a joint statement by WHO and UNICEF in 2009 (WHO and UNICEF 2009).There is emerging evidence of

discrepancies between MUAC and WFH indicating that these measures are not equivalent and neatly overlapped in the same population. In fact the prevalence of severe wasting measured by WFH can be almost double that of the prevalence of severe wasting measured by MUAC. More evidence on this discrepancy in the two measures is needed because this has implications for the number of children who need to be treated for SAM using ready-to use therapeutic foods.

1.2 Rationale of the Study

1.2.1 Overview of the Nutrition Situation in South Asia

Under-nutrition encompasses stunting, wasting, underweight, and deficiencies of essential vitamins and minerals (collectively referred to as micronutrients) and is caused by a combination of factors such as a diet lacking in sufficient nutrients and the occurrence of infectious diseases such as diarrhoea.

While the past decade has witnessed many development successes—including worldwide reductions in child and maternal mortality, increased vaccination rates, and increasing education for women—levels of under-nutrition have remained high, especially in South Asia. Based on current population and prevalence estimates, more than 80 million children in South Asia are chronically malnourished, and 32 million are moderately or severely acutely malnourished. Trends for this region show that while there has been improvement overall, the rate of improvement within the region varies. Most countries, excluding Sri Lanka, have a high prevalence of under-nutrition, and the rate of improvement has been slowing in recent years.

Undernourished children are at a substantially increased risk of death. All forms of moderate and severe malnutrition account for 40 percent to 50 percent of all deaths in children under 5 years of age (Uauy et al. 2012). SAM is one of the top three nutrition-related causes of death in children under 5.

The underlying determinants of malnutrition in South Asia are manifold and in some respects multiplicative (Ikeda et al. 2013, Haddad and Gillespie 2003). For example, high population density combines with poverty, inadequate purchasing power that undermines food access, lack of hygiene and sanitation at the community and household

level, and other factors to keep the prevalence of malnutrition (specifically stunting and wasting) virtually unchanged.

1.2.2 Wasting Situation in South Asia

The South Asia region has the world's highest prevalence of wasting. Recent joint estimates (Table 3) from UNICEF, the World Health Organization (WHO), and the World Bank show that globally 52 million children under 5 are moderately or severely wasted; 28 million of those children, or 54 percent, are in South Asia. However, based on current under-5 population estimates, that number is closer to 32 million. From 1990 to 2011, the prevalence of wasting in South Asia declined from 18 percent to 15 percent in 2011, but the actual number of children affected remains largely unchanged at 32 million. It is disheartening that after 21 years, the same number of children are affected by wasting. This is partly attributable to the lack of both sustained programming on preventive nutrition that reaches all children in need and programming targeted at children who are moderately or severely wasted.

The different forms of malnutrition are present to varying degrees across all developing regions, but South Asia's pattern of malnutrition consists of a high prevalence of stunting and wasting. In other regions such as sub-Saharan Africa, the prevalence of wasting is significantly lower and has consistently been low compared to South Asia. Yet programs tackling acute malnutrition in sub-Saharan Africa have been reasonably successful, even when implemented on a small scale.

1.2.3 Nutrition Situation in Nepal

According to NDHS 2016, Thirty-six percent of children under age 5 are stunted, 10% are wasted, 27% are underweight, and 1% are overweight. Fifty-five percent of children under age 2 are breastfed within 1 hour of birth, and 66% of children under age 6 months are exclusively breastfed. Forty-seven percent of children age 6-23 months receive meals with the minimum recommended diversity (at least four food groups), 71% receive meals at the minimum frequency, and 36% meet the criteria of a minimum acceptable diet. During the 6 months before the survey, 86% of children age 6-59 months received a vitamin A capsule, and 76% of children age 12-59 months received

deworming medication. More than half (53%) of the children age 6-59 months and 41% of the women age 15-49 are anaemic. Nutritional status of adults: Eleven percent of women age 15-49 are short (less than 145 cm), and 17% are thin (BMI less than 18.5). Another 22% of women are overweight or obese. Among men, 17% percent are thin, and 17% are overweight or obese. Forty-two percent of women age 15-49 with a child born in the past 5 years took iron tablets for at least 180 days, and 69% took deworming medication during the pregnancy of their last child. Ninety-five percent of households use iodized salt for cooking.

Table 1: Nutritional situation in Nepal

	Data Source & Year	Weight for Age (underweight)		Height for Age (stunting)		Weight for Height (wasting)	
		% <-2 z-score	% <-3 z-score	% <-2 z-score	% <-3 z-score	% <-2 z-score	% <-3 z-score
Nepal	NDHS 2011	29	8	40	16	11	3
Nepal	NMICS 2014	30.1	8.6	37.4	15.8	11.3	3.2
Central Hill	NMICS 2014	16.7	1.6	27.7	11.5	5.9	2.1
Province 1	NDHS 2016	24.4	4.1	32.6	9.3	11.8	0.9
Province 2	NDHS 2016	36.8	7.9	37.0	12.7	14.4	3.0
Province 3	NDHS 2016	13.3	3.4	29.4	10.4	4.2	1.3
Province 4	NDHS 2016	14.9	2.6	28.9	10.1	5.8	1.6
Province 5	NDHS 2016	27.2	4.4	38.5	11.4	7.6	1.4
Province 6	NDHS 2016	35.6	10.8	54.5	24.9	7.5	2.2
Province 7	NDHS 2016	28.1	4.2	35.9	11.0	9.3	1.5

Source: NDHS 2011 and NMICS 2014

1.3 Objectives

1.3.1 General Objective

- To assess the Socio demographic differentials of malnutrition in children under 5 years of age and determine its causes.

1.3.2 Specific Objectives

- To assess the socio demographic differentials of the children under 5 years of age.
- To assess the anthropometric measurements of the children under 5 years of age.
- To determine dietary diversity of the children under 5 years of age.
- To assess the Breastfeeding practices of the children.
- To determine the causes of Acute Malnutrition in children under 5 years of age.

1.4 Research Questions

- What is the nutritional status of under five children and associated factors in selected community of Nuwakot district?
- What causes determine the malnutrition in children under 5 years of age?
- What are the socio demographic differentials that affect malnutrition in children under 5 years of age?

1.5 Research Hypothesis

1.4.1 Hypothesis 1

H_o: there is no significant difference between the gender and prevalence of Malnutrition.

H_1: there is significant difference between the gender and prevalence of Malnutrition

1.4.2 Hypothesis 2

H_o: there is no significant difference between the maternal education and prevalence of Malnutrition.

H_1: there is significant difference between the maternal education and prevalence of Malnutrition

1.4.3 Hypothesis 3

H_o: there is no significant difference between the cultural practices among different castes and prevalence of Malnutrition.

H_1: there is significant difference between the cultural practices among different castes and prevalence of Malnutrition

1.4.4 Hypothesis 4

H_o: there is no significant difference between the breastfeeding practices and prevalence of Malnutrition.

H_1: there is significant difference between the breastfeeding practices and prevalence of Malnutrition

1.6 Statement of the Problem

Malnutrition, defined as underweight, is a serious public-health problem that has been linked to a substantial increase in the risk of mortality and morbidity. Women and young children bear the brunt of the disease burden associated with malnutrition.

In Africa and south Asia, 27−51% of women of reproductive age are underweight (ACC/SCN, 2000), and it is predicted that about 130 million children will be underweight in 2005 (21% of all children). Many of the 30 million low-birth-weight babies born annually (23.8% of all births) face severe short-term and long-term health consequences.

Rates of malnutrition worldwide show no sign of decreasing. In fact, recent analysis predicts that an extra 100 million people will be starving by 2015, a sobering projection considering the United Nation's millennium development goal to halve the worldwide rate of malnutrition by that year. The challenge of addressing malnutrition lies in its complicated causes and the complex interplay of individual, maternal, familial, societal, political and environmental forces that initiate and perpetuate malnutrition.

Endemic poverty is perhaps the one feature common to almost all causes of malnutrition. Over 2 billion people live on less than $2 a day, and many rely on small plots of land as their main source of food and income. Without savings, and when harvests fail from drought or deluge, malnutrition is inevitable. Political systems can also perpetuate malnutrition. Violent conflict disrupts food production and distribution, while despotic leadership, poor governance and widespread corruption undermine efforts to precipitate positive change. Secondary contributors to malnutrition are also evident. Over a billion people cannot access clean water, and preventable and treatable infectious diseases weaken millions. Childhood immunization rates for common

diseases such as measles and whooping cough are still alarmingly low in many poorer countries, while high prenatal and maternal morbidity and mortality from malnutrition perpetuate a generational cycle of poverty and hunger. Treating malnutrition once it has been recognized and when resources have been provided is relatively straightforward. Anthropometric surveys can be conducted rapidly, and therapeutic feeding centres constructed and put into operation. In addition to food supplementation, initiatives to combat vitamin A, iron and iodine deficiencies are required. Creative work by nongovernmental organizations has shown that large groups of children experiencing PEM can receive treatment in community-based therapeutic care programs with good outcomes. Simple and locally driven nutrition supplementation initiatives that focus on undernourished pregnant women have had positive effects on subsequent infant and childhood morbidity and mortality figures.3 The World Food Programme has been established to collect food from donor countries and oversee its distribution to international and local nongovernmental organizations in "Food for Life, Food for Growth, and Food for Work" programs.

The prevention of malnutrition is a global collective problem. Providing food and medical care to malnourished populations is but a stopgap measure. Generating real change will only come after a united global community creates peaceful and imaginative solutions. A commitment to invest in and support universal education, health care initiatives and sustainable agricultural efforts, and to reduce trade barriers and offer debt relief is paramount.

The time to begin is now.

1.7 Conceptual Framework

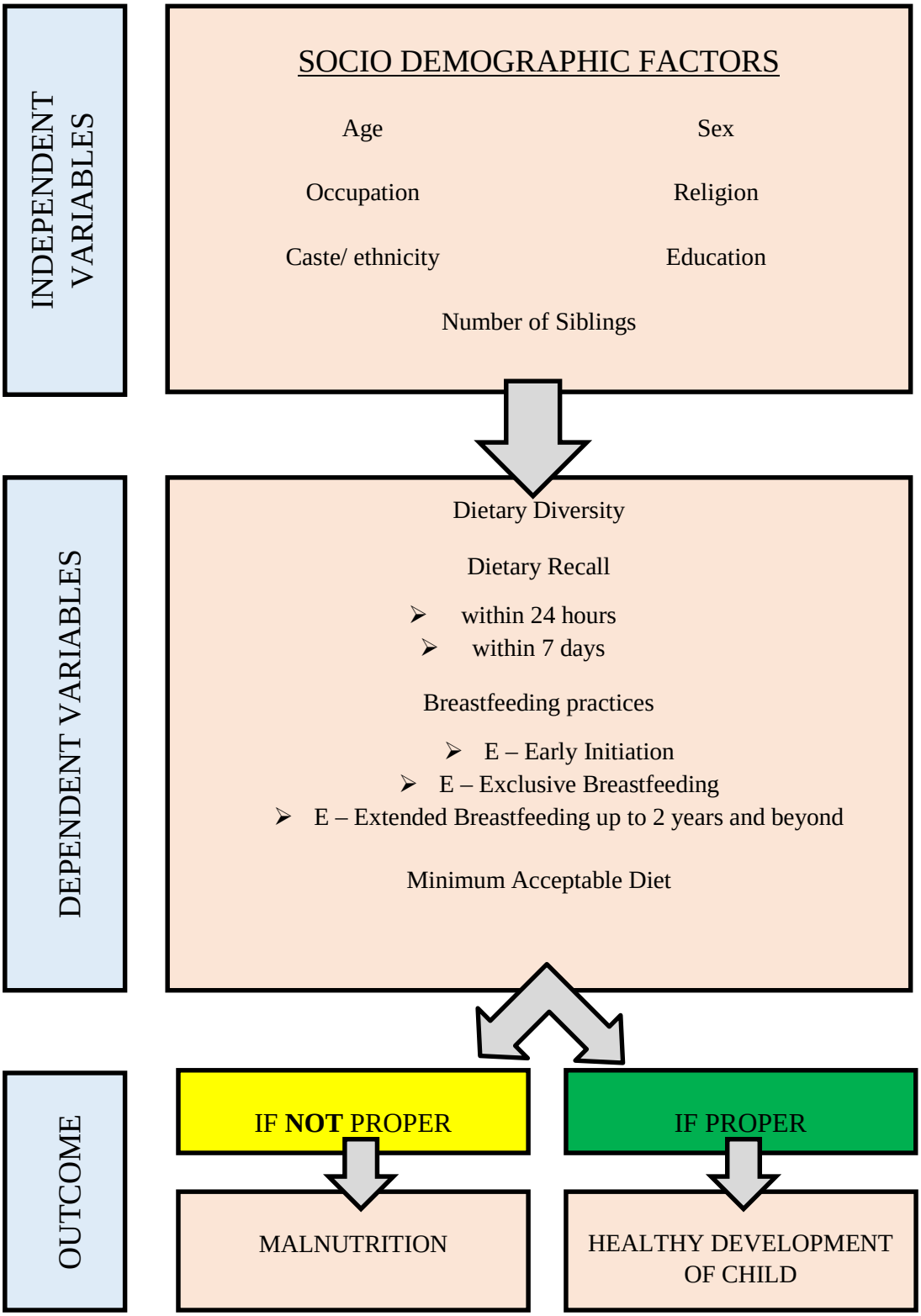


Figure 1: Conceptual Framework

Variable are any characteristics, number, or quantity that can be measured or counted. A variable may also be called a data item.

Independent variables are variables that are manipulated or are changed by researchers and whose effects are measured and compared. The other name for independent variables is Predictor(s). The independent variables are called as such because independent variables predict or forecast the values of the dependent variable in the model.

The other variable(s) are also considered the dependent variable(s). The dependent variables refer to that type of variable that measures the effect of the independent variable(s) on the test units. We can also say that the dependent variables are the types of variables that are completely dependent on the independent variable(s). The other name for the dependent variable is the Predicted variable(s).

In the above framework the researcher intends to see if the dependent variables and the independent variables influence the outcome or not. Independent variables like age, sex, occupation, religion, caste/ethnicity, education and dependent variables like Dietary diversity, Dietary recall, breastfeeding practices if happen to be proper then the outcome will be healthy child else the child becomes malnourished.

CHAPTER II- LITERATURE REVIEW

2.1 Sociology of Malnutrition

Human resource development begins from the stage of conception of the child and could relate to the following developmental stages: pre-natal, postnatal, infancy, childhood, teenage, youth, adult and old age. During these stages the most important aspect to be attended to is health and nutrition of the child. These would take care of the rest of the development. To fail to protect young children at the critical ages of their growth and development is to wreak lasting damage on a whole generation, the results of which may well have effects on economic development and welfare for decades ahead. Pertinently the World Health Organization views health as *a state of complete physical, mental and social well-being and not merely as the absence of disease or infirmity'. Thus Health is not merely a biological phenomenon, it is equally related to the social phenomena.

The recognition of the fact that the health of an Individual is more than a biological phenomenon has brought into forefront the significance of behavioural dimensions of health.

Accordingly several sociologists in western countries have endeavoured to study the problem of Health in relation to Individual and Society and have contributed to the field Medical Sociology by proposing new concepts and by making useful observations. Here an attempt is made to review briefly these efforts.

First of all Hyman (1968) makes distinction between two types of sociologists. One set of them utilizing the medical settings as convenient "strategic" places for the testing of general sociological theories and the other involved in the application of sociological theory and research to the solution of medical problems.

He considers the first category of sociologists as with deductive* orientation and the second with inductive* orientation. Mechanic (1978) observed that as a consequence of cultural relativism every society views health problems from the perspective of its own culture and provides coping responses according to the understanding, knowledge, values, attitudes and beliefs of the people.

Kark Sidney (1974) viewed that, all communities have their concepts of health integrated as part of the total culture. Associated with its values and beliefs about health, every community has its well established ways of maintaining health, preventing disease, and treating the sick-people differ in their daily functioning, their status and roles and in the way they relate with one another. Inability to fulfil normal expectations in these respects, whatever the expectations are for different people in various communities, is often a reflection of illness.

S.R.Mehta (1934) points out that the health needs of people are related to the community social structure and would change according to the changes observed in it. The health behaviour of an individual to a large extent, will be determined by the attitude, motive and normative pattern often influenced by the social, psychological, cultural and economic factors operating within and without the social structure of the community or society. Cockerham (1978) considers that each society's definition of illness becomes institutionalized within its cultural patterns, so that one measure of social development is a culture's conception of illness.

Dingwall (1976) observed that illness may be viewed as a form of failure at everyday life, a disruption in the 'familiar and taken for granted' state of affairs between subjective experience of one's own body and one's knowledge of what is normal experience or conduct determined by a competent member of some collectivity. Thus ethno medicine considers medical knowledge invoked by the physician to interpret a patient's behaviour identical to the knowledge invoked by a lay person to any other person's behaviour or conduct.

Dorrian Apple (1960) noted that Layperson's judgements about whether or not a person is sick based upon two criteria; i) the regency or novelty of the experience, behaviour or attribute; and ii) the degree to which the experience Interferes with normal activities*

2.1.1 Sociological Concepts

The prominent conceptual explanations in regard to illness and illness-behaviour, or sick role are functionalist theory (Talcott Parsons i 1951); labelling theory (Howard Becker s 1973); Health Belief Model (Rosenstook: 1966). According to Functionalist

theory, illness is dysfunctional because it threatens to interfere with the stability of the social system. This analytical approach is the basis for Parson's theory of the sick role'. Talcott Parsons (1951) is the first one to view illness as deviance and to postulate his concept of the sick role* Illness can be viewed as a deviant social state brought, about by disruption of normal behaviour through disease* The basis on which illness has been defined as a deviant behaviour violating the social norms within a given social system* This functionalist approach to deviance through the concept of Parson's "sick-role" views sickness as disturbance in the "normal" condition of the human being* both biologically and socially* (Parsons 1951)* Parsons (1951) postulates that being sick is not Just experiencing the physical condition of a sick state* rather it constitutes a social role since it involves behaviour based on institutional expectations and is reinforced by the norms of society corresponding to these expectations.

Howard Becker's (19b3) "Labelling Theory" is based on the concept that what is regarded as deviant behaviour by one person or social group may not be so regarded by other persons or social groups. In the process of seeking medical care two persons having similar symptom may behave differently.

According to Rosenstock's (1966) "Health Belief Model" an individual's perception that he or she is personally susceptible and that the occurrence of the disease would have severe implication of the personal nature motivate him or her to go in for preventive practices to avoid illness.

In the sociological studies on Health, the relationship between unequal stratification system and Health status gained considerable importance in the west Good health is an obviously important human condition, but unfortunately for those toward the bottom of the stratification system good health is to some degree unequally distributed through the stratification system. There are two basic reasons for this, first adequate health care is unequally distributed and second conditions promoting better health are unequally distributed.

A second reason good health is unequally distributed is that a low income often means poor nutrition, less sanitary living conditions and less knowledge about how to maintain better health. A lower position in the stratification system means a more unhealthy work

environment (Herbo, 1983)* the relationship between unequal distribution of income and health shows that chronic diseases are more prevalent among those with lower incomes. Further that the number of days per year people are disabled due to illness is strongly related to income. In short along with an unequal distribution of income the stratification system also operates to distribute good health unequally (Herbo, 1983)* an unequal distribution of good health can be found in a number of statistics. For example infant mortality is an often used indicator because it is a condition that can be reduced with better medical care. The data shows lower the income, higher the infant mortality rate in the United States. Furthermore, it is important note that with the best medical technology and knowledge in the world, the United States has a relatively high infant mortality rate among industrialized nations. A prime reason for this poor standing by the United States may be that its distribution of medical care is based more on the ability to pay than on need (Herbo, 1983).

2.1.2 Sociology of Health and Illness

The sociology of health and illness, alternatively the sociology of health and wellness (or simply health sociology), examines the interaction between society and health. The objective of this topic is to see how social life affects morbidity and mortality rate, and vice versa. This aspect of sociology differs from medical sociology in that this branch of sociology discusses health and illness in relation to social institutions such as family, employment, and school. The sociology of medicine limits its concern to the patient-practitioner relationship and the role of health professionals in society. The sociology of health and illness covers sociological pathology, reasons for seeking particular types of medical aid, and patient compliance or noncompliance with medical regimes.

Health, or lack of health, was once merely attributed to biological or natural conditions. Sociologists have demonstrated that the spread of diseases is heavily influenced by the socioeconomic status of individuals, ethnic traditions or beliefs, and other cultural factors. Where medical research might gather statistics on a disease, a sociological perspective on an illness would provide insight on what external factors caused the demographics who contracted the disease to become ill.

This topic requires a global approach of analysis because the influence of societal factors varies throughout the world. This will be demonstrated through discussion of the major diseases of each continent. These diseases are sociologically examined and compared based on the traditional medicine, economics, religion, and culture that is specific to each region. HIV/AIDS serves as a common basis of comparison among regions. While it is extremely problematic in certain areas, in others it has affected a relatively small percentage of the population. Sociological factors can help to explain why these discrepancies exist.

There are obvious differences in patterns of health and illness across societies, over time, and within particular society types. There has historically been a long-term decline in mortality within industrialized societies, and on average, life-expectancies are considerably higher in developed, rather than developing or undeveloped, societies. Patterns of global change in health care systems make it more imperative than ever to research and comprehend the sociology of health and illness. Continuous changes in economy, therapy, technology and insurance can affect the way individual communities view and respond to the medical care available. These rapid fluctuations cause the issue of health and illness within social life to be very dynamic in definition. Advancing information is vital because as patterns evolve, the study of the sociology of health and illness constantly needs to be updated.

History of Sociology of Health and Illness

Wall painting found in the tomb of an Egyptian official known as the physician's tomb. Humans have long sought advice from those with knowledge or skill in healing. Paleopathology and other historical records, allow an examination of how ancient societies dealt with illness and outbreak. Rulers in Ancient Egypt sponsored physicians that were specialists in specific diseases. Imhotep was the first medical doctor known by name. An Egyptian who lived around 2650 B.C., he was an adviser to King Zoser at a time when Egyptians were making progress in medicine. Among his contributions to medicine was a textbook on the treatment of wounds, broken bones, and even tumours.

Stopping the spread of infectious disease was of utmost importance for maintaining a healthy society. The outbreak of disease during the Peloponnesian War was recorded

by Thucydides who survived the epidemic. From his account it is shown how factors outside the disease itself can affect society. The Athenians were under siege and concentrated within the city. Major city centres were the hardest hit. This made the outbreak even more deadly and with probable food shortages the fate of Athens was inevitable. Approximately 25% of the population died of the disease. Thucydides stated that the epidemic "carried away all alike". The disease attacked people of different ages, sexes and nationalities.

Physician in ancient Greece treating a patient 480–470 BC, ancient medical systems stressed the importance of reducing illness through divination and ritual. Other codes of behaviour and dietary protocols were widespread in the ancient world. During the Zhou Dynasty in China, doctors suggested exercise, meditation and temperance to preserve one's health. The Chinese closely link health with spiritual well-being. Health regimes in ancient India focused on oral health as the best method for a healthy life. The Talmudic code created rules for health which stressed ritual cleanliness, connected disease with certain animals and created diets. Other examples include the Mosaic Code and Roman baths and aqueducts.

Those that were most concerned with health, sanitation and illness in the ancient world were those in the elite class. Good health was thought to reduce the risk of spiritual defilement and therefore enhanced the social status of the ruling class who saw themselves as the beacon of civilization. During the late Roman Period, sanitation for the lower classes was a concern for the leisured class. Those that had the means would donate to charities that focused on the health of non-elites. After the decline of the Roman Empire, physicians and concern with public health disappeared except in the largest cities. Health and public doctors remained in the Byzantine Empire. Focusing on preventing the spread of diseases such as small pox lead to a smaller mortality rate in much of the western world. Other factors that allowed the modern rise in population include: better nutrition and environmental reforms (such as getting clean water supplies).

The present day sense of health being a public concern for the state began in the middle ages. A few state interventions include maintaining clean towns, enforcing quarantines

during epidemics and supervising sewer systems. Private corporations also played a role in public health. The funding for research and the institutions for them to work were funded by governments and private firms. Epidemics were the cause of most government interventions. The early goal of public health was reactionary whereas the modern goal is to prevent disease before it becomes a problem. Despite the overall improvement of world health, there still has not been any decrease in the health gap between the affluent and the impoverished. Today, society is more likely to blame health issues on the individual rather than society as a whole. This was the prevailing view in the late 20th century. In the 1980s the Black Report, published in the United Kingdom, went against this view and argued that the true root of the problem was material deprivation. This report proposed a comprehensive anti-poverty strategy to address these issues. Since this did not parallel the views of the Conservative government, it did not go into action immediately. The Conservative government was criticized by the Labour Party for not implementing the suggestions that the Black Report listed. This criticism gave the Black Report the exposure it needed and its arguments were considered a valid explanation for health inequality. There is also a debate over whether poverty causes ill-health or if ill-health causes poverty. Arguments by the National Health Service gave considerable emphasis to poverty and lack of access to health care. It has also been found that heredity has more of a bearing on health than social environment, but research has also proved that there is indeed a positive correlation between socioeconomic inequalities and illness.

More recently, sociological studies following a life course perspective in health emphasized the limitations of the view linking health outcomes on individual agency only.

Methodology of Sociology of Health and Illness

The Sociology of Health and Illness looks at three areas: the conceptualization, the study of measurement and social distribution, and the justification of patterns in health and illness. By looking at these things researchers can look at different diseases through a sociological lens. The prevalence and response to different diseases varies by culture. By looking at bad health, researchers can see if health affects different social

regulations or controls. When measuring the distribution of health and illness, it is useful to look at official statistics and community surveys. Official statistics make it possible to look at people who have been treated. It shows that they are both willing and able to use health services. It also sheds light on the infected person's view of their illness. On the other hand, community surveys look at people's rating of their health. Then looking at the relation of clinically defined illness and self-reports and find that there is often a discrepancy.

A great deal of the time, mortality statistics take the place of the morbidity statistics because in many developed societies where people typically die from degenerative conditions, the age in which they die sheds more light on their life-time health. This produces many limitations when looking at the pattern of sickness, but sociologists try to look at various data to analyse the distribution better. Normally, developing societies have lower life expectancies in comparison to developed countries. They have also found correlations between mortality and sex and age. Very young and old people are more susceptible to sickness and death. On average women typically live longer than men, although women are more likely to have bad health.

Disparities in health were also found between people in different social classes and ethnicities within the same society, even though in the medical profession they put more importance in “health related behaviours” such as alcohol consumption, smoking, diet, and exercise. There is a great deal of data supporting the conclusion that these behaviours affect health more significantly than other factors. Sociologists think that it is more helpful to look at health and illness through a broad lens. Sociologists agree that alcohol consumption, smoking, diet, and exercise are important issues, but they also see the importance of analysing the cultural factors that affect these patterns. Sociologists also look at the effects that the productive process has on health and illness. While also looking at things such as industrial pollution, environmental pollution, accidents at work, and stress-related diseases.

Social factors play a significant role in developing health and illness. Studies of epidemiology show that autonomy and control in the workplace are vital factors in the ethology of heart disease. One cause is an effort-reward imbalance. Decreasing career

advancement opportunities and major imbalances in control over work have been coupled with various negative health costs. Various studies have shown that pension rights may shed light on mortality differences between retired men and women of different socioeconomic statuses. These studies show that there are outside factors that influence health and illness.

2.1.3 Social Behaviour

Social behaviour is behaviour among two or more organisms within the same species, and encompasses any behaviour in which one member affects the other. This is due to an interaction among those members. Social behaviour can be seen as similar to an exchange of goods, with the expectation that when you give, you will receive the same. This behaviour can be effected by both the qualities of the individual and the environmental (situational) factors. Therefore, social behaviour arises as a result of an interaction between the two—the organism and its environment. This means that, in regards to humans, social behaviour can be determined by both the individual characteristics of the person, and the situation they are in.

A group of women gathered around, talking. This is an example of social behaviour. A major aspect of social behaviour is communication, which is the basis for survival and reproduction. Social behaviour is said to be determined by two different processes that can either work together or oppose one another. The dual-systems model of reflective and impulsive determinants of social behaviour came out of the realization that behaviour cannot just be determined by one single factor. Instead, behaviour can arise by those consciously behaving (where there is an awareness and intent), or by pure impulse. These factors that determine behaviour can work in different situations and moments, and can even oppose one another. While at times one can behave with a specific goal in mind, other times they can behave without rational control, and driven by impulse instead.

There are also distinctions between different types of social behaviour, such as mundane versus defensive social behaviour. Mundane social behaviour is a result of interactions in day-to-day life, and are behaviours learned as one is exposed to those

different situations. On the other hand, defensive behaviour arises out of impulse, when one is faced with conflicting desires.

The Development of Social Behaviour

Social behaviour constantly changes as one continues to grow and develop, reaching different stages of life. The development of behaviour is deeply tied with the biological and cognitive changes one is experiencing at any given time. This creates general patterns of social behaviour development in humans. Just as social behaviour is influenced by both the situation and an individual's characteristics, the development of behaviour is due to the combination of the two as well—the temperament of the child along with the settings they are exposed to.

Culture (parents and individuals that influence socialization in children) play a large role in the development of a child's social behaviour, as the parents or caregivers are typically those who decide the settings and situations that the child is exposed to. These various settings the child is placed in (for example, the playground and classroom) form habits of interaction and behaviour insomuch as the child being exposed to certain settings more frequently than others. What takes particular precedence in the influence of the setting are the people that the child must interact with—their age, sex, and at times culture.

Emotions also play a large role in the development of social behaviour, as they are intertwined with the way an individual behaves. Through social interactions, emotion is understood through various verbal and nonverbal displays, and thus plays a large role in communication. Many of the processes that occur in the brain and underlay emotion often greatly correlate with the processes that are needed for social behaviour as well. A major aspect of interaction is understanding how the other person thinks and feels, and being able to detect emotional states becomes necessary for individuals to effectively interact with one another and behave socially.

As the child continues to gain social information, their behaviour develops accordingly. One must learn how to behave according to the interactions and people relevant to a certain setting, and therefore begin to intuitively know the appropriate form of social

interaction depending on the situation. Therefore, behaviour is constantly changing as required, and maturity brings this on. A child must learn to balance their own desires with those of the people they interact with, and this ability to correctly respond to contextual cues and understand the intentions and desires of another person improves with age. That being said, the individual characteristics of the child (their temperament) is important to understanding how the individual learns social behaviours and cues given to them, and this learnability is not consistent across all children.

2.1.4 Malnutrition: A Political Problem

In Niger, malnutrition is a chronic situation, not an exceptional emergency. Over the past six months, in 13 of MSF's largest malnutrition programmes, MSF treated over 10,000 people, the large majority of whom (88%) were children under the age of five. The nutritional programmes considered are in Sudan, the Democratic Republic of the Congo (DRC), Liberia, Ivory Coast and Niger. Dr Milton Tectonidis, the doctor in charge of malnutrition issues at MSF headquarters in Paris, France, has watched the developments in managing malnutrition and says that, far from being inevitabitale, malnutrition is often the result of political decisions. Dr. Tectonidis, has surveyed the information gathered from January to June 2004 from the selected projects to try and draw some lessons indicated by the results gathered. This work has once again demonstrated the political nature of malnutrition, and evaluated the development of MSF's management of malnutrition. "In all these cases, except for Niger, malnutrition is the result of a conflict involving massive population displacements," Dr. Tectonidis said. Between January and June 2004, MSF received nearly 9,000 children under the age of five into our therapeutic management programs for severe malnutrition in the selected project sites. Instability and malnutrition are strongly correlated. The two most unstable situations, namely the Sudan and the DRC, are also where MSF's nutritional activities are the most concentrated. "In northern Sudan, in Bentiu, the constant instability aggravates the food and sanitation situation. However, in our therapeutic nutritional centre (TNC) in Akuem, in the southern part of the country, we have seen a drop in admissions in 2004, since the past two years of stability have allowed for good harvests in 2003," explained Dr. Tectonidis. As for Darfur, the violence and mass

exoduses have had serious consequences on the food supply. In certain refugee camps, the high malnutrition rate among children under five has reached 25%.

The fluctuation in admission rates in the TNCs according to combats or periods of stability is also blatant in the DRC. "After the army retook the city of Mukubu, admissions dropped and we closed the TNC. However, in the city of Kayna, in North Kivu, currently one of the most instable regions in the country, the food situation is extremely serious ", said Dr. Tectonidis. MSF TNCs have, on average, five admissions a day, and what is being seen is considered alarming: "60% of patients suffer from kwashiorkor (malnutrition complicated by major deficiencies in vitamins and micronutrients) and many adults suffer from severe malnutrition", he said. Structural malnutrition: Do not sacrifice the present to ensure the future.

There are countries where malnutrition is related to structural causes (natural factors, extreme poverty, carelessness on the part of the government, etc.). In Niger, the MSF's program in Maradi managed nearly 13,000 patients between August 2001 and August 2003. During the first six months of 2004, 3,245 children were admitted to the centre. The long-term solutions proposed to remedy the chronic lack of food often rests on major development projects. "On the one hand, I fear that these projects are simply paying lip service; on the other hand, it is unacceptable to sacrifice the present to ensure the future. While we wait for development in the next 20 years, now is the time that malnourished children need our help", Dr. Tectonidis said. "Lastly, to quote what Amartya Sen, Nobel Prize Winner in Economics, said, "There is no such thing as an apolitical food problem" (Poverty and Famines: An Essay on Entitlement and Deprivation, Amartya Sen, Oxford: Clarendon Press, 1981.)

Hunger and Malnutrition in the 21st Century

Despite record food output globally, hunger is still with us. Patrick Webb and colleagues argue that key policy actions are urgently needed to tackle this scourge and must focus on improving diet quality for all

Today’s world is characterised by the coexistence of agricultural bounty and widespread hunger and malnutrition. Recent years have seen a reversal of a decades old

trend of falling hunger, alongside the re-emergence of famine. National and global evidence shows that ensuring an adequate food supply is still an important contribution to eradicating hunger. However, generating more food in the form of staple grains or tubers is not enough. Good nutrition and an end to hunger both require everyone to have an appropriate diet. How can that be achieved?

Characterising the Problem

A recent report for the World Committee on Food Security argued that "malnutrition in all its forms—not only hunger, but also micronutrient deficiencies, as well as overweight and obesity—is … a critical challenge not only in the developing but also in the developed countries. Resolving malnutrition requires a better understanding of the determinants and processes that influence diets." Malnutrition ranges from extreme hunger and undernutrition to obesity. Furthermore, malnutrition is found in all countries, irrespective of their economic development, where people lack high quality diets. Thus, solutions to hunger and to all forms of malnutrition need to focus on ensuring an adequate supply of food, but equally, on the quality of diets.

Today, risk factors for ill health associated with poor quality diets are the main causes of the global burden of disease. Low quality diets lack key vitamins, minerals (micronutrients), and fibre or contain too many calories, saturated fats, salt, and sugar. In 2010, dietary risk factors combined with physical inactivity accounted for 10% of the global burden of disease (measured as disability adjusted life years, which reflect the number of years lost due to ill health, disability, or early death). By 2015, six of the top 11 global risk factors were related to diet, including undernutrition, high body mass index (BMI), and high cholesterol. Where governments have invested the economic gains derived from rising productivity in safety nets and services accessible to the poor, this has resulted in national growth. However, where poverty persists, including in rich nations, hunger also persists.

Several Faces of Hunger

Hunger is a broad unscientific term that relates to nutrition and health outcomes in various ways. The proportion of people defined as hungry over the long term (usually

termed “chronically undernourished”) fell from 18.6% globally in 1990-2002 to under 11% in 2014. That was a decline of 211 million people while the world’s population increased by 2 billion. Big gains were made in large countries like China and in Brazil, Ethiopia, and Bangladesh. South America was particularly successful, reducing undernourishment by over 50% in 25 years. Such gains were made possible largely by rapid reduction of poverty, rising levels of literacy, and health improvements that reduced preventable child mortality.

Famine is the most acute face of hunger. Over 70 million people died in famines during the 20th century. Most deaths occurred in human induced crises, in which political mismanagement, armed conflict, and discrimination of marginalised political or ethnic groups compounded the effects of environmental shocks, such as droughts or locust invasions. Deaths from famine fell from the mid-1980s onwards. However, as of 2017 four countries were again struggling to cope: Somalia, Yemen, South Sudan, and Nigeria. In each case, instability induced by conflict, terrorism, drought and decades of failed governance have left over 20 million people facing famine, including 1.4 million children “at imminent risk of death.”

A major cause of mortality in famines is children becoming severely wasted. Around 52 million children were wasted in 2016, of whom around 70% (36 million) resided in Asia. Roughly 12.6% of deaths among children under 5 are attributed to wasting worldwide. Although wasting has declined, progress has been slow and some countries have seen a rise, including Pakistan and India. Many of the drivers of wasting are often the same as for stunting—namely, low birth weight, lack of exclusive breast feeding, poor hygiene and sanitation, and infectious disease. While wasting is one sign of acute hunger, stunting (being too short for one’s age) represents chronic distress. Around 151 million preschool children were stunted in 2017, down from 200 million at the turn of the 20th century. Improvements were made in east Asia, including China (today reporting a prevalence of only 6% compared with the global mean of 23%) and Bangladesh as well as in Latin America. Nevertheless, South Asia and East and Central Africa all still had rates over 32% in 2017.

Coexisting Forms of Malnutrition Related to Diet

The coexistence of multiple forms of malnutrition is a global phenomenon. That is, wasting often coexists with stunting in the same geographical areas, and can be found simultaneously in children. For example, around 9% of children in India exhibit both conditions, while the rate in parts of Ghana is reported to be >3%. Many countries with a high prevalence of stunting have made limited progress in achieving annual average rates of reduction required to meet global targets. For example, Timor Leste needs an annual reduction of around 5% to reduce stunting by 40% by 2030, but its current reduction rate is barely above zero.9 Ethiopia also needs an annual average rate of reduction of 5%, but continues to remain at 3%.

Part of the reason for slow progress lies in overlapping micronutrient deficiencies. Inadequate supply of energy and protein both impair a child's growth, but micronutrient deficiencies also have a role. It has been estimated that roughly 2 billion people, or about 29% of the world's population, faced micronutrient deficiencies in 2010. Micronutrient deficiencies are also widely present in high income countries. For example, childhood anaemia in 2010 was 26% in the Russian Federation and in Georgia, and 16%, on average, across the European Union.

Obesity is conventionally associated with food excess, but it is also associated with micronutrient deficiencies and even with daily hunger, as shown for Malaysia, Canada, and Iran. Indeed, people with obesity can be prone to deficiencies of micronutrients, such as zinc, iron, and vitamins A, C, D, and E. Between 1990 and 2010, the prevalence of adults with a high BMI in sub-Saharan Africa tripled. At the same time, hypertension increased by 60%, and the prevalence of high blood glucose rose nearly 30%. The prevalence of overweight and obesity among South Asian women is almost the same today as the prevalence of underweight. Pacific and Caribbean islands and countries in the Middle East and Central America have reached extremely high rates of adult overweight and obesity. Some have a prevalence as high as 80% (e.g., Tonga, 84% for men, 88% for women).

Many countries today face the dual burden of rising rates of female obesity with continuing high rates of maternal underweight. The latter matters because of ill effects on the mother and on the unborn child. Roughly 30% of stunting by a child's 3rd

birthday can be attributed to being born small for gestational age, which is linked to nutrition before birth and health problems of the mother. Not only is maternal underweight still more prevalent than overweight in rural parts of South Asia and sub-Saharan Africa but adult female underweight rose recently in Senegal, Madagascar, and Mali, mainly in urban settings.

Thus, actions are needed in all countries around the world to deal with undernutrition, micronutrient deficiencies, and overweight and obesity simultaneously. No country is exempt. “Triple duty” investments are needed everywhere because wealth and food sufficiency will not in themselves resolve the problems of low quality of diets.

Effective Actions to Tackle Hunger and Malnutrition

In 2016, the world hit a new record by producing over 2.5 billion metric tons of cereal grains—up from 1.8 billion tons 20 years earlier. But hunger persists because an increased supply of food alone is neither the solution to hunger nor an answer to malnutrition. Countries that have made recent progress in reducing hunger and improving nutrition have a core set of common characteristics. Firstly, they tend to be politically stable countries that have pursued relatively equitable growth policies (not only increasing wealth for some but reducing poverty overall). Secondly, they employ targeted safety nets for the poor and invest in accessible services (education, clean water, healthcare). Thirdly, they assume responsibility for responding to shocks (economic, environmental, or due to conflict) in timely ways that mitigate human suffering.

Successful actions typically include a mix of targeted so called nutrition specific programming (aimed at preventing or resolving defined nutrition and health problems in individuals) and nutrition sensitive interventions for the whole population that deal with the underlying causes. It provides details of evidence based policies and programmes in a variety of sectors, which are known to reduce hunger and deal with malnutrition. In food and agriculture, these may include national price support interventions that increase the supply and accessibility of nutrient rich foods (often perishables, like dairy, fruits and fresh meats), coupled with technical and financial support for women farmers to produce nutrient rich vegetables in their gardens. In

health, national policies to support accessible high quality services are critical to ensuring antenatal and postnatal care, particularly combined with targeted nutrition, exclusive breast feeding, and infant feeding messaging. Measures directed at underweight mothers are important for good birth outcomes, as well as varied forms of micronutrient supplementation. In other words, the quality of services, scale of coverage, and the singling out of nutritionally vulnerable demographic groups are all keys to success.

Finally, the sustainable development goals require all countries and their citizens to act together to end hunger and all forms of malnutrition by 2030. Setting targets is a good first step, but actions need to follow quickly. Urgent attention to achieve such goals is seriously overdue. Policy action must be designed to reduce malnutrition in all its forms, and be adequately funded. Measures must be evidence based, implemented at scale, and include both broad based and targeted actions aimed at the most nutritionally vulnerable people. The evidence to support such actions is growing, but it is already plentiful and compelling; there is no need for delay. The rapidly escalating threats posed by malnutrition represent a planetary challenge on a par with poverty and climate change. An appropriate response at the required scale is top priority for decision makers globally. It cannot wait.

2.2 Epidemiology of Malnutrition

The increased risks of death and disease associated individually with wasting and stunting have been widely investigated and documented (Collins 2007, Black, Allen et al. 2008, McDonald, Olofin et al. 2013). Both wasting and stunting are associated with increased risk of mortality with even mild deficits being associated with higher risk of dying and increasing progressively with the degree of the deficit. This means that any child experiencing a degree of wasting or stunting in any context is at heightened risk of dying. Wasting conveys double the risk of mortality conveyed by stunting and being both stunted and wasted an even higher risk. ‘Children with multiple deficits are at a heightened risk of mortality and may benefit most from nutrition and other child survival interventions’, (McDonald, Olofin et al. 2013). However the significantly higher mortality risk of severe stunting compared to moderate wasting is notable. It

does not appear to have been a particular focus of attention globally to date. The above finding on greatly heightened mortality risk with multiple anthropometric deficits is particularly interesting in light of the available evidence on low MUAC. MUAC is widely used for the identification of children to receive treatment for acute malnutrition and has been shown to be the anthropometric measure most closely predictive of mortality in children under 5 years of age (Myatt, Khara et al. 2006) and associated with wasting (see Box 4). Muscle arm indices, derived from MUAC and triceps skinfold thickness have also been found to be related to height-for-age (Frisancho and Garn 1971), (Friedman, Phillips-Howard et al. 2005), (Tanner, Leonard et al. 2014). A relationship between MUAC and stunting has also been previously reported (Briend and Zimicki 1986, Guesdon, Aissa et al. 2013). This suggests that low MUAC children may be wasted and stunted and that MUAC could be of particular use in identifying those children who are suffering from degrees of wasting and stunting simultaneously. Given the above finding on heightened mortality risk for wasting and stunting combined, if MUAC was indeed identifying children suffering from both wasting and stunting this may partly explain the strong relationship found between low MUAC and mortality risk. Given that MUAC is already used for the identification of children for admission into treatment programmes we wanted to investigate whether this was also providing an opportunity to identify stunted children. The additional analysis by Myatt was therefore conducted and seems to support the hypothesis that MUAC tends to select both wasted children and stunted children. However, further research into this association will be needed.

The literature also indicates that wasting and stunting share other important health implications. Wasting leads to reduced immune function and in some cases mucosal damage lowering resistance to colonization and invasion by pathogens. This both increases the risk and worsens the course of infectious disease particularly respiratory infection, malaria, intestinal infection, and diarrheal disease (Katona and Katona-Apte 2008). The term "malnutrition−infection complex" has been coined to describe the cyclical pattern that links infection, anorexia, complex metabolic adjustments (Schaible and Kaufmann 2007), and malabsorption, as well as behavioral changes affecting feeding practices and in combination leading to malnutrition in the context of limited

nutritional reserves (Tomkins and Watson 1989). Stunting has also been found to be associated with heightened risk of death from infectious disease (particularly diarrhoea, pneumonia and measles) (Black, Allen et al. 2008). In general the relationship between all manifestations of under-nutrition and infection is highlighted as an important mechanism linking them to mortality risk, although the precise nature of the immune defects in each manifestation of under-nutrition has not yet been well characterized. "Under-nutrition can deem the cause of death in a synergistic association with infectious diseases; if the under-nutrition did not exist, the deaths would not have occurred" (Black, Victora et al. 2013). Stunting is also linked to poor school performance and in some studies to deficits in early motor development (Grantham-McGregor, Cheung et al. 2007). A recent study indicates that wasting may also lead to deficits in psychomotor and mental development (McDonald, Manji et al. 2013).

A systematic review and Meta-analysis on effects of single and combined WASH interventions on nutritional status of children indicated that it was significantly associated with increased pooled mean height-for-age Z-score [SMD = 0.14, 95% CI = (0.09, 0.19); I2 = 39.3%]. WASH interventions had more effect on HAZ among under two children [SMD = 0.20, 95% CI = (0.11, 0.29); I2 = 37%]. Children who received combined WASH interventions grew better compared with children who received single interventions [SMD = 0.15, 95% CI = (0.09, 0.20); I2 = 43.8%]. (Gizaw 2019)

A cross sectional study conducted on water, sanitation, and hygiene practices associated with nutritional status of under-five children in semi-pastoral communities in Tanzania showed the prevalence of stunted, underweight, wasted, anaemia, and diarrhoea were 31.6%, 15.5%, 4.5% 61.2%, and 15.5%, respectively. Children with diarrhoea 2 weeks preceding the survey (P= 0.004), children using surface water for domestic purposes (P< 0.001), and those with uneducated mothers (P= 0.001) had increased risk of being stunted and underweight. Children introduced to complementary foods before 6 months of age (P= 0.02) or belonging to polygamous families (P= 0.03) had increased risk of being stunted. Consumption of cow's milk that is not boiled (P= 0.05) or being a boy (P= 0.03) was associated with underweight. Prevalence of under nutrition among under-

five children in the population under study was alarming and it could be associated with poor WASH practices and other sociocultural factors. (Kassim 2018)

A cross sectional study was conducted among the 347 mothers and their 6-24 months' children on Demographic factors and dietary diversity of Chepang children of Dhading, Nepal. The results found that 55.6% mothers fed their children 1-3 items and 44.4% mothers fed four or more items within the 24 hours. There was no significant association by the gender, age, family types, HHs annual income with dietary diversity, but there was significant association between mother's educations with dietary diversity. (Ghimire 2018)

Nutritional status and associated factors in under-five children of Rawalpindi, Pakistan revealed that malnutrition was found to be present in 32% of children. Adequately nourished children were 68%, while moderately and severely malnourished children were 14% and 18% respectively. Malnutrition was significantly associated with maternal illiteracy ($p = 0.01$) and presence of a family member with special needs ($p = 0.05$). Whereas there was no any significant association between malnutrition and gender, family size, family income, breast feeding and presence of siblings under 5 years of age (Mahmood, Nadeem, Saif, Mannan, & Arsad, 2016).

A cross sectional study was conducted in Borbote village, Illam to assess the prevalence and associated factors with malnutrition in under five children. A total of 186 under-five children were selected, among 20 % of malnourished children 14 % were moderately malnourished and 6 % were severely malnourished. Mothers exclusively breast feeding for 6 months had only 20.0% low weight for age children and those who didn't had 34.8% (P=0.041). 20.5 % of low weight of child of the pregnant ladies who took iron supplementation in comparison to 37.1% (P =0.037) in those who didn't take supplements. Malnutrition was found more in those who were below poverty line 27.94% (P=0.023) compared to those above poverty line 12.00% (Niraula et al., 2013).

Early initiation of breastfeeding and vitamin A supplementation with nutritional status of children aged 6-59 months showed that more than half of the toddlers (54.6%) did not get early initiation of breastfeeding. Based on multivariate analysis results, most dominant variables related to weight/age, height/age and weight/height indicators were

early initiation of breastfeeding and Vitamin A supplementation. Toddlers who did not get early initiation of breastfeeding are at risk of 1.555 times stunting compared to toddlers who got early initiation of breastfeeding. The most dominant variable related to height/age is vitamin A supplementation. (Simanjuntak 2018)

A cross sectional analytical study in Socio-Demographic Factors Influencing Nutritional Status of Children (6-59 Months) in Obunga Slums, Kisumu City, Kenya the results show strong association between income and stunting (OR=0.47; CI=0.24-0.91) and underweight (OR=0.44; CI=0.22-0.92). Wasting was strongly associated with Age of the mother (OR=1.07; CI=1.01-1.33) and mother's education (OR=0.34; CI=0.14-0.83). Religion and sex of the child were ruled out based on the analysis outcome. Income, mother's age and mother's education are very critical in child health interventions. (Omondi D. O., Kirabira P., 2016)

The community-based cross-sectional study was conducted on under-five children in Bareilly, Uttar Pradesh, India. The prevalence of underweight, wasting, and stunting was 33.11%, 46.88%, and 10.44%, respectively. The total prevalence of malnutrition was 57.11%. Malnutrition was found to be significantly associated with age (0-12 months and 25-36 months), sex, socioeconomic status, and maternal education. Conclusion: Malnutrition was found to be more in children aged less than 1 year and in those aged 2-3 years. It was more common in female children, in children of low socioeconomic status, in children from nuclear families, and among those whose mothers were illiterate (Singh, et al 2016).

A community based cross-sectional study, undertaken in Rural, Urban and Slum population of UT Chandigarh. Nutritional status of children was assessed using WHO classifications. Out of the total 424 children surveyed, 262 (61.8%) were found to be underweight. Underweight prevalence was maximum among 25-36 months (75%) of age. There were 24.6% females of normal weight as compared to 40.6% in males. Normal weight was highest for birth order one (37.7%). Exclusive breast feeding, Pre-lacteal feed, colostrum's feeding all were significantly related to underweight. (Kumar et al 2015)

A cross sectional study conducted in an urban area of district Rohtak, Haryana, India studied nutritional assessment among children (under five years of age) using various anthropometric indices. The rate of malnutrition was 27.6% (under-nutrition 26.4%, over-nutrition 1.2%). The rate of stunting, wasting and underweight were seventeen point six percent (17.6%), four point four percent (4.4%) and twelve percent (12%) respectively. Neither consumption of fish nor any other factor from the study was found to be significantly associated with the nutritional status however stunting was associated with the age group of the caregiver. Less than one-third (23.6%) of the children were fed less than four food groups a day. More than half the children (66.8%) showed at least one clinical sign of nutrient deficiency. (Rajappa & Shaji, 2015)

A study was conducted in Malnutrition Status among Under -5 Children in a Hill Community of Nepal which showed that 17 % of children were moderately and 10. 4% were severely underweight. 22.9% and 17.5% were found to be moderately and severely stunted respectively. Less than 10% were found to be moderately and severely wasted. Older age group of children, education level of mother, not exclusive breast feeding practice had significant ($p < 0.05$) effect on stunting. More than 50% children were affected with stunting, underweight and wasting at the same time (Gaurav, Poudel, Bhattarai, Pradhan, & Pokharel, 2015).

The study conducted on impact of feeding practices on nutritional status of children in rural area of Navsari district showed 11.5% prevalence of underweight, 15.6% prevalence of stunting and 8.6% prevalence of wasting. Only 56.4 % of mothers initiated breastfeeding within one hour. Only 36.2 % of infants were exclusively breastfed for 6 months and 97.5 % had received complementary feeding at 6–9 months of age. There was significant association between underweight with the birth order of the child, birth weight of the child and time of initiation of the breast-feeding to the child. There was significant association between stunting with the sex of the child. There was significant association between time of initiation of breast-feeding with the birth order of the child and type of delivery. Gandhi, S., Godara, N., Modi, A., & Kantharia, S. (2014). Another study conducted on, "Malnutrition Status among under - 5 Children in a Hill Community of Nepal" found that; seventeen percent of under- 5 children were moderately and 10.4 % were severely underweight. Similarly, 22.9%,

and 17.5% were found to be moderately and severely stunted respectively. Less than 10% were found to be moderately and severely wasted. Older age group of children, education level of mother, not exclusive breast feeding practice had significant ($p < 0.05$) effect on stunting. More than 50% children were affected with stunting, underweight and wasting at the same time.(Gaurav, Poudel, Bhattarai, Pradhan, & Pokharel, 2014)

Another study was under taken to assess nutritional status of children and identify the associated factors of Kunchha village development committee. Nutritional status of children age 12-59 month was assessed using anthropometric measurement namely weight, height and mid upper arm circumference (MUAC) using standard procedure. To identify the factor, semi structural questionnaire was used for the mothers. 60% of children had normal nutritional status and 40% followed by some malnutrition status by Gomez classification. No of ANC visit (odd ratio = 7.54 and 95% CI was 1.37 - 41.41), practice during the pregnancy period (P value < 0.021), and feeding practice of extra milk to the children (P value < 0.037) was significantly associated factors.(Dhungana, 2013)

A case control study was conducted in factors influencing malnutrition among children under 5 years of age in Kweneng west district of Botswana revealed small number of daily meals taken by the child (Adjusted OR=19.04, 95% CI 3.24-112.13), lack of knowledge of methods of prevention of child malnutrition by the parent (Adjusted OR=4.71, 95% CI 1.41-15.82), parent's unemployment (Adjusted OR=50.3, 95% CI 4.86-52.1), low birth weight (Adjusted OR=12.34, 95% CI 2.76-55.02), inadequate Vitamin A supplementation (Adjusted OR=13.27, 95% CI 1.94-90.46), child illness (OR=20.95, 95% CI 7.55-58.10), and child raised by a guardian to be associated with malnutrition (Adjusted OR=5.67,95% CI 1.30-24.73) (Kadima, 2012). Nutritional Status of Children under Five Years of Age and Factors Associated in Padampur VDC, Chitwan revealed that prevalence of underweight was 22.7 %, stunting 37.3% and wasting 25.7% respectively. The risk of stunting increases with age. The socio economic status was most important factor associated with stunting, underweight and wasting. (Ruwali, 2012).

A cross sectional study done on, "Nutritional Status of Under Five Year Children and Factors Associated in Kapilvastu District, Nepal", found that, better socio-economic status, mother's age 20-35years, birth order up to second, gap more than two year between two pregnancies, recommended exclusive breast feeding, early recommended supplementary foods, complete immunization and timely care seeking had positive effect on children health, which were also statistically significant. Considering the weight-for-height, height-for-age, BMI-for-age and MUAC-for-age; 5% to 60% children were below -2SD (standard deviation) and nearly one-fourth below-3SD (Bhandari & Chhetri, 2011). The study conducted in Mahottari district on Nutritional Status of Children under Five Years and Factors associated showed that socio-cultural and household indicator showed poor relation to nutrition. The result showed no significant relationship of sex, ethnicity and household economic status with nutritional status of children. Significant association was observed between age of the children, mothers' education and use of rice scum at household and nutrition status of children (Mishra & Sharma 2010).

Influence of infant-feeding practices on nutritional status of under-5 children showed that among all under five children surveyed, 36.4% underweight (<2SD weight- for-age), 51.6% stunted (<2SD height- for-age), and 10.6% wasted (<2SD weight- for-height). Proportions of underweight (45.5%) and stunting (81.8%) were found maximum among children aged 13–24 months. Wasting was most prevalent (18.2%) among children aged 37–48 months. Initiation of breast-feeding after six hours of birth, deprivation from colostrum and improper complementary feeding were found significant ($P<0.05$) risk factors for underweight. Wasting was not significantly associated ($P>0.10$) with any infant feeding practice studied. Delayed initiation of breast-feeding, deprivation from colostrum, and improper weaning are significant risk factors for under nutrition among under-fives. (Kumar 2006)

Female children are more likely to be stunted, underweight and wasted as compared to male. Female headed households are more likely to have moderately and mildly stunted children and mixed results are observed for underweight and wasting. The likelihood for all forms of malnutrition is higher among children with smaller than average size at birth as compared to average or bigger size at birth. Mixed results are observed

regarding likelihood of different forms of malnutrition among children with mothers having different educational level. Conclusion: BMI of mothers is found significant variable while explaining children's nutritional status. Similarly, Size at birth is significantly associated with nutrition during the childhood. (Pradhan 2010). A cross-sectional comparative study was conducted in Belahara VDC, where prevalence and predictors of underweight, stunting and wasting in under-5 children was 27%, 37% and 11% respectively. In the final model of logistic regression statistical tool, male was found protective for stunting. Comparatively, the risk of being underweight in the children from the poor socioeconomic status is almost four times as much as in the children from the rich socioeconomic status [OR= 4.336 (1.719 <OR<10.936)]. Children from joint family were found protective against stunting than children in the nuclear family. Other covariates such as age at pregnancy and ethnicity of the child were found to be significantly associated only at 10% level of significance. (Sapkota, 2009). A Study on nutritional status of under-5 Jirel children of Eastern Nepal was conducted according to MUAC measurement, among 309 children, 51.13% were found to be normal and 12.62% were severely malnourished. According to Gomez classification, 37% children were normal but no one was found to be severely malnourished. 64% were found to be having mild to moderate malnutrition. According to Waterlow's classification 71% were found to be normal and 29 percent were stunted while no one was found to be wasted in the study.(Rh et al., 2005)

CHAPTER III- RESEARCH METHODOLOGY

This chapter presents the study designs, study setting and population, sampling, sample size, sample selection procedures, inclusion and exclusion criteria, instrumentation, data collection procedures and data analysis.

3.1 Study Design

Analytical cross sectional study design was conducted to assess the socio demographic differentials of malnutrition in children under 5 years of age and determine its causes in earthquake affected district Nuwakot using structured questionnaire and anthropometric measurements.

3.2 Study Population

Children under 5 years of age who were living in Nuwakot district and who met the inclusion criteria were the study population.

3.3 Study Area

Research was conducted in the highly earthquake affected district Nuwakot. Nuwakot District is a part of Province No. 3. It is one of the seventy-seven districts of Nepal, a landlocked country of South Asia. The district, with Bidur as its district headquarters, covers an area of 1,121 km² and had a population of 288,478 in 2001 and 277,471 in 2011. It is surrounded by various districts, Dhading in the south west, Rasuwa in the north, Sindhupalchowk in the East and a little portion of Kathmandu in the south east. A mere 75 kilometre from the country's capital with varying topography and climate, Nuwakot offers the feel of mountain, hill and plains. The total population of Nuwakot is 277,471. It consists of 12 Municipalities out of which, 10 are Rural Municipalities and 2 are Urban Municipalities. Population of under 5 is 6306 whereas 6 months to 59 months is 6116 according to HMIS 2017/2018. The district consist urban as well as rural setting with diverse topography i.e. plains and hilly region, as the study area is spread out over the district, there seems to be lots of discrepancies in factors related to development. The areas towards the headquarter and near to Kathmandu have urban feel with much developed facilities related to health, education, transportation while the remaining parts are deprived of such facilities. Hence contributing to inequity in all

aspects. So the rationale behind site selection is to identify the differences in nutritional status within the same municipality with such diverse factors socially and topographically.

3.4 Study Duration

The study was conducted for the duration of four weeks. The data collection was carried out in aftermath of the mega earthquake.

3.5 Sampling Frame

Nuwakot district was selected as for the diversity purpose and purposively for the ease of researcher. Then the wards of the district were taken as clusters. The clusters were, the then wards according to previous administration division system when VDC's existed. There were all together 560 wards from 61 VDC's and 1 municipality. These 560 wards were defined as 560 clusters. Probability Proportional to Size (PPS) sampling was performed in these clusters and 48 clusters were selected. The number of HH's that can be covered in a day by a team is decided by the following process.

Table 2: Event Time allocated

Time per day for field work	6 am-6 pm = 720 minutes
Travel time to cluster location	90*2 (to and from) = 180 minutes
Two breaks of 10 minutes plus 1 hour break	10'*2+40'=60 minutes
Travel time from one household to another	9 minutes
Household survey	20 minutes

Ward is the smallest administrative and political unit in Nuwakot district with a range of 1,642-6,406 population in rural municipality and 1,287 – 6,938 range of population in municipalities. Therefore, a ward was defined as the cluster.

3.6 Estimation of the number of Required Clusters

To estimate the required number of clusters, estimated number of households that can be visited by one team in a day was calculated. As detailed in the table 2, it was estimated that a total of 8 households could be visited and surveyed in a day by each

team. Therefore, the total number of households estimated as sample (382 HH) was divided by 8 to estimate the total number of required clusters, which was 48.

Altogether five reserve clusters (RCs) were selected in addition to 48 clusters. Reserve clusters were meant to be visited only if survey team could not reach 80% of the sample size i.e. 382 households. Since the 80% of the sample was met, reserve clusters were not visited.

3.7 Sampling Procedure

In the present study, a two staged cluster sampling was employed. Sample size was calculated by using standard formula (Cochran's). 48 clusters within the district and 8 households within each cluster was visited. Within the household, one child below five years was randomly selected. Additional 5 clusters were randomly selected, but were only used if there were not enough children in the selected clusters. Total sample size in the present survey was 382 households.

In the first stage, clusters were randomly selected based on Probability Proportional to Size (PPS) using the ENA software. In the second stage, the households within each cluster were selected using systematic random sampling procedure. A household was defined as persons routinely sharing food from the same cooking pot and living in the same household. Arriving in the field, the enumerators got an updated list of all the households in the cluster from the village development committee's office of the cluster. The sampling interval was found by dividing the total number of households in the cluster by the total number of households required. The first household was randomly selected within the sampling interval by drawing a random number between 1 and the sampling interval. Within the household, all children below 5 years of age that are living in the household were listed and one child was randomly selected. The next household was found by adding the sampling interval to the first household that was selected. This process continued until 8 households were visited. The undernourished detected cases were counselled and referred to government health facilities with nutritional correction centre using referral slip HMIS 1.4. Before leaving the subject, the filled instrument was rechecked for completeness and consistency. The obtained data was used for research purpose only.

3.8 Sample Size

Sample of 384 household was taken as calculated from the total estimate 50% prevalence at 95% Confidence Interval and 5 % allowable error. Out of which 382 household were enrolled into study and two household did not completed the interview starting from tool 1 of questionnaire.

Calculation of sample size for infinite population:-

Sample size (n_0) = $Z^2 \times p\ (1-p)/d^2$

Where z= confidence interval at 95% (standard value of 1.96)

P= estimated prevalence of malnutrition (50%)

d= margin of error (5%)

Now,

$n_0=1.96^2\times0.5\times\ (1-0.5)\ /\ (0.05)^2$

= 384.16

≈ 384

Calculation of sample size for finite population:-

The total no. of children of 6 -59 months are 50,341. Thus we apply finite population sample formula to obtain new sample size to conduct survey in this particular district.

Therefore,

New SS = n_0 / [1+ {(n_0-1) / POP}]

Where,

New SS = New sample size for finite population

n_0 = Sample size in infinite population

POP = Total number of population (in this case total number of population is number of 6-59 months age children in this district)

New sample size obtained = n_0 / [1+ {(n_0-1) / POP}]

= 384 / [1+ {(384-1) / 50341}]

=381.2

=382

3.9 Inclusion Criteria

- Household selected randomly was a sampling unit.
- In this study, the mother was considered to be the key respondent.
- If the household members were not present when the survey team visited the household, the team had to return to the household. Each household could be visited up to three times in an effort to identify household members.
- A household was skipped and not replaced if the members of the household had left the house permanently or were not expected to return before the survey team had left the cluster.
- Mothers having children under 5 years of age were interviewed.
- For FGD, married women who have had at least a child were the participant.

3.10 Exclusion Criteria

- Abandoned or empty houses were not counted as households because they did not meet the definition of a household.
- Mothers NOT having children under 5 years of age and who have NOT delivered a baby were not be interviewed.
- For FGD, unmarried and married women who have NOT had at least a child were NOT included as participant.

3.11 Data Collection Techniques and Tools

4.11.1 Data Collection Technique

Primary data was collected through interview at household level and Focus Group Discussions was conducted at community level. Basic Anthropometric measurements like Height, Weight and MUAC was measured and recorded. Other information were acquired from review of published and unpublished sources such as journals, books and articles etc.

4.11.2 Data Collection Tools

For interview: Semi-structured Interview Questionnaire was used.

Tool 1 consisted of the structured interview schedule to generate data pertinent to socio-demographic factors and general household information.

Tool 2 consisted questions related maternal and child care practices, Dietary Diversity, Dietary Recall, Immunization, Care of Illness, Wash and Sanitation. Tool 2 was only administered in the household where children from 6 – 59 months were found.

Tool 3 consisted of form for child anthropometric measurements. Form was developed to record the measurements of MUAC, length/height and weight.

For MUAC:

For measuring the Mid Upper Arm Circumference of the child, the Shakir's Tape (generally known as MUAC tape) was used. The child's left upper arm was measured by removing the clothes.

For Anthropometric measurement:

For weighing the child: Standard Digital Weighing Scale (SECA) was used with maximum capacity of 150 kg and least count of 0.10 kg. The weighing machine was set to "0"every time before taking the weight. Standard weight of 1 KG was used to calibrate the scale before the data collection on each day.

For taking length/height:

Standard wooden Height Board (UNICEF, Stadiometer / Infantometer) was used. Length was measured for children from 6 – 23 months and Height for children from 24–59 months of age. The height board was fixed properly in smooth surface, checked before taking the length or height of the child.

3.12 Data Processing and Analysis

Data was categorized and coded. Computer compilation was done and further processing and analysis was done using MS-EXCEL, SPSS 20 and The Emergency Nutrition Assessment (ENA) for SMART, version 2011. Chi-Square test was used as a basis to identify further strength of analysis for variables. Bivariate analysis was done and Multivariate regression was used to draw significance over the variables found significant from chi-square test.

3.13 Validity and Reliability

The validity of questionnaires was established by reviewing the related literatures and by consulting with peer, research advisor and subject matter experts. Questionnaire tool was used only after approval from the concerned lecturers and professors of TU.

The reliability was maintained by checking the questionnaires for leading, completeness, consistency, relevancy, clarity and its direct bearing with objectives. The pretesting was done in 10% of sample 40 children, accompanied by mothers /care takers of the estimated study sample having similar characteristics in non-selected cluster. Necessary modification was made as required after pretesting.

Field workers were contracted to do the data collection. The fieldworkers attended two days training. The training mainly focused on discussion of the objectives of the study, the sampling procedure, the questionnaire and anthropometric measurements. A whole day was assigned for the anthropometric measurements and the enumerators got practical experience in the field. The field exercise included testing of the sampling procedure, the questionnaire and the anthropometric measurements. In total, 6 enumerators (both male and female) did the data collection with two people in each team. The majority of the enumerators had collected data in previous surveys.

3.14 Ethical Consideration

Research clearance was obtained from the IRB of Tribhuwan University. All eligible subjects were informed about the study before they were asked to participate in the survey. Throughout each phase of the research project, efforts were made to ensure the project didn't contribute to the further marginalization of children. Additionally, the research aimed to foster the self-esteem and self-efficacy of the respondents by emphasizing their strengths, resiliency and constituency. All respondents were assured of their confidentiality. Anonymity was maintained throughout the data processing and analysis. Written informed consent was sought from each participant of the study.

3.15 Possible Biases of the Study

The result of the study might be affected due to possibility of recall bias among the study population during interview.

CHAPTER IV-FINDINGS AND DISCUSSION

This chapter presents the findings related to Socio-demographic differentials along with the factors associated with child nutritional status of under five years children surveyed in households of Nuwakot district.

A total of 384 household were taken as samples and out of them 382 responded in the interview and among the 382 encountered for interview process 168 household had children under five years of age along with the care taker meeting the criteria of the study. These included the children with their mothers who were met and agreed to participate in the study through household visit. All participants have fulfilled the designed criteria and given their consent to take part in the study. The questionnaire was administered to assess the socio-demographic characteristics, information related to child nutrition status, breast feeding and dietary practices, pregnancy, malnutrition status through anthropometric measurement and MUAC of the children.

4.1 Socio Demographic Characteristics of the Respondents

Table 3: Type of family distribution among the respondents

Type of the family				
	In total household interviewed		In household with < 5years child	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Nuclear	214	56.0	83	49.4
Joint	166	43.5	84	50.0
Extended	2	.5	1	.6
Total	382	100.0	168	100.0

The table above depicts the types of family among the total household surveyed as well as among the households with under five years of age. In case of total household, the nuclear type of family is higher than others whereas in case of other sample, there is slightly equal share of nuclear and joint family types in under five years children's household.

Table 4: Distribution of Head of household among respondents

Head of the household

	In total household interviewed		In household with < 5years child	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Male	303	79.3	145	86.3
Female	79	20.7	23	13.7
Total	382	100.0	168	100.0

In both the cases, among total households as well as selected interviewed households, Male are found to be head in majority of household. In case of households with less than 5 years children only 13.7% household head were females.

Table 5: Caste/Ethnicity wise distribution of the respondents

Caste/Ethnicity of the respondents

	In total household interviewed		In household with < 5years child	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Brahmin	57	14.9	20	11.9
Chhetri	23	6.0	10	6.0
Janajati	243	63.6	112	66.7
Dalits	38	9.9	19	11.3
Others	21	5.5	7	4.2
Total	382	100.0	168	100.0

The variance in caste wise distribution seems similar in both the cases with majority of Janajati and fewer percentage share of others followed by Chhetri and Dalits. This might be because the majority of the population of the district is Janajati.

Table 6: Religion wise population distribution of respondents

Religion of the respondent

	In total household interviewed		In household with < 5years child	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Hindu	255	66.8	115	68.5
Buddhist	118	30.9	50	29.8
Christian	9	2.4	3	1.8
Total	382	100.0	168	100.0

In both the cases, Majority of the respondents belonged to Hindu & least to Christian community as expected. FGD revealed that the percentage of Cristian might increase in coming years, because of the trend of changing their religion.

Table 7: Monthly income wise distribution of the respondents

Monthly income of the family

	In total household interviewed		In household with < 5years child	
	Frequency	Percentage (%)	Frequency	Percentage (%)
20,000 above	137	35.9	62	36.9
15,000-20,000	104	27.2	45	26.8
10,000-15,000	79	20.7	38	22.6
5,000-10,000	33	8.6	12	7.1
below 5,000	29	7.6	11	6.5
Total	382	100.0	168	100.0

The monthly income table shows the similar results in total household surveyed as well as in household with < 5 years of age. The higher percentage of earnings of respondents belonged to Rs.20000 and above, monthly income category which is as similar as our average per capita income of our country.

Table 8: Paternal occupation of the interviewed households with < 5years of age

Paternal occupation among < 5years children group

	Frequency	Percent
Service	25	14.9
Agriculture	54	32.1
Daily labour	38	22.6
Business	21	12.5
Others	30	17.9
Total	168	100.0

The above table shows higher percentage (32.1%) of father's occupation of under five years child involved in agriculture whereas lower (12.5%) are involved in business. As Nepal is dependent on agriculture, and their main source of income is agriculture, the result depicts the same.

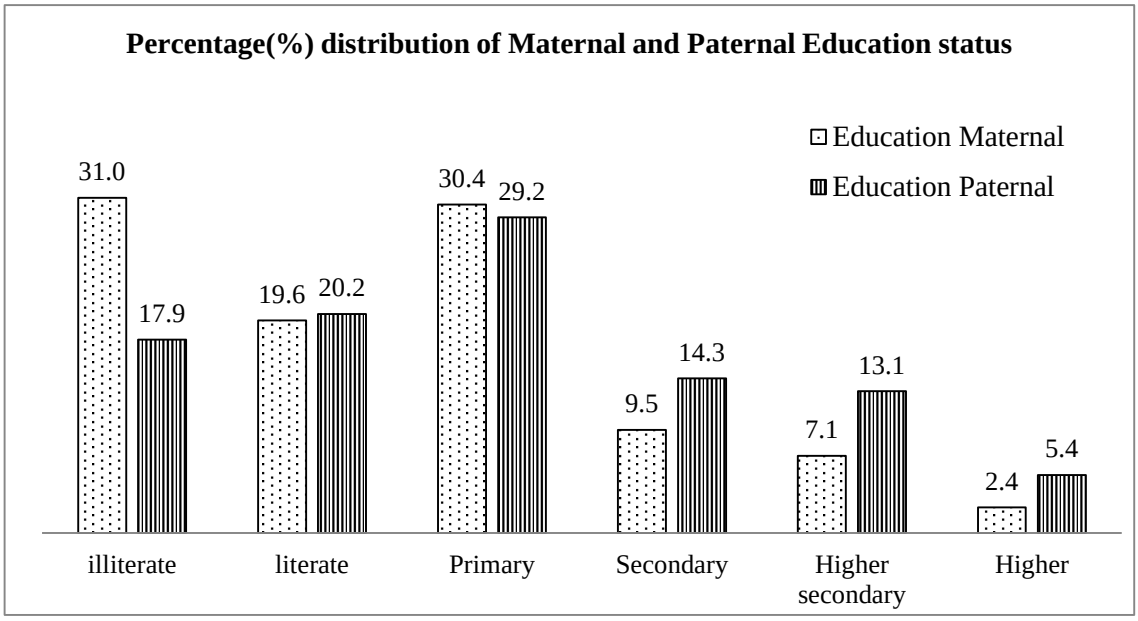
Table 9: Maternal occupation distribution of interviewed < 5 years child household

Maternal occupation among < 5 years children group

	Frequency	Percent
Service	5	3.0
Agriculture	76	45.2
Daily labour	6	3.6
Business	19	11.3
Housewife	62	36.9
Total	168	100.0

The table depicts higher (45.2%) involvement of mothers in agriculture followed by Housewife (36.9%). Similarly, only few (3%) are involved in Service. This results however matches with our country's situation as most of the population is dependent in agriculture and a huge part of female are busy with household chores.

Figure 2: Distribution of Education status of parents of surveyed under five year children



The bar graph shows higher percentage of mother's are illiterate (31%) followed by primary education (30.4) and only 2.4% have gained higher (University) education. Similarly in case of paternal education status, higher percentages (29.2%) have completed primary education, followed by literate (20.2%) and only 5.4% have gained higher education. This shows the disparity between male and female.

Table 10: Sex wise distribution of the under five years of children included in study

Sex of the children		
	Frequency	Percent
Male	81	48.2
Female	87	51.8
Total	168	100.0

There is similar distribution of both male and female, where percentage of female (51.8%) is somewhat higher than that of male (48.2%). If we compare this result with country's sex ratio, the ratio is higher i.e. 94.2 according to CBS 2011.

4.2 Anthropometric Measurement Results and Prevalence of Malnutrition in the Household Surveyed

Table 11: Distribution of age and sex of sample

	Boys		Girls		Total		Ratio
Age (m)	**N**	**%**	**N**	**%**	**N**	**%**	**Boy: girl**
6-17	34	50.7	33	49.3	67	39.9	1.0
18-29	23	46.0	27	54.0	50	29.8	0.9
30-41	12	44.4	15	55.6	27	16.1	0.8
42-53	9	45.0	11	55.0	20	11.9	0.8
54-59	3	75.0	1	25.0	4	2.4	3.0
Total	**81**	**48.2**	**87**	**51.8**	**168**	**100.0**	**0.9**

This describes the age wise and sex wise composition of the under five years children's samples from the study where higher (39.9%) of children belonged to 6-17 months age group followed by 18-29 months (29.8%) and least were from 54-59 months age group(2.4%).

Table 12: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

Malnutrition Indicators based on weight-for-height-z-scores	**All** n = 168	**Boys** n = 81	**Girls** n = 87
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(17) 10.1 %	(10) 12.3 %	(7) 8.0 %
Prevalence of moderate malnutrition (<-2 and >=-3 z-score, no oedema)	(12) 7.1 %	(7) 8.6 %	(5) 5.7 %
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(5) 3.0 %	(3) 3.7 %	(2) 2.3 %

The prevalence of oedema is 0.0 %

The anthropometric results comparing to WHO 2006 standards derived from ENA for SMART shows the above results where prevalence of global malnutrition was found to be 10.1%, where moderate acute malnutrition accounts for 7.1% and severe acute malnutrition was found to be 3% on the basis of weight for height Z- scores. And if we compare the data with NDHS 2016, the prevalence of GAM is similar whereas the result of SAM prevalence is a bit higher than the national average as the study is confined to a district only. And the higher result might also be the result of aggravating factor i.e. the recent mega earthquake.

Table 13: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

		Severe wasting (<-3 z-score)		**Moderate wasting (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**	
Age (m)	**Total no**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	67	2	3.0	3	4.5	62	92.5
18-29	50	2	4.0	5	10.0	43	86.0
30-41	27	1	3.7	2	7.4	24	88.9
42-53	20	0	0.0	1	5.0	19	95.0
54-59	4	0	0.0	1	25.0	3	75.0
Total	168	5	3.0	12	7.1	151	89.9

The above table shows the age wise distribution of malnutrition indicators where, in case of severe wasting, both 6-17 months and 18-29 months age group contributes each 2 cases and higher number of moderate wasting i.e. 5 is also seen in 18-29 months age group. The result justifies the fact that children are malnourished mainly during the ages 6-29 months. As the mother starts complimentary feeds after 6 months, the children who do not get proper IYCF practices during their feeding are likely to get malnourished. Hence the result supports the fact that children are malnourished due to poor feeding behaviours.

Table 14: Prevalence of acute malnutrition based on MUAC cut-off (and/or oedema) and by sex

Malnutrition Indicators based on MUAC cut offs	All n = 168	Boys n = 81	Girls n = 87
Prevalence of global malnutrition (< 125 mm and/or oedema)	(14) 8.3 %	(10) 12.3 %	(4) 4.6 %
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(13) 7.7 %	(10) 12.3 %	(3) 3.4 %
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(1) 0.6 %	(0) 0.0 %	(1) 1.1 %

On the basis of MUAC measurements, 8.3% prevalence of global malnutrition was found where moderate acute malnutrition contributed to 7.7% and severe acute malnutrition was found to be 0.6%. This result supports to the fact that malnutrition still has the iceberg phenomenon characteristics and the screening via MUAC is not as effective as by Length/Height for weight.

Table 15: Prevalence of underweight based on weight-for-age z-scores by sex

Malnutrition Indicators based on weight-for-age	All n = 168	Boys n = 81	Girls n = 87
Prevalence of underweight (<-2 z-score)	(41) 24.4 %	(29) 35.8 %	(12) 13.8 %
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(25) 14.9 %	(17) 21.0 %	(8) 9.2 %
Prevalence of severe underweight (<-3 z-score)	(16) 9.5 %	(12) 14.8 %	(4) 4.6 %

There was 24.4% of prevalence of underweight as for weight for age z scores where moderate underweight was found to be 14.9% and severe underweight was 9.5%. And if we compare this data with the national average from NDHS 2016, it is somewhat similar i.e. 27%.

Table 16: Prevalence of Stunting based on height-for-age z-scores

Malnutrition Indicators based on height for age z scores	All n = 168	Boys n = 81	Girls n = 87
Prevalence of stunting (<-2 z-score)	(62) 36.9 %	(38) 46.9 %	(24) 27.6 %
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(33) 19.6 %	(19) 23.5 %	(14) 16.1 %
Prevalence of severe stunting (<-3 z-score)	(29) 17.3 %	(19) 23.5 %	(10) 11.5 %

The result showed that 19.6% and 17.3% of under five children were moderately and severely stunted respectively accumulating to 36.9%. If compared to national average according to NDHS 2016, it is 36%.

Similarly in province 3 the lowest was the wasting (5.5 %) where the highest was stunting (39.8%). The finding was contrast in the study conducted in Bharatpur municipality of Chitwan district where the stunting was higher and the underweight was less than the present findings. (Upadhya 2018). Similar finding was seen in the study conducted by Upadhya and Bhusal in 2017, where wasting was higher and stunting and underweight were in similar range. Majority of the children were stunted in the study conducted in the study conducted by Dhungana 2017. The finding was contrast with the study conducted in Aman Jordan (azhari, slaikh, Al-musa and Iblan 2017). The prevalence of wasting, stunting and underweight was found parallel in the study conducted in factors influencing malnutrition among the children of < 5 years in eastern Nepal (Bajracharya and Subedi, 2017). Whereas the finding was contrast in the study conducted by Abdulla 2016. Rural Nepal shoed that the finding of stunting and wasting was in line to the present findings whereas less children were underweight according to WHO criteria. (Chataut and Khanal 2016)

Severe wasting (3.0%) in survey children was found more than in provenience 3 (1.3%), severe stunting (17.3%) was also higher (10.4%). While prevalence of underweight was similar in the survey children and the provenience 3 (10.4%). (NDHS 2016).

Based on MUAC, 6.2% of 6 – 59 months aged children were moderately wasted (MUAC greater than 11.5 cm but less than 12.5 cm) while 19.6% were mildly wasted (MUAC greater than 12.5 cm but less than 13.5 cm).

The prevalence of wasting was higher in boys 12.3 % than in girls 4.6 %, stunting was higher in boys 46.9% than girls 27.6 % and underweight prevalence was also higher in boys 35.8% than girls 27.6 %.

The distribution of wasting stunting and underweight based on gender showed similar pattern with that of NDHS 2016 where the boys were more malnourished then the girl. The prevalence of wasting, stunting and underweight was higher in girls than in boys in the study conducted in Mahottari (Mishra and Sharma, 2010). The finding were similar in study conducted by Pradhan 2010. The finding was in contrast to the study conducted in Palpa District of Nepal (Kumar 2017). The result was in line to the study conducted in Lamjung, Gorkha and Tanahun district of Nepal where the prevalence of malnutrition was higher in boys. The finding of study was similar to Hidabu Abote District, North Shewa, Oromia Regional State (Mengistu, K., & Alemu, K. (2013).

4.3 Association between Related Factors and Malnutrition Status of the Children

Table 17: Association between socio demographic factors and malnutrition status of the children

Characteristics	Total		Malnutrition status				P-Value
			Yes		No		
	N=168		N=17		N=151		
	Number	%	Number	%	Number	%	
Type of the Family							
Nuclear	83	49.40%	11	64.70%	72	47.70%	
Joint	84	50%	6	35.30%	78	51.70%	0.401
Extended	1	0.60%	0	0	1	0.70%	
Sex of the household head							
Male	145	86.30%	14	82.40%	131	86.80%	0.617
Female	23	13.70%	3	17.60%	20	13.20%	
Caste/Ethnicity of the respondent							

Brahmin	20	11.90%	1	5.90%	19	12.58%	
Chhetri	10	6%	0	0	10	6.62%	
Janajati	112	66.70%	11	64.70%	101	66.89%	0.361
Dalits	19	11.30%	4	23.50%	15	9.93%	
Others	7	4.20%	1	5.80%	6	3.97%	
Monthly income of the household(Rs)							
20,000 and above	62	36.90%	6	35.29%	56	37.09%	
15,000-20,000	45	26.79%	3	17.65%	42	27.81%	0.303
10,000-15,000	38	22.62%	7	41.18%	31	20.53%	
5,000-10,000	12	7.14%	0	0.00%	12	7.95%	
below 5,000	11	6.55%	1	5.88%	10	6.62%	
Maternal Occupation							
Service	5	2.98%	0	0.00%	5	3.31%	
Agriculture	76	45.24%	9	52.94%	67	44.37%	
Daily labour	6	3.57%	0	0.00%	6	3.97%	0.722
Business	19	11.31%	1	5.88%	18	11.92%	
Housewife	62	36.90%	7	41.18%	55	36.42%	
Maternal Education							
Illiterate	52	30.95%	5	29.41%	47	31.13%	
Literate	33	19.64%	2	11.76%	31	20.53%	
Primary	51	30.36%	8	47.06%	43	28.48%	
Secondary	16	9.52%	2	11.76%	14	9.27%	0.514
Higher secondary	12	7.14%	0	0.00%	12	7.95%	
Higher	4	2.38%	0	0.00%	4	2.65%	

The above table shows no any significant association between malnutrition and socio demographic characteristics. There is no significant association between the gender, maternal education, cultural practices among different castes and prevalence of Malnutrition.

From this result, we can withdraw the fact that malnutrition has various causes, ranging from basic, underlying and immediate causes and this condition can arise regardless of variables like sex, ethnicity, economic conditions or literacy factors. Hence, if the MIYCN practice is poor, then the condition of malnutrition can arise.

From, FGD similar thoughts were raised stating, “Malnutrition doesn’t see poor or rich, literate or illiterate, upper or lower caste. It depends on how you care for your children.”

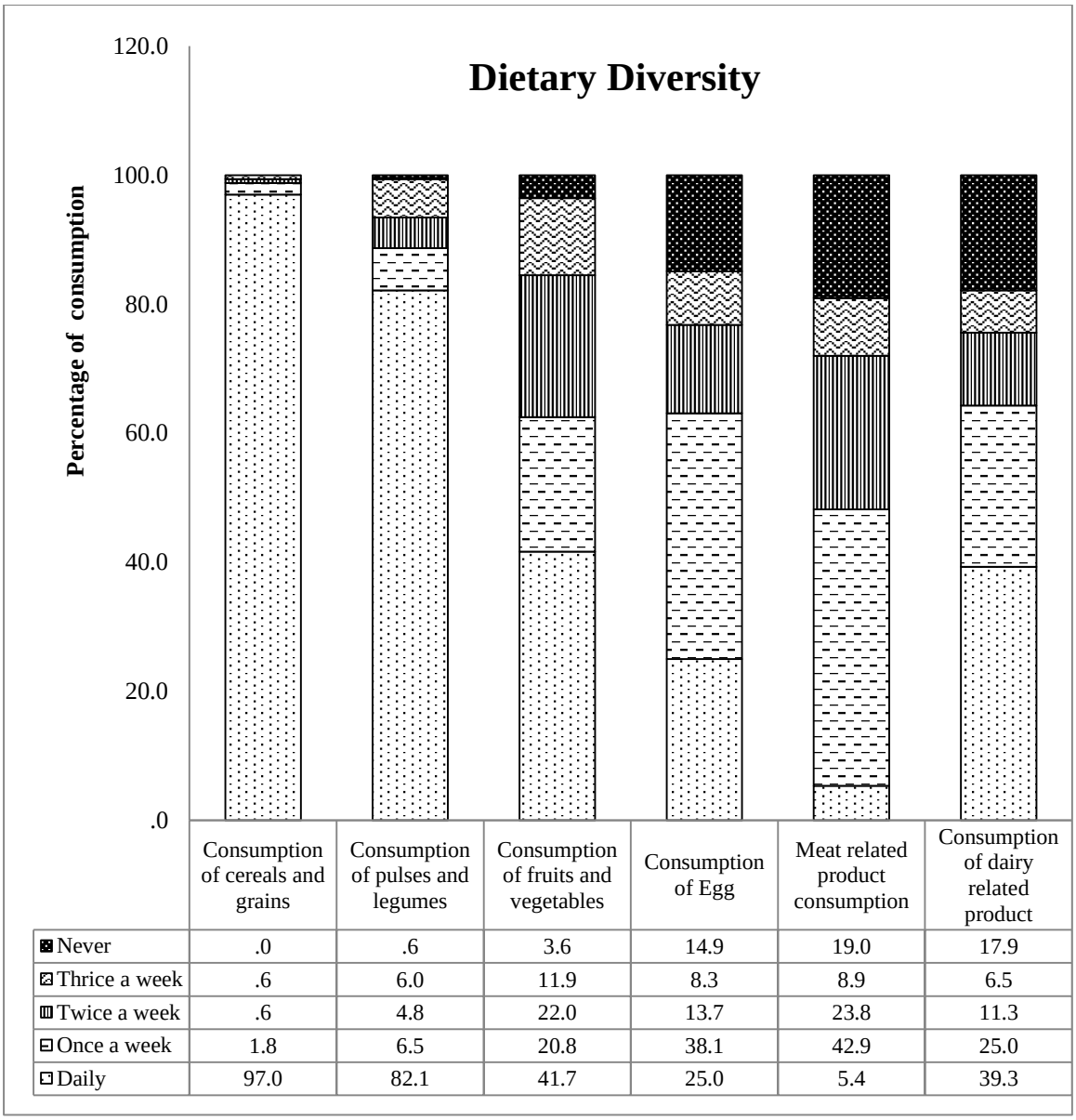
The contrast result was seen in study conducted in Mumbai suburban region and Tehsil Zarghoon Town, District Quetta, Bluchistan (Ghane and Kumar 2017; Achakzai and Khan, 2016). The study conducted in Assam also showed the significant association between socio-demographic factors and malnutrition. The socio economic status was the most important factor associated with malnutrition in study conducted in Padampur VDC, Chitwan (Ruwali, 2012). The lower socio economic status, lower level of maternal education unemployed mother and extended large families were significantly associated with malnutrition in study conducted by Abdulla 2016 which was in contrast to present study. No any significant association between types of family, income, family size was seen in study conducted in Rawalpindi, Pakistan (Mahmood, nadeem, saif, Mannan and Arsad, 2016). No significant association between ethnicity, household economic status where as significant association was observed between mothers education and malnutrition (Mishra and Sharma, 2016).

Table 18: Associated Dietary factors and Dietary Diversity characteristics

	Total N=168		Malnutrition status				
			Yes N=17		No N=151		
Type of salt used	Number	%	Number	%	Number	%	P-Value
Loose crystal salt	10	5.95%	1	5.88%	9	5.96%	
Packaged salt without logo	7	4.17%	1	5.88%	6	3.97%	0.933
Packaged salt with logo	151	89.88 %	15	88.24 %	136	90.07 %	

The above table shows majority of the respondents (89.88%) using packaged salt with logo where as higher (88.24%) of children also fall under this category and there is no significant association seen between types of salt used with the malnutrition status as p-value is 0.933.

Figure 3: Dietary diversity and its association with malnutrition status among the children



	Consumption of cereals and grains	Consumption of pulses and legumes	Consumption of fruits and vegetables	Consumption of Egg	Meat related product consumption	Consumption of dairy related product
Never	.0	.6	3.6	14.9	19.0	17.9
Thrice a week	.6	6.0	11.9	8.3	8.9	6.5
Twice a week	.6	4.8	22.0	13.7	23.8	11.3
Once a week	1.8	6.5	20.8	38.1	42.9	25.0
Daily	97.0	82.1	41.7	25.0	5.4	39.3

The above chart shows the frequency of different food groups being consumed. The chart also depicts that Carbohydrate group is consumed by the 97% of the people daily whereas only 5% of people consumed meat related products daily. The daily consumption percentage dropped to 82% in legumes consumption followed by fruits and vegetables (42%) and dairy related product (39%) and egg (25%).

Table 19: Breastfeeding practices and its association with malnutrition status among the children

	Total N=168		Malnutrition status: Yes N=17		Malnutrition status: No N=151		P-Value
	Number	%	Number	%	Number	%	
Initiation of Breast feeding							
Within 1 hour	105	62.50%	6	35.29%	99	65.56%	0.045
< 1 hour	43	25.60%	7	41.18%	36	23.84%	
Don't know	20	11.90%	4	23.53%	16	10.60%	
Administration of Colostrum							
Yes	152	90.48%	15	88.24%	137	90.73%	
No	6	3.57%	1	5.88%	5	3.31%	0.864
Don't know	10	5.95%	1	5.88%	9	5.96%	
Exclusively Breastfeeding Duration							
< 6 months	67	39.88%	8	47.06%	59	39.07%	
Equals to 6 months	79	47.02%	8	47.06%	71	47.02%	0.608
> 6 months	22	13.10%	1	5.88%	21	13.91%	

Among various breast feeding practices only one variable has shown association. There is no significant difference between colostrum feeding and Exclusive breastfeeding duration whereas there is a significant association between early initiation of breastfeeding practices and prevalence of Malnutrition (p=0.045).

“Among the mothers who do not breastfeed properly or sufficiently, their children fall sick more than the ones who get proper breastfeeding”, stated an elderly women from the FGD group. Another statement to which everyone agreed to was regarding the packaged powder milk and the rampant use of it. Earlier, when home delivery was common, the babies never received packaged milk, but nowadays the health persons, prescribes as if it is some medicine that the child needs.

Table 20: Univariate & Multivariate analysis of factor significant from Chi-Square test

	Unadjusted Analysis			Multivariate Analysis		
Initiation of Breast Feeding	Crude OR	95% CI	P-Value	Adjusted OR	95% CI	P-Value
Within 1 hour						
>1 hour	0.242	0.062-0.955	0.043	0.332	-1.101-0.618	0.075
Don't know	0.312	0.098-0.990	0.048	0.316	-1.153-0.739	0.119

Higher percentage of malnourished children (41.18%) belonged to children whom initiation of breast feeding was done only after 1 hour of birth. Similarly, majority (65.56%) of normal children belonged to those who were breastfed within one hour of delivery. As significant seen from chi-square test, univariate and multivariate analysis are performed to determine the strength of association which shows crude odds ratio of > 1 hour breast fed child and don't know status to be 0.242 and 0.312 respectively which means they are significantly more prone to malnutrition by their respective odds ratio times with P-value of 0.043 and 0.048 respectively.

Whereas from the multivariate analysis, the adjusted odds ratio of > 1 hour breast feeding initiated child and don't know status is 0.332 and 0.316 respectively with P-value 0.075 and 0.119.

The study conducted on Influence of infant-feeding practices on nutritional status of under-five children showed that initiation of breast-feeding after six hours of birth, deprivation from colostrum and improper complementary feeding were found significant ($P<0.05$) risk factors for underweight. (Kumar 2006). Similarly there was statistically significant association between malnutrition and time of initiation of the breast-feeding to the child ($p < 0.05$). (Gandhi 2014). The most dominant variables associated with nutritional status are early initiation of breastfeeding (Simanjuntak 2018). Whereas no any significant association was found between breast feeding and malnutrition (Mahomad, Nadeem, Saif, Mannan and Arsad, 2016). Meshram et al found that there was no significant association between feeding practices and nutritional status of infants.

There is association seen from the univariate analysis whereas no strong association has been seen from the multivariate analysis after adjusting odds ratio for type of family, sex of the children, and ANC check-up in pregnancy, place of delivery and exclusive breast feeding duration.

Table 21: Association between maternal and child related factors/characteristics and nutritional status of the children.

	Total N=168		Malnutrition status: Yes N=17		Malnutrition status: No N=151		P-Value
	N	%	N	%	N	%	
Sex of the children							
Male	81	48.21%	10	58.82%	71	47.02%	0.356
Female	87	51.79%	7	41.18%	80	52.98%	
Place of child delivery							
Home	68	40.48%	8	47.06%	60	39.74%	
Health institution	99	58.93%	9	52.94%	90	59.60%	0.806
Others	1	0.60%	0	0.00%	1	0.66%	
ANC Yes or No							
Yes	156	92.86%	14	82.35%	142	94.04%	
No	11	6.55%	3	17.65%	8	5.30%	0.143
Don't Know	1	0.60%	0	0.00%	1	0.66%	
Times of ANC Visit	N=156		N=14		N=142		
4 times or more	121	77.56%	12	85.71%	109	76.76%	0.444
Less than 4 times	35	22.44%	2	14.29%	33	23.24%	
Iron Tablets during Pregnancy							
Yes	148	88.10%	14	82.35%	134	88.74%	
No	16	9.52%	3	17.65%	13	8.61%	0.4
Don't Know	4	2.38%	0	0.00%	4	2.65%	
Child Vaccination card							
Yes	143	85.12%	15	88.24%	128	84.77%	0.703
No	25	14.88%	2	11.76%	23	15.23%	

Weaning age of the child							
6 months and above	112	66.67%	10	58.82%	102	67.55%	0.469
Below 6 months	56	33.33%	7	41.18%	49	32.45%	
Diarrheal in Last two weeks							
Yes	8	4.76%	1	5.88%	7	4.64%	0.872
No	158	94.05%	16	94.12%	142	94.04%	
Don't Know	2	1.19%	0	0.00%	2	1.32%	
Fever in Last two weeks							
Yes	24	14.29%	1	5.88%	23	15.23%	0.296
No	144	85.71%	16	94.12%	128	84.77%	

The table above depicts that there's no association between maternal and child related factors/characteristics and nutritional status of the children. Several studies shows a significant association between sex of the child and malnutrition. Whereas studies conducted in Bharatpur municipality and south Ethiopia showed significant association between diarrheal episode and malnutrition (Upadhya 2018; Asfaw 2015) similarly place of child delivery was significantly associated with malnutrition (Dhungana 2017). Antenatal care services was found statistically significant with child malnutrition (Talukder, 2017). No ANC visit was significantly associated with malnutrition in study conducted in Kuncha VDC (Dhungana 2014). A study in Borbote Village more children were malnourished who didn't take iron supplementation during pregnancy. (Niraula et al., 2013) the immunization was found associated with wasting (Gautam 2017) immunization was found to be protective factor against under nutrition (Priyanka, Vincit 2016). There was a significant association between maternal and child care practices and malnutrition (Achakzai and Khan, 2016).

The FGD participants agreed to a phenomenon, that children who are marasmic suffer from diarrhoea more frequently. And, these children got sick more frequently than healthy children. "I knew a child who was born from a mother who was only 15 years old, was never breastfed as the mother could not produce milk had to be taken to Bharatpur (NRH) and was admitted for 4 months, and still the child is 2 and half years and looks smaller than a year old child.

Table 22: Association between Wash and Sanitation components and Nutritional Status of the children

	Total N=168		Malnutrition status: Yes N=17		Malnutrition status: No N=151		P-Value
	Number	%	Number	%	Number	%	
Frequency of Washing hand(As per guideline)							
Wash Frequently	78	46.43%	8	47.06%	70	46.36%	0.956
Wash Less Frequently	90	53.57%	9	52.94%	81	53.64%	
Main Source of Drinking water							
Tap Water	164	97.62%	17	100.00%	147	97.35%	
Tube well/bore Water	1	0.60%	0	0.00%	1	0.66%	
Dug Well (Covered/uncovered)	1	0.60%	0	0.00%	1	0.66%	0.977
Rain Water Collection	1	0.60%	0	0.00%	1	0.66%	
Surface water(River, Pond, Lake)	1	0.60%	0	0.00%	1	0.66%	
Treat Water brought from source							
Yes	78	46.43%	8	47.06%	70	46.36%	0.956
No	90	53.57%	9	52.94%	81	53.64%	
Toilet in House							
Yes	155	92.26%	15	88.24%	140	92.72%	0.766
No	13	7.74%	2	11.76%	11	7.28%	

The table above shows no significant association between wash and sanitation components and nutritional status of the children. Prevalence of under nutrition among under-five children in the population under study was alarming and it could be associated with poor WASH practices and other sociocultural factors (Kassim, 2018). WASH interventions were significantly associated with increased mean height-for-age Z score in under 5 year's old children. The effect of WASH on linear growth is markedly different with age and types of interventions, either single or combined. Implementing combined WASH interventions has a paramount benefit to improve nutritional status of children (Gizaw 2019).

The FGD group highlighted that poor wash and sanitation practices lead to many communicable diseases.

4.4 Results from Focus Group Discussion

Introduction

After the mega earthquake, many districts have been affected and are still struggling to come back to the same state as earlier. And as the country is shifting into new federal structure, the turmoil is increasing. Similarly, the prevalence of malnutrition is not improving. The different causes of malnutrition are quite predominant in our society that directly or indirectly is contributing to produce malnourished children.

Objective

Focus group discussions (FDG) were undertaken to find the causes of malnutrition and determine their association.

Methodology

One focus group discussions (FGD) was conducted with 9 mothers to explore their views on malnutrition and find causes of malnutrition. The FGD also sought to see association between the causes and malnutrition. The FGD witnessed 9 mothers with at least a child and age ranging from 20 to 29 years.

Key Findings

The main findings from data generated by the focus group discussions are summarized below. The consultation brought about valuable information also in terms of current challenges and daily concerns of the mothers living in the study area.

In terms of knowledge on malnutrition, essentially positive feedback was received from the participants as they all had heard about malnutrition. While further discussion brought the fact that almost all of them answered malnutrition to be a disease or illness. When further points were collected, majority of them expressed that the cases of malnutrition was looked upon as a curse that brought upon as stigma in the community and people hid their ailment until the last moment when the child had to be rushed to the hospital.

However, when questioned about the causes various different causes came forth, viz. in the order of what they said, i. Poverty, ii. Junk foods iii. Poor child caring practices iv. Diarrhoea v. Early marriage and conception vi. Malnourished mother vii. Impure water and food viii. Busy schedule of family. The causes were then further discussed individually and explored for association with malnutrition. Nevertheless meticulous discussion regarding the causes brought upon the following points:

i. Poverty

Almost all the participants agreed to the cause for being a key contributing factor for malnutrition. Poverty not only had effect on child's nutrition but all of his requirement depended in it, ranging from his basic needs to all his developmental needs.

ii. Junk foods

To this cause all the mothers raised their voice unanimously as they were also the victim of it. They referred packaged noodles, biscuits, chips and toffees to be their enemies. "*The children demands the things they see attractive in the shop and once they eat those tasty foods, it is us who have to struggle to feed our home prepared food.*" stated a participant. "*It is everywhere, one can get the noodles in any shop you want and it is impossible to keep our children away from it, and moreover the advertisements are made in such a way that the milk is useless without horlicks or viva, with biscuits dipped in it, and only thing nutritious is noodles and chips with all the vitamins and drinking packaged juice is far healthier than the whole fruits."* a mother stated with complete rage. Hence, junk food were one reason that the mothers were having trouble keeping their children healthy.

iii. Poor child caring practices

The child caring practice is also an important factor for a child to be malnourished. If the child is not taken proper care by the family, the child is obvious to be malnourished and ill. The women who get married at early ages and bear children at young ages are the ones who are likely to have these issues of rearing their children. The maturity holds a serious issue in child care practice was their point.

iv. Diarrhoea

The participants looked upon diarrhoea as a cause, as many of them had faced their children suffering from diarrhoea and in result, not eating properly and even if they fed upon anything the result would be watery stool. Moreover the children turns lean very fast once the child is diarrhoeic.

v. Early marriage and conception

"*I know of a girl who got married at 16 and had a child, whose weight at birth was eleven hundred grams. The mother was also 35 kg only, now how in the earth is she going to take care and feed the child. She can't even lactate as the breasts are not yet developed.*" a participant poured her thoughts. Similarly, most of the participants agreed that early marriage and conception can cause malnutrition.

vi. Malnourished mother

Needless to say, all the mothers in the group agreed to the fact that mother needs to be healthy for a child to be healthy.

vii. Impure water and food

Unanimous words came from all of the mothers regarding the cause that impure water and food caused the children to get ill and the illness made the children malnourished.

viii. Busy schedule of family

Almost half of the participant raised their voice in the factor that if the mother and the family turns busy then it can cause malnutrition. If the parents tend to be busy and not give proper time for the child, during feeding, and other activity also then the child turns malnourished. Even if they are rich and they feed their child the best food, still the child tends to be malnourished.

Finally to sum up they agreed that these causes had association with children being malnourished.

CHAPTER V: SUMMARY AND CONCLUSION

6.1 Summary

Malnutrition remains a significant problem in South Asia, affecting more than 80 million children under the age of 5. The prevalence of malnutrition has been in decreasing trend. The status of stunting and underweight has decreased significantly, yet wasting is thriving to reduce. The objective of the study was to assess the Socio demographic differentials of malnutrition in children under 5 years of age and determine its causes in earthquake affected district.

An analytical cross-sectional study using a semi structured questionnaire and anthropometric measurements was carried out to determine the nutritional status of children in Nuwakot district. Probability Proportional to Size (PPS) sampling technique was used to determine the 1st stage cluster and the 382 household were selected by systematic random sampling. Emergency Nutritional Assessment for SMART 11 was used to determine nutritional status based on WHO Standards criteria. Chi-Square test was used as a basis to identify further strength of analysis for variables. Bivariate analysis was done and Multivariate regression was used to draw significance over the variables found significant from chi-square test.

Prevalence of global malnutrition was found to be 10.1%, where moderate acute malnutrition accounts for 7.1% and severe acute malnutrition was found to be 3%. On the basis of MUAC measurements, 8.3% prevalence of global malnutrition was found where moderate acute malnutrition contributed to 7.7% and severe acute malnutrition was found to be 0.6%. There was 24.4% of prevalence of underweight, where moderate underweight was 14.9% and severe underweight was 9.5%. The result showed 19.6% and 17.3% of under five children were moderately and severely stunted respectively accumulating to 36.9%. The chi-square test showed the significant association between initiation of the breast feeding ($p = 0.045$) and the malnutrition. Univariate and multivariate analysis showed the strength of association which shows crude odds ratio of > 1hour breast fed child and don't know status to be 0.242 and 0.312 respectively which means they are significantly more prone to malnutrition by their respective odds ratio times with P-value of 0.043 and 0.048 respectively.

The present finding concludes that under nutrition is still a public health problem among under five children in Nuwakot district. The basic and underlying causes of malnutrition need to be highlighted and effectively addressed in order to prevent malnutrition led mortality and morbidity. The local authorities need to act on to manage malnutrition in this district by conducting various programs on prevention and treatment of malnutrition.

6.2 Conclusions

The study concluded that the prevalence of wasting, stunting and underweight was 10.1%, 36.9% and 24.4 %. The results shows that the malnutrition is prevalent in the Nuwakot district as well as the country and is contributing to the under 5 mortality and morbidity. The result justifies the fact that children are malnourished mainly during the ages 6-29 months. The male child were more malnourished then the female child. Similarly the significant association was found in between initiation of the breast feeding and the malnutrition. The growth and development of the under-five depend solely on the interactions among these factors. Similarly, IYCF practices especially early initiation of breastfeeding plays significant role in prevention of malnutrition. FGD with the women group suggested

- Better and enhanced counselling regarding IYCF.
- Local authorities need to allocate budget to improve the nutritional status by implementing various interventions in the district.
- Awareness program regarding under nutrition and prevention of malnutrition should be included at various levels.
- Improve and strengthen the growth monitoring to identify malnutrition in early stage so that prompt intervention can be implemented.
- Promotion of program directed towards locally nutritious food and discouraging packaged food in the community.

REFERENCES

Abdulla, M. (2016). Assessment and determinants of nutritional status in sample of under five year old Irique children. *European Journal of Biology and Medical Science Research, 4*(4), 1-24. Retrieved from http://www.eajournals.org/wp-content/uploads/Assessment-and-Determinants-of-Nutritional-Status-in-a-Sample-of-Under-Five-Year-Old-Iraqi-Children.pdf

Achakzai, P., & Khan, R. (2016). Nutritional Status and Associated Factors among Children Less Than Five Years of Age in Tehsil Zarghoon Town, District Quetta, Baluchistan. *Journal of Ayub Medical College Abbottabad, 28*(1), 146-151. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/27323581

Asfaw, M., Wondaferash, M., Taha, M., & Dube, L. (2015). Prevalence of undernutrition and associated factors among children aged between six to fifty nine months in Bule Hora district, South Ethiopia. *BioMed Central Public Health*, *15*(1), 41. doi: 10.1186/s12889-015-1370-9

Azhari, M., Slaih, A., Khader, Y., Al-Musa, A., & Iblan, I. (2017). Nutritional status among children under five years in Amman, Jordan. *Journal of Child Health and Nutrition*, 110 - 115. doi: http://dx.doi.org/10.6000/1929-4247.2017.06.03.4

Bajracharya, S., & Subedi, A. (2017). Factors influencing malnutrition among the children of under 5 Years. *Journal of Chitwan Medical College, 7*(21), 7-12. Retrieved from http://www.jcmc.cmc.edu.np/journal_volume-21

Chataut, J., & Khanal, K. (2016). Assessment of nutritional status of children under five years of age in rural Nepal. *Kathmandu University Medical Journal, 14*(53), 73-77. Retrieved from http://www.kumj.com.np/issue/53/73-77.pdf

Dhungana, G. P. (2014). Nutritional status of under 5 children and associated factors of Kunchha Village Development Committee. *Journal of Chitwan Medical College, 3*(4), 5. doi:10.3126/jcmc.v3i4.9553

Ghane, V. R., & Kumar, R. (2017). Nutritional status of under five children of Mumbai suburban region. *International Journal of Research in Medical Sciences*, *5*(7), 7. doi:10.18203/2320-6012.ijrms20173011.

Gandhi, S., Godara, N., Modi, A., & Kantharia, S. (2014). Impact of feeding practices on nutritional status of children in rural area of Navsari district. *International Journal of Medical Science and Public Health* 2014; *3*(11), doi: 10.5455/ijmsph.2014.020820143

Ghimire J 2018). Demographic factors and dietary diversity of Chepang children of Dhading, Nepal. *MOJ Public Health, 7*(5):261–264. doi: 10.15406/mojph.2018.07.00240

Gautam, K. (2017). Nutritional Assessment and its Associated Factors among 6-59 Months Children in Dalit Community of Bagchaur Municipality, Salyan.

Kumar, D., Goel, N. K., Mittal, P. C., & Mishra, P. (2006). Influence of infant-feeding practices on nutritional status of under-five children. *The Indian Journal of Pediatrics, 73*(5), 417-421. doi: 10.1007/bf02758565

Kumar, D., Goel, N. K., Kalia, M., Mahajan, V. (2015). Socio-demographic factors affecting the nutritional status of the under three children in Chandigarh, UT (2015). *Healthline Journal of Indian Association of Preventive and Social Medicine 6* (1), 46-52. Retrieved from http://iapsmgc.org/index_pdf/173.pdf

Kassim, N., Kimanya, M., Mshida, H., & Mpolya, E. (2018). Water, Sanitation and Hygiene Practices Associated with Nutritional Status of Under-Five Children in Semi-Pastoral Communities Tanzania. *The American journal of tropical medicine and hygiene, 98*(5) 32-36. doi: 10.4269/ajtmh.17-0399

Mishra, S. K., & Sharma , R. (2010). Nutritional status of children under five years and factors associated in Mahottari District, Nepal, 2010. *Nepal Health Research council.* Retrieved from http://library.nhrc.gov.np:8080/nhrc/handle/123456789/632

Mahmood, S., Nadeem, S., Saif, T., Mannan, M., & Arshad, U. (2016). Nutritional status and associated factors in under-five children of Rawalpindi. Journal of Ayub Medical College Abbottabad, 28(1), 67-71. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/27323566

Meshram II, Laxmaiah A, Venkaiah K. Impact of feeding and breastfeeding practices on the nutritional status of infants in a district of Andhra Pradesh, India. Natl Med J India 2012;25:201-6.

Meshram II, Laxmaiah A, Venkaiah K. Impact of feeding and breastfeeding practices on the nutritional status of infants in a district of Andhra Pradesh, India. Asia pacific journal, 27(2), 1345-1361 retrieved from https://doi.org/10.1177/1010539513486174

Mengistu, K., & Alemu, K. (2013). Prevalence of Malnutrition and Associated Factors Among Children Aged 6-59 Months at Hidabu Abote District, North Shewa, Oromia Regional State. *Journal of Nutritional Disorders & Therapy*, *01*. doi: 10.4172/2161-0509-3-t1-001

Breastfeeding practices on the nutritional status of infants in a district of Andhra Pradesh, India. Natl Med J India 2012; 25: 201-6.

Meshram II, Laxmaiah A, Venkaiah K. Impact of feeding and breastfeeding practices on the nutritional status of infants in a district of Andhra Pradesh, India. Natl Med J India 2012;25: 201-6.

Niraula, S., Barnwal, S., Paudel, S., Mishra, S., Dahal, S., Das, S., Jha, N. (2013). Prevalence and associated risk factors with malnutrition among under-five Nepalese children of Borbote village, Ilam. *Health Renaissance, 11*(2), 8. doi:10.3126/hren.v11i2.8217

Pradhan, A. (2010). Factors Associated with Nutritional Status of the Under Five Children. *Asian Journal of Medical Sciences, 1* (1), 6-8. doi: 10.3126/ajms.v1i1.2927

Priyanka, R., Vincent, V., Jini, MP., Saju, CR. An assessment of the nutritional status of under-five children in a rural area of Thrissur district, Kerala, India. *International Journal of Community Medicine and Public Health*, *3*(12), 3479-86. doi: http://dx.doi.org/10.18203/2394-6040.ijcmph20164278

Simanjuntak, B. Y., Haya, M., Suryani, D., & Ahmad, C. A. (2018). Early initiation of breastfeeding and vitamin A supplementation with nutritional status of children aged

6-59 months. *National Public Health Journal; 12* (3), 107-113; doi: 10.21109/kesmas.v12i3.1747

Singh, H., Chaudhary, V., Joshi, H. S., Upadhyay, D., Singh, A., & Katwal, R. (2016). Sociodemographic correlates of nutritional status of under-five children. *Muller Journal of Medical Sciences and Research*, *7*(1) 44-49. doi: 10.4103/0975-9727.174639

Omondi D. O., Kirabira P., socio-demographic factors influencing nutritional status of children (6-59 months) in Obunga Slums, Kisumu City, Kenya, Public Health Research, 6 (2), 69-75. doi: 10.5923/j.phr.20160602.07.

Ruwali, D. (2018). Nutritional status of children under five years of age and factors associated in Padampur VDC, Chitwan. *Health Prospect, 10*, 14-18. doi:http://dx.doi.org/10.3126/hprospect.v10i0.5639

Talukder, A. (2017). Factors associated with malnutrition among under-five children: Illustration using Bangladesh Demographic and Health Survey, 2014 Data. *Europe Pubmed Central*, *4*(10), 88. doi:10.3390/children4100088

Upadhyay, H., & Bhusal, M. (2017). Statistical analysis on nutritional status and its associated factors of under five years children in Nepal. *Advanced Journal of Graduate Research*, *2*(1), 12-24. https://doi.org/10.21467/ajgr.2.1.12-24

Upadhyay Pokharel, A., Parajuli, S., & Acharya, A. (2018). Prevalence and associated factors of undernutrition among under-five children of Bharatpur Municipality of Chitwan District, Nepal. *Birat Journal of Health Sciences*, *2*(3), 266-272. doi:http://dx.doi.org/10.3126/bjhs.v2i3.18941

ANNEXES

ANNEX 1

Questionnaire

SOCIO DEMOGRAPHIC DIFFERENTIALS OF MALNUTRITION IN CHILDREN UNDER 5 YEARS OF AGE AND DETERMINE ITS CAUSES IN EARTHQUAKE AFFECTED DISTRICT NUWAKOT

QUESTIONNAIRE
TOOL 1
This questionnaire is to be administered to any household member who can answer the questions or is above 18 years.
VERBAL CONSENT I am …… and this is a research study on socio demographic differentials of malnutrition in children under 5 years of age and determine its causes in earthquake affected district Nuwakot. The research will help me understand malnutrition and its causes in the district among children under 5 years of age. Today you will be participating in an interview which should take approximately 20 minutes. Your participation is voluntary. If you do not wish to participate, you may stop at any time. Responses will be confidential and your name will not appear anywhere in the final write up. Do you agree to participate? a. Yes b. No

Cluster no:		Household number:	
Interviewer's name:	_____		
Supervisor's name:	_____		

Date: DD/MM/YYYY	__ __ /__ __ /__ __ __ __
Result of Interview	
Completed	1
No household member at the time of visit	2
Entire household absent for extended period of time	3
Refused	4
Others (specify)	5

GENERAL HOUSEHOLD INFORMATION				
1.	Respondent's name:			
2.	Respondent's relation to HH Head:		_____	
3.	Respondent's age (completed years):		_____	
4.	Name of Household head:			
5.	Type of family	a) Nuclear	b) Joint	c) Extended
6.	Sex of household head:	a) Male	b) Female	c) Others
7.	Number of Household members:		_____	
8.	No of women age 15-49 years:			
9.	No of children under 5 years of age:		_____	

SOCIO_DEMOGRAPHIC INFORMATION				
1.	Caste			
2.	Religion			
	a. Hindu	b. Buddhist	c. Muslim	d. Christian
	e. Others (specify) _____			
3.	Marital status			
	a. Married	b. Unmarried	c. Widow	d. Divorced
	e. Others (specify) _____			
4.	HH's monthly income		NRS	
5.	Paternal occupation			
	a. Service	b. Agriculture	c. Daily labour	d. Business
	e. Others (specify) _____			
6.	Maternal occupation			
	a. Service	b. Agriculture	c. Daily labour	d. Business
	e. Housewife	f. Others (specify) _____		
7.	Paternal education			
	a. Illiterate	b. Literate	c. Primary	d. Lower Secondary
	e. Secondary	f. Higher	g. Higher	h. Others _____
8.	Maternal education			
	a. Illiterate	b. Literate	c. Primary	d. Lower Secondary
	e. Secondary	f. Higher	g. Higher	h. Others _____

QUESTIONNAIRE			
TOOL 2			
MOTHER and CHILD RELATED QUESTIONNAIRE			
This questionnaire is to be administered to mother or caretaker who cares for the child who lives with them and is under the age of 5.			
Cluster no:		Household number:	
Interviewer's name:	_____		
Supervisor's name:	_____		

Date: DD/MM/YYYY	__ __ /__ __ /__ __ __ __

Repeat greetings if the respondent is different.			
Result of Interview			
Completed			1
No household member at the time of visit			2
Entire household absent for extended period of time			3
Refused			4
Others (specify)			5
1.	Child's Name:		
2.	Mother's Name:		
3.	Respondent's name:		
4.	Respondent's relation with the child:	_____	
5.	Date of Birth (DD/MM/YYYY):	__ __ / __ __ / __ __ __ ____	
6.	Age of Child (completed years):	_____ years	
7.	Sex of the child:	a. Male	b. Female

8.	Place of the child's delivery:		
	a. Home	b. Health Institution	c. Others (specify)
9.	Did you go for ANC visit?		
	a. Yes	b. No	c. Don't Know
10.	If yes, how many times?		_____ times
11.	Did you take Iron tablets during and after pregnancy?		
	a. Yes	b. No	c. Don't Know
12.	What type of salt do you use in your kitchen?		
	a. Loose crystal salt	b. Packaged salt without logo	c. Packaged salt with logo
13.	After how much time did the child initiate breastfeeding after birth?		
	a. <1 hour	b. >=1 hour	c. Don't Know
14.	Did you feed colostrum to your child?		
	a. Yes	b. No	c. Don't Know
15.	How long did you exclusively breastfeed your child?		
	a. <6 months	b. =6 months	c. >6 months

DIETARY DIVERSITY						
16.	I would like to remind you about types of food that the child may have had within the past **7** days.					
	Cereals Grains, Roots and tubers Products					
i.	Rice (bhat)	Daily	Once a week	Twice a week	Thrice a week	Never
ii.	Dhedo	Daily	Once a week	Twice a week	Thrice a week	Never
iii.	Bread (roti)	Daily	Once a week	Twice a week	Thrice a week	Never
iv.	Potato	Daily	Once a week	Twice a week	Thrice a week	Never
v.	Yam (Tarul)	Daily	Once a week	Twice a week	Thrice a week	Never
vi.	Dry Colocasia (pidalu)	Daily	Once a week	Twice a week	Thrice a week	Never
vii.	Sweet Potato	Daily	Once a week	Twice a week	Thrice a week	Never

	Pulses and Legumes					
i.	Daal	Daily	Once a week	Twice a week	Thrice a week	Never
ii.	Soyabean	Daily	Once a week	Twice a week	Thrice a week	Never
iii.	Pea	Daily	Once a week	Twice a week	Thrice a week	Never
iv.	Gram	Daily	Once a week	Twice a week	Thrice a week	Never
v.	Sesame seeds (teel)	Daily	Once a week	Twice a week	Thrice a week	Never
	Fruits and Vegetables					
i.	Fruits (Apple, Orange, guava, papaya, Banana, Mango, Litchi, jack fruit, ground apple, cucumber, avocado, amala, Lemon, berries, pomelo, kaphal, strawberry, halwabed, mausam)	Daily	Once a week	Twice a week	Thrice a week	Never
ii.	Vegetables (green leafy vegetables, karkalo, cabbage, cauliflower, seasonable vegetables)	Daily	Once a week	Twice a week	Thrice a week	Never
	Animals Products					
i.	Meat	Daily	Once a week	Twice a week	Thrice a week	Never
ii.	Fish	Daily	Once a week	Twice a week	Thrice a week	Never
iii.	Egg	Daily	Once a week	Twice a week	Thrice a week	Never
iv.	Milk and milk Products (yogurt, mohi, ghee, paneer, cheese, butter)	Daily	Once a week	Twice a week	Thrice a week	Never
	Junk foods					
i.	Packaged noodles, chow-chow	Daily	Once a week	Twice a week	Thrice a week	Never
ii.	Biscuits	Daily	Once a week	Twice a week	Thrice a week	Never
iii.	Potato Chips (Lays, kurkure)	Daily	Once a week	Twice a week	Thrice a week	Never
iv.	Chocolates and candies	Daily	Once a week	Twice a week	Thrice a week	Never
v.	Titaura	Daily	Once a week	Twice a week	Thrice a week	Never

vi.	Panipuri	Daily	Once a week	Twice a week	Thrice a week	Never
vii.	chatpate	Daily	Once a week	Twice a week	Thrice a week	Never
viii.	Momo	Daily	Once a week	Twice a week	Thrice a week	Never
ix.	Chowmein	Daily	Once a week	Twice a week	Thrice a week	Never

DIETERY RECALL				
IF Child < 6 months				
17.	Is the child fed anything other than breast milk? (Probe)			
	a. Yes	b. No	c. Don't Know	d. Others
18.	If Yes, specify	_____		
IF Child >= 6 months				
19.	At what age of the child, weaning was done?			_____ months
20.	Is the child still being breastfed?			
	a. Yes	b. No	c. Don't Know	
21.	Yesterday, during day or night did the child drink anything from a bottle with nipple?			
	a. Yes	b. No	c. Don't Know	
22.	Yesterday, did the child drink ORS during the day or night?			
	a. Yes	b. No	c. Don't Know	
23.	Yesterday, did the child take any vitamin or mineral or any medicine during day or night?			
	a. Yes	b. No	c. Don't Know	
24.	I would like to remind you about liquids that the child may have had yesterday during day or night, even combined with other foods.			
i.	Plain Water	a. Yes	b. No	c. Don't Know
ii.	Juice or Juice drinks	a. Yes	b. No	c. Don't Know
iii.	Soup	a. Yes	b. No	c. Don't Know
iv.	Milk	a. Yes	b. No	c. Don't Know
v.	Infant formula like lactogen	a. Yes	b. No	c. Don't Know
vi.	Tea, coffee	a. Yes	b. No	c. Don't Know

25.	I would like to remind you about foods that the child may have had yesterday during day or night, even combined with other foods.			
i.	Yogurt	a. Yes	b. No	c. Don't Know
ii.	Cerelac	a. Yes	b. No	c. Don't Know
iii.	Foods made from grains	a. Yes	b. No	c. Don't Know
iv.	Pumpkin, carrot etc.	a. Yes	b. No	c. Don't Know
v.	Dark green, leafy vegetables	a. Yes	b. No	c. Don't Know
vi.	Ripe mangoes	a. Yes	b. No	c. Don't Know
vii.	Other fruits or vegetables	a. Yes	b. No	c. Don't Know
viii.	Liver, heart or other organ meats	a. Yes	b. No	c. Don't Know
ix.	Meat	a. Yes	b. No	c. Don't Know
x.	Eggs	a. Yes	b. No	c. Don't Know
xi.	Fresh or dried fish	a. Yes	b. No	c. Don't Know
xii.	Foods made from beans, peas etc.	a. Yes	b. No	c. Don't Know
xiii.	Cheese or milk product	a. Yes	b. No	c. Don't Know
xiv.	Other solid, semi-solid or soft	a. Yes	b. No	c. Don't Know

IMMUNIZATION				
1.	Do you have a card where the child's vaccinations are written down?			
	a. Yes	b. No	c. Don't Know	
2.	Has the child been immunized against?			
i	BCG	a. Yes	b. No	c. Don't Know
ii.	Polio 1	a. Yes	b. No	c. Don't Know
iii.	Polio 2	a. Yes	b. No	c. Don't Know
iv.	Polio 3	a. Yes	b. No	c. Don't Know
v.	DPT 1st dose (pentavalent)	a. Yes	b. No	c. Don't Know
vi.	DPT 2nd dose (pentavalent)	a. Yes	b. No	c. Don't Know
vii.	DPT 3rd dose (pentavalent)	a. Yes	b. No	c. Don't Know
viii.	Measles	a. Yes	b. No	c. Don't Know
ix.	Japanese Encephalitis	a. Yes	b. No	c. Don't Know

CARE OF ILLNESS				
1.	In last two weeks, has the child suffered from	a. Yes	b. No	c. Don't Know
2.	In last two weeks, has the child suffered from fever?	a. Yes	b. No	c. Don't Know
3.	In last two weeks, has the child become ill?	a. Yes	b. No	c. Don't Know
4.	If Yes, Specify			

WASH and SANITATION				
1.	How often do you wash your hands? (5 critical times o o o o o)			
	a. Wash less frequently	b. Wash frequently		
2.	What is the **MAIN** source of drinking water?			
	a. Tap Water	b. Tube well/ Borehole		
	c. Dug well (covered / uncovered)	d. Rain water collection		
	e. Surface water (river, pond, lake,	f. Tanker truck		
	g. Bottled water (jar, mineral water)			
3.	What is the **MAIN** source of water for household purposes?			
	a. Tap Water	b. Tube well / Borehole		
	c. Dug well (covered / uncovered)	d. Rain water collection		
	e. Surface water (river, pond, lake,	f. Tanker truck		
4.	How long does it take to get water from the source? (both way)			__ minutes
5.	Do you treat the water brought from the source?			
	a. Yes	b. No	c. Don't Know	
6.	If Yes how do you treat the water?			
	a. Boiling	b. Chlorination		
	c. Filter through cloth	d. Commercial candle filter		
	e. Exposure to sunlight (SODIS)	f. Others (specify)		
7.	Do you have toilet in your house?			
	a. Yes	b. No	c. Don't Know	

8.	What kind of latrine do you have in your HH?		
	a. Pit Latrine		b. Piped sewer latrine
	c. Septic tank latrine		d. Others (Specify)
9.	Do you share your toilet with other?		
	a. Yes	b. No	c. Don't Know

TOOL 3 ANTHROPOMETRY		
1.	Child's MUAC	
	a. MUAC	b. Not measured,
2.	Child's length or height	
	a. Length/ height	b. Not measured,
3.	Child's weight	
	a. Weight	b. Not measured,
Thank the respondent for their valuable time.		