"DETERMINANTS AND CONSEQUENCES OF MALNOURISHED UNDERFIVE URBAN CHILDREN: A CROSS SECTIONAL STUDY"

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Doctor of Philosophy
In the Faculty of Nursing

By

MRS.VAISHALI S. BAGEWADI

Registration No: KLEU/Ph.D./DO1218005/Year:2018-19

Under the Guidance of

PROF.SUMITRA L.A

Professor & HOD

Dept. of Child Health Nursing

Co-Guide

DR. SANGEETA KHARDE M.Sc. (N), Ph.D.

Professor & Vice Principal,

KAHER Institute Of Nursing Sciences, Belagavi

KAHER INSTITUTE OF NURSING SCIENCES BELAGAVI

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Belagavi.

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Place : Belagavi

Date : 15/05/2024

Guide

Prof.Sumitra L.A M.Sc.(N)

Professor & HOD

Dept.of Child Health Nursing

Place : Belagavi

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Date : 15/5/24

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Signature of Principal :

Dr.Veereshkumar Nandagaon M.Sc. (N), Ph.D(N),

Principal,

KAHER, Institute of Nursing Sciences,

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Place : Belagavi

Date : 15/5/24

Signature of Dean :

Dr.Preeti Bhupali M.Sc. (N), Ph.D(N),

Dean faculty of Nursing ,

KAHER, Institute of Nursing Sciences,

Belagavi – 590010, Karnataka

Dean Faculty of Nursing Science
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Place : Belagavi

Date : 15/05/2024

Signature of Guide

Prof. Sumitra L.A. M.Sc. (N),

Professor & HOD ,

Dept.of Child Health Nursing,

Belagavi – 590010, Karnataka

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Place : Belagavi

Date : 15/05/2024

Signature of Co-guide:

Kharde

Dr.Sangeeta Kharde M.Sc. (N), Ph.D(N),

Professor & HOD ,

Dept.of Child Health Nursing,

Belagavi – 590010, Karnataka

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Date: *Signature of the candidate*

Place: Belagavi ***Mrs.Vaishali Bagewadi***

ABBREVATIONS:

Sl.No	Abbreviation	Expanded Forms
1.	**AOR**	Adjusted Odds Ratio
2.	**BMI**	Body Mass Index
3.	**CI**	Confidence Interval
4.	**DHO**	District Health Officer
5.	**IEC**	Institutional Ethics Committee
6.	**LBW**	Low Birth Weight
7.	**MLR**	Multiple Linear Regression
8.	**MUAC**	Mid Upper Arm Circumference
9.	**OR**	Odds Ratio
10.	**RTI**	Respiratory Tract Infection
11.	**SAM**	Severe Acute Malnutrition
12.	**SE**	Standard Error
13.	**SES**	Socio-Economic Status
14.	**SPSS**	Statistical Package for Social Sciences
15.	**WHO**	World Health Organization

ABSTRACT

Malnutrition is now the most prevalent nutritional condition in poor nations, and it is a major contributor to under-five mortality and morbidity globally. More than one third of the world's malnourished youngsters are found in India alone. Among them, more than half of young children under the age of 3 are seemed to be underweight.[1] **The objective** of this study was to assess the determinants of malnutrition among underfive children. **Study design:** A cross sectional study with key informant interview to identify the determinant factors of malnutrition.460 children with their mothers participated in the study. Anthropometric measurements were taken and causative factors were assessed with pre tested and validated questionnaires. Odds ratio with 95% confidence interval was used to identify the determinants of Malnutrition among underfive children using multivariate logistic regression. **Results:** Muslim children (OR=0.40 (95% CI, p=0.0010), Extended family (OR= 5.42 (95% CI, p=0.0001) Breastfeeding started very late (OR= 4.99 (95% CI, p=0.0001), Bottle feeding (OR=0.28 (95% CI, p=0.0030), Daily feeding frequency < 5 times (OR=3.38 (95% CI, p=0.0001),Exclusive breastfeeding not given for 6 months(OR= 2.69 odds (95% CI, p=0.0001) and Bottle washed only with water (OR= 0.74 odds (95% CI, p=0.0500) were more likely to suffer from malnutrition.

Conclusion: Malnutrition was found to be influenced by socioeconomic, demographic, environmental and child-specific and feeding related factors. These findings are highly noteworthy because they offer potential paths of action that could be followed to improve child's nutritional status. Breastfeeding started very late after birth, Bottle feeding, daily feeding frequency < 5 times, Exclusive breastfeeding not given for 6 months and washing the bottle only with water without boiling the bottle were identified as some of the determinants of Malnutrition whereas Pneumonia,

occurrence of Respiratory Tract Infections twice/thrice a month are identified as effects of malnutrition. Therefore due emphasis has to be given on knowledge and practice towards the awareness on feeding practices especially to the mothers/caretakers and also towards the breastfeeding support practices and support maternal and child health especially in the prenatal and postnatal periods and also Malnutrition has become a more widespread issue, and it can be prevented by providing children with the proper care and upbringing when they are younger. Additionally, educating mothers about the value of good nutrition for their children can help to solve the malnutrition issue in our community.

Key words: Malnutrition, Determinants, Underfive, Children, Feeding

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CHAPTER – I

1.1 INTRODUCTION & BACKGROUND

In India, undernutrition among children under the age of five has emerged as a major public health issue. The nutritional condition of children under five is also being impacted by the eating habits of the current generation, which is leading to an increase in the incidence of non-communicable illnesses such obesity, diabetes, hypertension, and coronary heart disease etc.

Globally in 2022, 149 million children under 5 were estimated to be stunted (too short for age), 45 million were estimated to be wasted (too thin for height). [1]

India is said to be the country where 60 million underweight children reside, and it is also where 80 percent of the world's malnourished children reside. The mortality of children under the age of five was about 59 out of every 1000 live births which is one of the highest rates in the world and it is mainly due to malnutrition in the children. [2]

Malnutrition is now the most prevalent nutritional condition in poor nations, and it is a major contributor to under-five mortality and morbidity globally. More than one third of the world's malnourished youngsters are found in India alone. Among them, more than half of young children under the age of 3 are seemed to be underweight. Malnutrition is regarded as one of the most urgent problems, and one of its main effects is delayed physical and intellectual development. [2]

The bulk of the world's malnourished children are mostly located in India, raising warnings about the need to improve health policies with a primary focus on reducing social and physical inequality.

Infant and under-five mortality rates have significantly decreased in India during the past 10 years, but it is also estimated that 50% of the world's malnourished children live in India. Rural areas have a higher frequency of underweight (38%) than urban areas (29%).In India, the prevalence of stunting among under five is 48% and wasting is 19.8% and underweight prevalence of 42.5%.[3]

According to certain surveys, a lot of kids eat unbalanced, unnutritious diet that leaves them undernourished or lacking in certain micronutrients. The community's capacity to make the best decisions is significantly influenced by the availability of nutrient-dense foods in marketplaces.[3] 38% of people in Karnataka are underweight, which accounts for both acute and chronic malnutrition. [4]

Lack of socioeconomic status equality is the major cause of malnutrition in India, which affects particular demographic groups due to their inadequate diets in terms of both quantity and quality. Babies born to unwell mothers are more likely to be unwell themselves. Long-term repercussions on people and society are associated with nutritional deficiencies. People who don't obtain enough nutrition are more likely to get infectious illnesses like pneumonia and TB, which often have higher fatality rates.[5]

Malnutrition can weaken the immune system, making children more susceptible to infections, illnesses and even death. It can also delay the healing process of injuries and increase the risk of developing chronic infections, such as tuberculosis.

Malnutrition can also affect a child's cognitive and motor development, leading to difficulties in learning, socializing and participating in physical activities. It can result in a lower IQ and poor academic performance, which can have long-term consequences on a child's future career prospects and economic opportunities.[6]

For survival, to maintain a high standard of living, and to ensure the security and protection of human life, nutrition is a crucial component of good health. For healthy development, correct organ formation and function, a strong immune system, and favourable neurological and cerebral growth, enough nourishment is necessary. [7]

Malnutrition in India statewise,[5] : Reported from Health information of India in 2004 for underfive children.

State	Percentage of malnutrition	State	Percentage of malnutrition
Kerala	19.7	Andhra Pradesh	31.4
Goa	20.1	Delhi	32.3
Andaman & Nicobar	23.3	West Bengal	32.5
Diu and Daman	23.4	Uttarakhand	33.5
Puducherry	23.7	Haryana	34
Tripura	24.3	Odisha	34.1
Punjab	25.7	Maharashtra	34.4
Himachal Pradesh	26.3	Karnataka	36.2
Lakshadweep	27	Assam	36.4
TamilNadu	27.1	Chattisgarh	37.6
Jammu & Kashmir	27.4	Gujrat	38.5
Mizoram	28	Rajasthan	39.1
Telangana	28.1	Dadra & Nagar Haveli	41.7
Nagaland	28.6	Madhya Pradesh	42
Chandigarh	28.7	Meghalaya	43.8
Manipur	28.9	Jharkhand	45.3
Arunachal Pradesh	29.4	Uttar Pradesh	46.3
Sikkim	29.6	Bihar	48.3

The state of Malnutrition among children in Karnataka

The NFHS-3 paints a rather dismal picture of Karnataka in regard to the health and nutrition status of children.

a. 44% of children under age five are stunted, or too short for their age, which indicates that they have been undernourished for some time.

b. 18% of children are wasted, or too thin for their height, which may result from inadequate recent food intake or a recent illness.

c. 38% are underweight, which takes into account both chronic and acute under nutrition.

d. Children in rural areas are more likely to be undernourished; but even in urban areas, more than one-third of children under age five years suffer from chronic under nutrition.[7]

Children who get just breast milk have a lower risk of malnutrition and ev en mortality, therefore encouraging more mothers to breastfeed is also necessary.In or der to increase nutritional status and combat various illnesses, supplemental feeding m ust be introduced to nursing in children beyond six months. The most effective means of supporting development are to increase nutrition. In order to increase nutritional status and fight against numerous illnesses in children after six months of age, supplemental feeding must be added to nursing.[8]

The most vulnerable age group for malnutrition is children under two, and preventing its appearance is one strategy to lessen the impact of malnutrition. The goal of acute malnutrition prevention is to stop malnourished children from

progressing to moderate acute malnutrition and to stop children with moderate acute malnutrition from becoming worse and becoming severely malnourished. The primary focus should be on community-wide preventive strategies since they have a greater impact on reducing childhood acute malnutrition than programmes that just serve children who are already very underweight. However, considerably less is understood about whether preventive measures perform best in a certain situation, particularly when huge populations are involved, there are little resources available, or there are integrated plans that incorporate a number of treatments with various goals. A vital part of health treatment is improving children's nutritional condition.[9]

Undernutrition and several dangerous childhood illnesses cause more than half of all deaths in children under the age of five. Mild and moderate undernutrition are the most prevalent types, and children between the ages of 6 and 24 months are the most vulnerable.[10]

Stunting in children is caused by chronic malnutrition, which has a negative impact on the entire community and the future. Malnutrition weakens a child's immune system, hinders their capacity to learn, and eventually affects their ability to support themselves and have healthy offspring. Many parents are ignorant of the benefits of breastfeeding and the necessity to provide children with nourishing meals in order to enhance their health.[11]

Malnourished woman is more likely to give birth to a malnourished kid, and her breast milk will not provide the essential nutrients the infant need. The greatest strategy to maintain sufficient dietary intake during the first few years after birth is through breast milk, which also strengthens the child's immune system. Additionally, studies have shown that breastfeeding is the best method to stop a kid from dying,

potentially saving 1.5 million lives annually. In order to protect the infant from malnutrition, it is also crucial to consume a healthy diet in addition to nursing. It has been shown that malnutrition frequently results from parents who are ignorant of a nourishing diet, rather than a lack of food.[11]

Malnutrition in children is caused by a wide range of direct and indirect factors. Researchers have found that gastrointestinal parasites, a variety of juvenile illnesses, inadequate care during illness, and an inadequate or inappropriate food intake are the main causes of child malnutrition.

Our general health, our living environment, and the food we eat interact intricately to define our nutritional condition, according to study. To put it another way, the three "pillars of well-being" are care, nourishment, and health.

One of the most important factors that has to be considered in order to prevent malnutrition over time is the consumption of an adequate and nutritious diet.

The body lacks energy, protein, and vitamins when food is consumed in inadequate quantities or in a nutrient-poor way. This impairs growth, development, and resistance and eventually leads to a host of ailments. After then, people become malnourished and the malnutrition cycle begins.

Malnutrition is also more common in children with severe diseases like diarrhoea or other childhood disorders. Children who suffer from acute respiratory infections (ARI) or diarrhoea on a regular basis are more likely to be malnourished. This can be partly attributed to reduced food and beverage intake, as well as decreased appetite during diseases such as diarrhoea. The quantity of food consumed greatly affects both an individual's general nutrition status and that of children. [12]

1.2 NEED /JUSTIFICATION OF THE STUDY

It has been established that malnutrition has negative consequences on human health and development.

The South East Asia Region (SEAR) is dealing with a higher prevalence of child undernutrition as a result of several socioeconomic, biological, and social causal factors.

Malnutrition is a major underlying cause of both child morbidity and mortality in India. Since there are so many potential causes of malnutrition, a variety of strategies are required to avoid it.

Within Karnataka, the severity of malnutrition varies widely from area to region and ecologically. Since there are many different causes of malnutrition, there must be several different strategies to alleviate it. It is essential to determine the root causes of the problem in order to implement the right remedy.

The child's dietary state affects their health, physical development and academic achievement. Every kid has a right to get the nutrients they need to sustain their normal health.

According to the research, a healthy diet is essential for both current and future generations' survival, growth and development.

A child's growth and the risk of death and morbidity in later years can both be impacted by malnutrition. More than half of mortality in children under the age of five are related to malnutrition of which mild and moderate types are responsible for 75% of cases.

When a diet is deficient in nutrients or just one or more nutrients are sufficient, malnutrition results, which can cause a variety of health issues. These nutrients can include carbohydrates, proteins, vitamins and minerals. Undernutrition or undernourishment is the term for when the body receives insufficient nutrients while overnutrition is the term for when it receives excessive amounts.

Malnutrition, which is a term used to describe undernutrition, is typically brought on by a lack of sufficient access to healthy food. Undernutrition among children under the age of five is still seen as a community issue, notwithstanding a decline in the incidence rate over the past few years.

Children under the age of five are regarded as a vulnerable population in any society because nutritional deficiency has repercussions ranging from low birth weight to impacts on the health of the mother, socioeconomic and environmental variables.

For survival, a high standard of living and general well-being, excellent diet determines good health. For healthy development, effective organ formation and function, a robust immune system and the neurological and cognitive maturation of children, adequate nutrition is crucial. Malnutrition impairs a child's cognitive development, preventing them from leading active lives.[13]

Malnutrition is characterised as a pathological condition brought on by a relative, absolute, or overabundance of one or more vital nutrients. Early childhood malnutrition has a long-term negative impact on subsequent physical development and intellectual function.[14]

A number of earlier research looked at the causes of malnutrition in India, but relatively few of them focused on cities. Although many studies are national in scope, there is a dearth of urban-focused literature. The current study adds to the body of knowledge on the underlying factors that influence malnutrition, particularly in Belagavi City's urban neighbourhoods.

A recent research was carried out by an NGO to evaluate the effectiveness of community-based evidence methodologies in regional settings. A thorough investigation was conducted to determine recent breastfeeding, age-appropriate feeding practices, hygienic practices, hand washing habits, the availability of seasonal local foods, and the weight of children under the age of five. The Anganwadi personnel organised and conducted daily sessions. The mothers who exhibited good actions were important facilitators. The excellent findings from these sessions showed that the weight of 70% of the total 280 children had improved.[15]

Given the aforementioned circumstances, the current study is being conducted to examine the causes and effects of malnutrition in children under the age of five. This kind of research aids in the development of more modern intervention programmes for the prevention of malnutrition and related health issues in children under the age of five.

Learning about nutrition is a vital part of anyone’s knowledge base. It helps us make informed decisions about what to eat, which can lead to improved health outcomes. Proper nutrition can prevent chronic diseases, improve mental health, boost energy levels, and enhance overall quality of life. Knowing how to maintain a nutritious diet is essential for keeping up a healthy lifestyle.

This study intends to look at the factors that connect to nutritional status in underfive children in order to create better nutritional treatments.

Problem statement

Determinants and Consequences of Malnourished underfive urban children: a cross sectional study

Objectives of the study

1. To study the determinants of Malnutrition among urban underfive children
2. To study the consequences of Malnutrition among urban underfive children

Operational definitions:

Malnutrition: refers to **imbalance between the body's supply and demands** for nutrition. [1]

Grades of Malnutrition [1]

Grades of Malnutrition	**Weight for the age of the standard (median)%**
Normal	> 80
Grade I	71-80 (Mild malnutriton)
Grade II	61-70 (Moderate malnutriton)
Grade III	51-60 (Severe malnutriton)
Grade IV	<50 (Very severe malnutriton)

Underfive: children who are **less than five years old**, especially those who are not in full-time education.

Determinant : a determinant is a **factor or cause** that makes something happen or leads directly to a decision. In the present study determinants refers to the factors or variables which determines the condition of Malnutrition.

Consequences: a **result or effect** typically one that is unwelcome or unpleasant.

In the present study it refers to the immediate health effects of Malnutrition in underfive children.

Associated Health Problems of Malnutrition include:

1. Delayed Growth & development (stunting, wasting , underweight)
2. Severe infections like diarrhea& ARI

Hypothesis:

H_{o1}: There will be no statistically significant association between malnutrition and its determinants among urban underfive children at 0.05 level of significance.

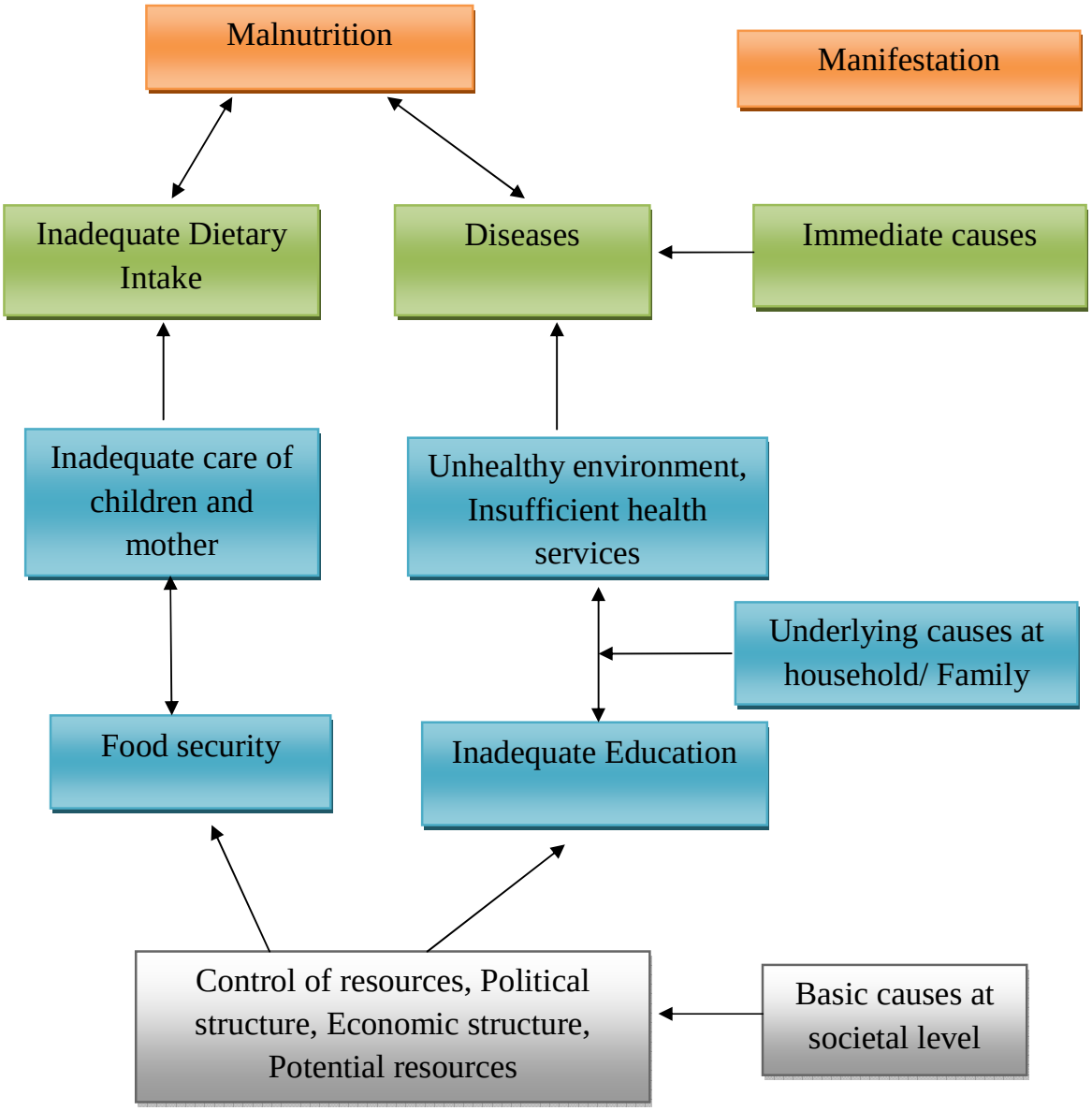
H_{o2}: There will be no statistically significant association between malnutrition and its consequences among urban underfive children at 0.05 level of significance.

Assumptions:

The study assumed that,

1.Underfive children and their mothers have some knowledge regarding causative factors and effects of Malnutrition.

2.Mothers of underfive children are interested to learn more about Malnutrition and its prevention.



Conceptual framework adapted from UNICEF

CONCEPTUAL FRAMEWORK

Conceptual framework based on UNICEF model for analyzing the causes of Malnutrition, 2020 [16]

The model of concept is a collection of interconnected portions or/ and summaries that are organized in a chronological and systematic order according to their relevance to one framework, and this model is sometimes referred to as or also called as conceptual framework.

A conceptual framework is a collection of statements, each of which expresses a relationship. The statements are organized in a logically interconnected deductive system that allows new statements to be derived from them.

Theory is known as an abstract and systematic explanation of several aspects of reality. To describe some of the part of the globe in a theory each of the concepts are connected to one another in a systematic and interconnected ways. Theories play a vital role in both qualitative and quantitative research.

In quantitative research, the researcher frequently begins with a framework, conceptual model or theoretical model. That the researchers make predictions based on all of these theoretical models or frameworks regarding various categories will act into the present or real globe if, theory is genuine. In other words, researchers use deductive reasoning to develop and arrive at general theories and particular predictions that can be empirically evaluated in the real world. The findings of the study are used to change, deny, accept or validate the theory.

In this study UNICEF's model was used to analyse the causes of malnutrition. The main reasons for child's malnutrition are caused by mainly three reasons, namely immediate, underlying and basic causes.

Immediate causes

The diet consumed by children has extremely few micronutrients. Food consumption and production have been impacted by the rise in food prices and climate change. Malnutrition can be caused by diseases such as diarrhea, respiratory tract infections, and fever. These diseases reduce the child's immunity, resulting in malnutrition.

This study discovered that the majority of mothers breastfed their newborns, despite the fact that nursing has a positive impact on a child's survival. Breastfeeding also lowers illnesses including infant diarrhea and respiratory tract infections, which were thought to be primary causes of malnutrition.

Underlying causes

Food insecurity, as well as inadequate treatment and health-care resources, are among the underlying causes. Many youngsters live in harmful environments in their homes. There are no proper toilets or other sanitation services available. Children are taught the need of washing their hands before eating and after using the restroom. Improper mother education about a nutritious diet contributes to malnutrition. Mothers who are knowledgeable about nutritious food consumption can help to prevent malnutrition at an early stage.

Basic causes

Malnutrition is caused primarily by political and economic structures. The formation and improvement of government policy has a direct impact on malnutrition, with socioeconomic position being a crucial component. Because children are considered the most vulnerable and disadvantaged population, policymakers and health programmers must modify child nutrition policies and programs to focus a larger emphasis on this age group. Because the socioeconomic position of a family has a significant impact on children's nutritional quality, policies and initiatives aiming at eliminating poverty may be a long-term solution to the problem.

1.3 REVIEW OF LITERATURE

A literature review can provide fresh ideas for research as well as aid in laying the groundwork for the study. An early literature review in the report gives readers a foundation for comprehending what is currently known about the subject and highlights the importance of the new investigation.

An in depth review of literature has been conducted from unpublished and published books, journals, materials, reports and other related materials. That it has helped a lot to the researcher and gave or provided the researchers with a in depth or deeper insight into the issues and has helped and assisted in the methodology, by defining the issue the tool construction, and analysis of data.

It has held that to get insight into the chapter or topic and grow or develop the experimental project, a ‘review of literature' is essential. Its written literature review give or evaluation provides background for knowing the investigators and researchers

to comprehend what has already been done in the subject under investigation and illustrates the approach in conducting new studies to meet needs and requirements.

The term review of literature have described by several researcher in their own method. That a lesser research scholar said that by going in depth or through of study completed by other researchers is held to be full and total information of what fact is and which have been unpublished and published and generalized on the particular issue by the researchers at university.

Polit and Beck explains the word as, literature review offers users an overview of the existing evidence on the subject in hand and develops a thesis that shows the requirement for much more research.

American Nurses Association defined the word review of literature is as a complete and total text, which objectives and purposes are comprehensively move by the each and every minute information or knowledge on a particular issue research statement.

The primary and most significant goal of a literature review is to gather an in-depth and comprehensive background that available related to an issue in order to conduct research. A literature review is a methodology or action of finding and searching or evaluating of the present existing materials in the particular subject of selected or given area and chapter which is selected by the research scholar.

In the process of carrying out the present study, the investigator has reviewed the following literature which has been categorized under the following headings,

Literature pertaining to:

- Prevalance and determinants of Malnutrition
- Consequences and associated Health Problems of Malnutrition

Prevalence and determinants of Malnutrition

A descriptive cross-sectional study was conducted in 2009 on 350 underfive children to examine the prevalence and predictors of malnutrition among children aged 6-59 months in Trans-Mara East sub-county in Narok county, Kenya. Multivariate logistic regression analysis showed that 9% and 4% of the children suffered from overweight and obesity respectively and 31%, 22% and 8% of the children were stunted, underweight and wasted, respectively. The key determinants for stunting were mother being a house wife and being poor and number of children in the household. For obesity, the predictors were child gender with males more likely to be obese relative to females and child age with 12-23 months, 24-35 months. Thus, the study concludes that there is double burden of malnutrition in rural settings characterized by higher prevalence of under nutrition and low prevalence of over nutrition.[17]

A case-control study was conducted from June 1 to August 30, 2015 on 451 under-five children (151 cases and 300 controls) at Dilla referral hospital in Gedeo zone, SNNPR, Ethiopia, to identify risk factors for acute malnutrition among under-five children. The results showed that determinants identified were; household monthly income, diarrheal diseases, maternal illiteracy complimentary feeding started before 6 months or late after 6 months, mothers/care givers infrequently hand washing, merchant mothers and family size more than four. Therefore behavioral and socio-demographic factors were identified as determinants of acute malnutrition

among under-five children. Thus collaborative effort is needed to promote hand washing practice, create mass awareness about complementary feeding, prevent diarrhea among underfive children, empower women and make family planning methods available.[18]

A community based case–control study was conducted from July to December 2014 on 292 children aged 6–59 months (146 cases and 146 controls) in 12 randomly selected Village Development Committees (VDCs) of the Bara district of Nepal, to assess the determinants of SAM among children aged 6–59 months.The results showed that, the prevalence of SAM among children under the age of 5 years was 4.14%. The factors significantly associatedwithSAMare :mother's age at birth <20 or >35 years,illiterate father, low socioeconomic status,bottlefeeding,birth interval <24 months and not initiating complementary feeding at the age of 6 months. Colostrum feeding, Mother's educational level, exclusive breastfeeding and initiation of breastfeeding were not significantly associated with SAM.The study concluded that a multi-sector approach is essential to address SAM.[19]

A community based cross-sectional study was conducted from October 2015 September2016 in urban slum area of Berhampur city on 300 mothers of children aged 6-59 months, to find out prevalence of under nutrition and its severity among the study population and to identify socio-demographic factors associated with malnutrition. The results showed that stunting (42%), 69% were underweight (55.3%) and wasting (75%) and Maximum number of underweight children belongs to age group 37-60 months (52.6%) followed by other two age groups. 20% were severely underweight and 21.3% were severely wasted. Factors found to be significantly associated with prevalence of malnutrition were hygienic and feeding practices of

mother and maternal education. The study concludes that Malnutrition is widely prevalent among study population more than the state and national prevalence. Faulty feeding practices, hygienic practice and Maternal education are contributory factor of this high prevalence of disease.[20]

A community based descriptive cross sectional study was done in Urban Health Training Centre of the Department of Preventive and Social Medicine, in Guru Nanak Chowk on 650 under-fives from slum and Non-slum area proportionately (i.e. 400 from slum & 250 from Nonslum area), to assess prevalence of stunting, wasting and underweight among under-five children and to study factors associated with them. The results showed that 38.15% were underweight, 40.46% were stunted, and 16% were wasted. The birth weight, education of mother, birth order and type of family were statistically significant. The proportion of under- five children with underweight showed significant association with their socioeconomic status, birth weight, age, education mother, and birth order. Proportion of under-five children with SAM and MAM decreased significantly with increase in education status of mother. Therefore the study concludes that birth weight, birth order and Maternal education were significantly associated withstunting, underweight and wasting. Proportion of children with underweight increases significantly with increase in age and decrease in socioeconomic status.[21]

A Community based case-control study was carried out in March 2016 on 311 (64 cases and 247 controls) children aged between birth to 59 months with their respective mothers or care takers in rural EnebsieSarmidr District, East Gojjam Zone, North West Ethiopia to identify the determinants of severe acute malnutrition. The results showed that 97.8% severe acute malnutrition was significantly associated with

late initiation of breast feeding greater than an hour after birth, age groups birth-24 months , diarrheal disease in the preceding 2 weeks before SAM , febrile illnesses, nonexclusive breast feeding , decreased or maintained mealing of the mother compared to the regular during pregnancy or lactation and birth interval less than 2 years after controlling other variables effect. The study concludes that nonexclusive breast feeding, child's age, diarrheal diseases, late initiation of breast feeding, and febrile illnesses, decreased or maintained mealing compared to the regular during pregnancy and lactating of the mother and narrow birth interval were identified as determinants of SAM. Therefore, collaborative efforts are needed to improve promotion of better child caring practices specifically, maternal and child feeding practices and prevention and treatment of acute illnesses.[22]

A case control study was conducted on 104 cases and 208 controls in Ethiopia, with the aimto identify determinants of severe acute malnutrition among under five children in selected public health facilities, Northwest Ethiopia. The study results showed that children from households of large family size, which didn't receive any nutrition information, having monthly income less than 1500 birr , didn't practice exclusive breastfeeding , practice infrequent hand washing ,which are food insecure and as well as children who had history of diarrhea two weeks prior to the survey were more likely to suffer from severe acute malnutrition. The study concludes that history of diarrhea, food security status, family size,exclusive breastfeeding practice, access to information on child feeding, hand washing practice and monthly income were identified to be predictors of severe acute malnutrition. Emphasis should be given to promoting family planning, improve household livelihoods and food security, strength awareness creation on exclusive breastfeeding and frequent hand washing practices as well as prevention of diarrhea. [23]

A study was conducted in South Wollo Zone, Amhara Region, Ethiopia, on 414 under-five children who were admitted with severe acute malnutrition between September 11, 2014, and January 9, 2016, with a aim to estimate the survival status and its determinants among under-five children. The results showed that, 3.4% died, 75.4% of children were recovered and discharged, 7.4% were nonresponders, 3.4% were unknown and 10.3% were defaulters,. The mean time to recovery was 12 days, whereas the median time to recovery was 11 days. Children's breastfeeding status at admission and children without comorbidities at admission hadstatistically significant effect on time to recovery from SAM. The study concludes that, policy makers, care providers and health facilities, may need to focus on the importance of breastfeeding especially for those under two years of age and give emphasis for cases with comorbidities.[24]

Department of Public health, Islamabad, conducted a cross sectional study from November 2016 to March 2017 on 200 underfive children with the objective to determine the determinants of nutritional status of under 5 years children. The study results showed that out of 200 children, One hundred and fifty one (75.50%) were normal, 39(19.50%) were mild and 10(5%) were having severe malnutrition. Eighty three (41.5%) were rich and 117(58.5%) were poor. 117(58.5%) were boys and 83(41.5%) were girls. One hundred (50%) children were of 6 to 24 months and 100(50%) were of 25 to 59 months of age. One hundred and fifty eight (79%) children were from joint family system and 42(21%) were living in nuclear family. The study concludes that except age all the other factors including family structure, socio-economic status and sex were associated with nutritional status of under 5 year children.[25]

A descriptive cross sectional study was conducted in Selected Health Facilities in Egume, Kogi State, Nigeria, to determine the prevalence and determinants of malnutrition in under five children. The results showed that 21.3%, 25.6%, 47.4% and 5.7% of the sampled children were mildly undernourished, moderately undernourished, severely undernourished and healthy respectively. The study concludes that toilet, mother's education, child's age, nutrition, gender, and clean water and are determinants of child malnutrition.[26]

To examine the socio-economic inequality in childhood malnutrition using the data from the fourth round of National Family Health Survey (2015–16), a study was conducted across 640 districts of India, Concentration curve and generalized concentration index were used to examine the socioeconomic inequalities in malnutrition. The study results showed that about 35% were underweight and 38% children were stunted during 2015–16. On an average about 35% of household in a district having the access of safe drinking water and 42% of household in a district exposed to open defecation. Districts having the higher share of undernourished children is coming from the particular regions like central, east and west part of the country. Prevalence of stunting and underweight children varies considerably across Indian districts (13 to 65% and 7 to 67% respectively). The study found the inverse relationship between district's economic development with childhood stunting and underweight. The study concludes that policies need to develop improved water and sanitation facility to public and female literacy should be continued. [27]

In Nepal a hospital-based case-control study was conducted on 256 under-five children (128 cases and 128 controls) to investigate the effect of maternal and social determinants of SAM among under-five children. The study results showed that the

odds of SAM were lower among male children, breastfeeding ≥13 months and optimal complementary feeding, breastfeeding 6–12 months, mothers from high socioeconomic status. SAM was significantly higher among children with a history of diarrhea and children of the age group 6–24 months. The study concluded that it is necessary to scale up services to improve the socioeconomic status which includes the monthly income of the mother, occupation and education. Girls of age group 6–24 months were more likely to develop SAM. Two contributing factors to decrease SAM are the availability and usage of soap in hand washing and importance of exclusive breastfeeding practices which are ideal for low cost interventions.[28]

By using 2011 Ethiopia demographic and Health Survey a study was conducted in Ethiopia to assess the determinants of malnutrition among underfive children. The study results showed that place of residence, mothers BMI, age of children, the incidence of diarrhea in the last two weeks before the survey region, wealth index, and mother and husband/partner educational level were found to be significant predictors for stunting. For wasting wealth index, region, husband/partner education, sex, age of child, mothers BMI, incidence of fever and diarrhea are significant predictor. The study also shows that there is cross-regional variation in stunting and wasting. The study concludes that since there are variations in stunting and wasting across regions the concerned body should give special attention to regions like Affar and Ben-gumuz.[29]

A cross-sectional study was conducted in Bangladesh by using Household surveys from 1996 to 2014 on underfive children to obtain projections of the prevalence of childhood malnutrition indicators up to 2030 and to analyse the changes of wealth-based inequality in malnutrition indicators and the degree of contribution of

socio-economic determinants to the inequities. Additionally,to identify the risk factors of childhood malnutrition. The study results showed that a decreasing trend was observed for all malnutrition indices. In 1990, predicted prevalence of stunting, wasting and underweight was 55·0, 15·9 and 61·8 %, respectively. By 2030, prevalence is projected to reduce to 17·4 % for underweight, 12·3 % for wasting and 28·8 % for stunting. Prevalence of stunting, wasting and underweight were 34·3, 6·9 and 32·8 percentage points lower in the richest households than the poorest households. Being an underweight mother, parents with a lower level of education and poorer households were the key risk factors for stunting and underweight. Contribution of the wealth index to child malnutrition increased over time and the largest contribution of pro-poor inequity was explained by wealth index. The study concludes that an evidence-based need for targeted interventions to improve household income-generating activities and education among poor households to reduce inequalities and reduce the burden of child malnutrition in Bangladesh [30]

A community-based cross-sectional study was conducted in 16 randomly selected clusters in two districts of Maharashtra state, India, on 2929 mothers and their 3,671 under five children to assess the prevalence and determinants of undernutrition among under-five children residing in urban slums and rural area. The study results showed that acute diarrhea was associated with wasting in rural area, Exclusive breastfeeding up to 6 months was the protective factor against wasting in both rural area and urban slum), prevalence of wasting, stunting and underweight were more seen in an urban slum than a rural area. The low income of the family has resulted in underweight children in an urban slum. The joint family acted as a protective factor against stunting in the urban slum. Boys were more prone to stunting in the urban slum. The study concludes that undernutrition was related to the

economic status of the family, maternal education, diarrhea (Past 1 month), and sex of the child. Improvement of maternal education will improve the nutritional status of the child.[31]

In Indonesia, between the indigenous and non-indigenous communities of 60 underfive children a cross sectional study was conducted toanalyze the determinant factors of malnutrition in children under five years in indigenous communities (SukuBaduy) and non-indigenous communities. The study results showed that the two factors influence the high prevalence of malnutrition namely, the education of the head of a family and prenatal care in the fourth trimester. Prevalence of children under five years suffering from malnutrition in indigenous communities is lower than in non-indigenous communities, which is 21,7% to 43,3%. The study concludes that it is necessary to increase public awareness on balanced nutrition in under five children and improved maternal health access to resolve children under five years of malnutrition in those communities.[32]

A cross sectional study was conducted in Musi sub-district, East Nusa Tenggara province in July 2019 to compare the difference between WHO and Indonesian growth standards regarding prevalence of stunting and underweight and its determinants. The study results showed that the prevalence of stunting and underweight were higher for the WHO than the national standard (53.9% vs 10.7% and 29.17% vs 17.7%; all $p < 0.001$). Determinants of stunting were maternal height below 150cm and maternal mid-upper arm circumference below 23.5cm when the WHO standard was used, and no determinant was found when the national standard was used. Determinants of underweight were multiple parities, young maternal age during pregnancy and intrauterine growth restriction, when the WHO standard was

used. When the national standard was used, the determinants of underweight were maternal education and intrauterine growth restriction. The study concludes thatthe WHO standard over-diagnosed stunting and underweight in Musi sub-district. Future studies should be done to re-evaluate the prevalence and determinants of stunting and underweight nationwide using the Indonesian standard.[33]

In Indonesia, a cross sectional study was conducted on 100 underfive children to study the determinants of malnutrition among underfive children. The study results showed that the risks of malnutrition and under-nutrition affecting under five children were high among fishermen community in Jakarta Bay with 5% and 15%, respectively. Risk factors were poor sanitation, mother with high-risk pregnancy who was ≤ 20 or ≥ 40 years of age, children who were often sick ,pregnant women who did not do prenatal visits on a regular basis, poor household and head of family's occupation as a fisherman.The study concluded that Children's nutrition issues among fishermen community were multidimensional in nature. An intervention program therefore, shall be integrated between poverty eradication, sanitation, and health programs improvement. [34]

In 25 randomly selected villages of Jaipur district, Rajasthan a cross-sectional study was carried out. The study results showed that only 41.70% of children had normal nutritional status, 47.72% were moderately undernourished and 10.60% were severely undernourished respectively. Supplementary nutrition, mother's age, mother ANC registration, place of delivery, immunization status and mother's literacy level were significantly associated with the nutritional status of the child. The study concluded that identification of potential determinant factors with nutrition-specific interventions and early nutritional status assessment are major strategies to prevent

childhood morbidity and mortality. Other affordable interventions like mother and child health care, adolescent girls' education and skill development programmeare required to halt the deteriorating malnutrition situation in India. [35]

On 166 underfive children in Bhagawati village Bagalkot, a cross sectional case control study was conducted with the objective to explore the parental determinants associated with malnutrition among under five children in rural area. The study results showed 40 (24.10%) were found moderately underweight and 2 (1.20%) were severely underweight. A significant association was found between nutritional status of underfive children and Parental determinants includes Father's educational status, Mother's age at delivery, Postnatal illness, Mother's occupation, Mother's education and Presence of illness or health problem during delivery. The study concluded that spacing, complete immunization, birth order, early recommended supplementary foods, mother's age, better socio-economic status, timely care seeking and recommended exclusive breast feeding, had positive effect on children health, which were also statistically significant.[36]

To identify determinant factors of severe acute malnutrition (SAM) among 246 underfive children, an un-matched case control study was conducted in Ethiopia. The study results showed children experienced diarrhea in past two weeks, their mothers had not nutrition counselling during pregnancy, children's age between 6-11 and 12-17 months as compared to controls. And children with inadequate dietary diversity. The study concluded that the main determinants of severe acute malnutrition are multi-level. Diarrhea and inadequate dietary intake, poor childcare and polygamy in qualitative finding,under the category of immediate cause of malnutrition. Not having nutrition counseling during pregnancy, having more than

(≥3) under-five children and young age (6-11 and 12-17months) were also among basic determinants of severe acute malnutrition. Multi-sectoral and decisive approach is required to addressing SAM in the riverine area.[37]

To determine the prevalence of severe acute malnutrition and risk factors on 522 under five children, a cross-sectional study was conducted in Umkaddada Locality, North Darfur, Sudan. The study results showed that the most common risk factors associated with severe acute malnutrition was being female child , unvaccinated child, child age between 12-17months , illness experienced by child 2 weeks prior , child birth interval between 12-17 months, large family size , prolonged breast feeding up to 2 years of age and mainly was diarrheal illness. There were no association between the employment, exclusive breast feeding in first 6 months, initiation of breast feeding within first hour, age, antenatal care of the mother, introduction of food at age of 6 months of the infant life and level of education. The study concluded that the prevalence of severe acute malnutrition among under five was above extremely threshold (>15%). The major determinants of severe acute malnutrition among children below five in the area; were being female child, prolonged breast feeding, diarrheal illness, large family size, child age, being not vaccinated and birth interval. Efforts are needed to increase the coverage rate of Expanded Program on Immunization (EPI) for at least 90% .[38]

A cross sectional study was conducted in Dhaka Bangladesh on 138 underfive children, to assess the current nutritional status among underprivileged living in selected slum areas of Dhaka city. The study showed that the prevalence of both underweight and stunting was more in female child, 41% and 29% respectively, whereas the prevalence of wasting was more than 50% in both female andmale.

Tendency to skip meal also reflected poor food intake both in quality and quantity. Qualitative analysis of mother's food intake revealed that, major portion of diet came from plant source whereas animal sources contributed trivial portion. The study concluded that nutritional status of under-five children is associated with multiple factors contributes to childhood under nutrition and attempts should be taken to improve the nutritional status of this disadvantageous cohort, living in impoverished areas of an affluent city of Dhaka. [39]

A hospital based cross sectional study was conducted on 64 patients with severe acute malnutrition, with the aim to identify the determinants of severe acute malnutrition among underfive children. The results showed that of the 64 cases and 116 controls, The mean age was 24 months in both cases and controls. 40% of children were between the age group of 12–23 months in both cases and controls and 28.2% of cases and 23.4% of controls were in the age group of 24–35 months. There was no difference in the mother's age at the time of the birth of the index child among both the cases and controls .The study concludes that collaborative efforts should be organized to improve promotion of better child caring practices through appropriate promotion of family planning, prevention and early treatment of acute childhood illnesses, and age specific child and maternal feeding practices.[40]

In the rural area of Wardha district, India, A community-based cross-sectional study was conducted on 594 children aged from 1-month to 60-months (Under-5 years) with the objective to find out the prevalence and determinants of stunting and wasting. The study results showed that the overall study revealed more cases of stunting & fewer cases of wasting from the rural area of the Wardha district. 294 (49.5%) females and 300 (50.5%) were males. 256 (43.09%) children had stunting

and 122 (20.54%) had wasting. The proportion of children with severe stunting and wasting were maximum in the age group of 1 to 3 years. A significant association was found between the prevalence of wasting and exclusive breastfeeding. A significant association was found between the prevalence of stunting and the age group and initiation of breastfeeding within one hour of birth. The study concludes that the scenario of wasting and stunting is similar across India. Future education programs and health promotion in Anganwadi centres should include a focused emphasis on IYCF practices, good nutrition and awareness campaigns for parents about undernutrition and its future consequences.[41]

On 21,896 children aged 0-59 months in Kenya, a study was conducted to assess the prevalence and drivers of individual level double burden of malnutrition(DBM) among underfive children. The study results showed that children born to higher-educated mothers are less likely to experience DBM, higher-wealth households are less likely to observe DBM in a child, living in the rural settings increases the odds of occurrence of DBM in a child, households with access to improved water and sanitation are less likely to observe DBM in a child and female children are less likely to experience DBM than their male counterparts. The study concludes that interventions should be structured to target the specific groups of children who are simultaneously stunted and wasted because they are more exposed to the associated health risks.[42]

On 200 randomly selected households from the lowland and 141 from the highland areas of Kilosa District in Morogoro Region, Tanzania, a Cross-Sectional study was conducted to determine the prevalence of undernutrition and its determinants. The study results showed that the prevalence of stunting and

underweight was higher in the highland compared to the lowland areas. Prevalence of stunting, underweight, and wasting was 41.0%, 11.5%, and 2.5% in lowland and 64.5%, 22.0%, and 1.4% in highland areas respectively. Significant determinants of underweight were child birth weight, areas of residence and age of the children, while determinants of stunting were the maternal age, child birth weight, area of residence, andsex of a child. The study concludes that prevalence of undernutrition, especially stunting and underweight, was high in the study areas. Determinants of stunting differed between highlands and lowland areas, highlighting the needs of having properly integrated interventions based on the geographical location.[43]

On 664 underfive children, in Jhapa district of Nepal, a community based case control study was done with the aim to assess determinants of SAM. The study results showed that the factors like, birth interval less than 2 years, frequency of breast feeding <8 times/day, household food insecurity and low economic status were found to be significant determinants of SAM and prevalence of SAM was found 7.53%. Multivariate logistic regression documented frequency of breast feeding <8 times/day and low economic status as determinants of SAM. The study concludes that ending malnutrition will require integrated approaches and greater efforts to eradicate extreme poverty. [44]

A systematic search strategy was conducted through databases- Medline (Ovid), Pub Med, SCOPUS, Pro Quest Central, Web of science, and POPLINE in Myanmar, to understand the social determinants of under-5 undernutrition. The study results showed that maternal factors, low access to health services, an unhealthy environment, food insecurity, and poverty were identified as important social determinants of under-5 undernutrition. The study concludes that the need for a multi

sectoral and systematic approach to address under-5 undernutrition and investment in women's education and empowerment, rural infrastructure and agriculture development, may be major contributors to improving the nutritional status of children in rural Myanmar.[45]

To identify the determinants of severe acute malnutrition, a hospital based cross sectional study was conducted on 64 cases and 116 controls with severe acute malnutrition. The study results showed that,of the 64 cases and 116 controls, The mean age was 24 months in both cases and controls 40% of children were between the age group of 12–23 months in both cases and controls, and 28.2% of cases and 23.4% of controls were in the age group of 24–35 months. There was no difference in the mother's age at the time of the birth of the index child among both the cases and controls. The study concludes that collaborative efforts should be organized to improve promotion of better child caring practices through promotion of family planning, prevention and early treatment of acute childhood illnesses and appropriate age specific child and maternal feeding practices.[46]

Consequences of Malnutrition

A randomized control study was conducted in Tigri and Dakshinpuri in New Delhi on 422 children aged 6 to 30 months with the objective to identify stimulation and learning opportunities, growth and burden of respiratory infections and diarrhea as predictors for neurodevelopment. The results showed that 30.5% of the variation in the total ASQ-3 score by the identified predictors. When adjusting for annual family income and child characteristics and stimulation and learning opportunities explained most of the variation by 25.1%. Weight for height and Height for age were positively associated with the total ASQ-3 score, while number of days with diarrhea was

negatively associated. The study concludes that the importance of general nutrition and early child stimulation for child development and diarrhea is an additional risk factor for adverse neurodevelopment in vulnerable children.[47]

A study was conducted to find out the effects of Early Childhood Diarrhea on school functioning in a shantytown in Brazil. The results showed that ECD correlated with age at starting school and remained a significant predictor even after controlling for days of breast feeding, family demographics, TONI-3 test of nonverbal intelligence and early growth. ECD also correlated with AFG Only TONI-3 test scores explained this association, suggesting that ECD may hinder school performance, but only in part school readiness, by impairing cognitive function as measured by performance on the TONI-3 nonverbal intelligence test. The study concludes that effects of early childhood diarrhea on performance and later school readiness which warrant far greater investment and further attention for the control of ECD and its consequences.[48]

An unmatched Case control study was conducted on aged 6-59 months who have malnutrition at MachakelWoreda, Northwest Ethiopia, to assess associated factors of malnutrition on under five children. The results showed that 65 (63.20%) of cases and 49 (24.40%) controls had fathers that cannot read and write. 39 (38.23%) of cases and 44(21.89%) of controls had history of diarrheal episode. Family's who use drinking water from unprotected source were 3 times more likely to <0.05have malnutrition as compared to those children whose family use drinking water from protected source. The study concludes that inappropriate feeding practice and child carrying were strongly associated with under five malnutrition. Therefore, the

responsible body should implement on nutritional intervention activities at all level of the community.[49]

A hospital-based case control study was conducted from December 2015 on 196 children under 5 years (98 cases and 98 controls) age ranged from 6 to 60 months in Dhaka Shishu hospital Bangladesh to determine the risk factors of severe acute malnutrition among under-five children. The results showed that risk factors were irregular hand washing with soap or other cleaning agents before feeding child, lack of taking balanced diet more than 3 times/day and father's education level 0–8 class. The study concludes that severe acute malnutrition was found to be associated with irregular hand washing , father's education level and lack of taking balanced diet. Therefore interventions to reduce malnutrition and address the factors contributing to malnutrition should be a policy priority.[50]

A cross-sectional study was conducted on 182 malnourished children in Shivamogga, Karnataka with the objective to assess the factors associated with malnutrition and risk of infections among malnourished children. The results showed 80 (43.96%) were boys and 102 (56.04%) were girls. More than 2/3rd (68.6%) under nourished children were in the age group of 0-3 years.The study concludes that most common co-morbidity found was fever (22.5%),respiratory tract infection (44%) and acute gastro enteritis (22.5%) .Children of relatively younger age, from rural areas and girls are the common victims of malnutrition. Acute gastro-enteritis and Respiratory tract infections were the common co-morbid condition. Therefore nutrition education has to be imparted to the people regarding consumption of cost effective nutritious diet.[51]

A systematic review was carried out on 36 articles in June 2016 in Iran. The aim of the study was to conduct a systematic review of malnutrition and its associated factors. The most important factors related to underweight were birth weight,father's education level and mother's education level. In regard to wasting and stunting gender was one of the main factors and the next four were birth weight, mother's, and father's education levels and living location, The study concluded that in some regions with low socioeconomic status, especially rural areas, the focus should be on the improvement of households living conditions such as mothers' and children's nutrition. Improvement in mothers' education, can have a significant impact on children's health. Under 5 years old girls need more attention than boys regarding to their poorer indicators.[52]

A case-control study was conducted from October 2016 to May 2017 in the protein calorie malnutrition unit and other units at Arthur Davison Children's Hospital in Ndola, Zambia on 144 children with 72 cases and 72 controls of underfive children with main objective of study was to establish risk factors associated with malnutrition. The results showed that Independent risk factors which were significantly associated with malnutrition were children of fathers who were out of employment and history of diarrhea. Thus the study concludes that lack of balanced diet, low social-economic status and Diarrhea illnesses were identified as risk factors significantly associated with malnutrition among children under the age of five.[53]

A study was done in Ethiopia on 9588 underfive children, with the objective to calculate the prevalence of stunting, and associated factors among underfive children. The results of the study showed that the prevalence of stunting was 38% (21% moderately, 17% severely). Children with illiterate mothers were 2 times more likely

to be moderately and severely stunted compared with their counterparts with secondary education. Female children were 9.66 times more likely to be in normal nutrition status as compared to male. Children of families in the highest wealth quintile were 7.92 times more likely to have normal stature compared with children from poorest ones. The study concludes that child age, child sex, birth interval, mother's educational status, wealth index, were the important determinants of stunting.[54]

A study was conducted in Ghana, the study used data from the 2014 Ghana Demographic and Health Survey to estimate the prevalence of stunting, wasting, and underweight, to identify the factors associate. The study involved 2720 children aged 0–59 months old children and their mothers. The results showed that the prevalence of underweight, wasting and stunting were 10.4%, 5.3%, and 18.4% respectively. The sex was associated with wasting and stunting, whereas age of the child was associated with underweight, wasting and stunting, The factors that were associated with a higher odds of child undernutrition included: a higher ($\geq 4^{th}$) birth order number of child, low birth weight (<2.5 kg) primary educational level of husband/partner minimum dietary diversity score (MDDS) and domicile in the northern region of Ghana. The study concludes that interventions and policies for undernutrition should address socioeconomic inequalities at the community level while factoring in women empowerment programmes.[55]

A case control study was conducted on children aged 6–59 months attending public health facilities in Illu Aba Bor Zone, south west Ethiopia, with the objective to determine the factors associated with acute malnutrition. The study results showed that acute malnutrition was significantly higher among children who had households

in the first wealth quintile and households in the second wealth quintile, family size greater than five , children started complementary feeding after six months , diarrhoea in the previous two weeks , among children with Dietary Diversity Score(DDS) of less than four, food insecure households, in mothers of children with no formal education and not exclusively breast fed child.The study concludes that Acute malnutrition was significantly associated with sub optimal breastfeeding and complementary feeding practices,lack of maternal education, larger family size, diarrheal diseases in the previous two weeks, dietary diversity score, household food insecurity and household wealth quintile, Thus, an organized effort should be made at all levels to improve education of mothers , child feeding practices and maternal and child health services.[56]

In Bilawal Medical college Hospital Kotri-Pakistan a Cross-Sectional Study was conducted from Dec 2017 to Nov 2018 on 106 children having age 6 months to 59 months, presented with malnutrition with the aim to determine the socio-demographic factors responsible for malnutrition. The results showed that severe malnutrition was most common among 70.8% of the cases and their mean age was 35.07+12.14 months. Severe malnutrition was significantly linked with inadequate feeding, inadequate diet and poor socioeconomic status, because most of the severely malnourished children had history of inadequate diet. The study concluded that inadequate breast feeding, poor antenatal care,poor diet, and poor socioeconomic status are responsible factors for severe malnutrition. [57]

A cross sectional study was done on 180 children aged between 6 months to 2 years children in rural field practice area of Kilpauk Medical College, Tamil Nadu, with objective to assess nutritional status of 6 months to 2 years children in terms of

acute and chronic malnutrition and to estimate the association of nutritional status with feeding practices. The results showed that Male children affected by chronic malnutrition more than female children. Sex distributions were equal, 61.2% belonged to 12 to 24 months age group, 55% belongs to middle socioeconomic status and mean age of children was 15.82 months. Prevalence of malnutrition was high among those not practising colostrum feeding and exclusive breast feeding. The prevalence of stunting 45.6%, underweight 31.65% and wasting 15%. Not initiating breast feeding within 4 hours of birth plays significant role in acute malnutrition. Traditional feeding practices and feeding frequency had major role in chronic malnutrition. The study concludes that prevalence of under nutrition among study population was high among this area. Feeding practices should be improved among the mothers. [58]

In Puducherry, an intervention study was conducted in three phases at rural area for children aged between13–60 months. The intervention group (57 mothers of 64 children) and control group (60 mothers of 64 children) included moderate and severely malnourished children, with the objective to assess the effect of community-based follow-up health education intervention programme. The results showed that in the intervention group, 81% (52) of malnourished children turned out to normal, whereas in the control group, 64% (41) of them became normal which indicates awareness level in all domains increased significantly in the intervention group. There was a statistically significant difference between the mean changes in the calorie intake among girls and protein intake among boys and girls between the two groups. The study concludes that there was comparatively marginal increase in weight gain, calories' intake, protein intake, and in the intervention group. [59]

On 9588 underfive children in Ethiopia a study was conducted by using 2016 Ethiopia demographic and Health Survey to calculate the prevalence of stunting, and associated factors among underfive children. The study results showed that the children with illiterate mothers were 2 times more likely to be moderately and severely stunted compared with their counterparts with secondary education. The odds of being stunted for children whose age group 24–35 months respectively as compared to children 0–5 months of age were 4.71 times higher. Prevalence of stunting was 38% (21% moderately, 17% severely). Children of families in the highest wealth quintile were 7.92 times more likely to have normal stature compared with children from poorest ones. Being female children were 9.66 times more likely to be in normal nutrition status as compared to male. The study concluded that birth interval, wealth index, child sex, mother's educational status, child age were the important determinants of stunting. Addressing these factors will help to prevent future injury of mentaland physical development in children and will assist in alleviating malnutrition and refining their quality of life.[60]

An observational cross sectional study was done in the PalakkaKahu District Health Centre on 165 underfive children to determine the relationship between antenatal care history and the number of family members in the incidence of stunting in infants aged 6–59 months. The results of this study indicate that based on the characteristics of toddlers obtained that normal birth weight 70.30%,the average age group of infants aged 6–15 months 20.61%, Low Birth Weight 29.70%, male sex 53.94%, female 46.06%. It is suggested that improving performance should be more active in providing education about pregnancy, family members should help in paying attention to parenting children to avoid stunting and visiting pregnant women. The study concludes that there is a relationship between Pregnancy Examination History

and the incidence of stunting in children aged 6–59 months and there is no relationship between the number of family members and stunting in children aged 6–59 months.[61]

In Yogyakarta, Indonesia on 729 underfive children, a cross sectional study was conducted with the objective to analyze the relationship between stunting and parental feeding style among under-five children. The study results showed that the proportion of poor parental feeding style was almost 50% and 37.6% were found to be stunting. Parental feeding style, mother's occupation and family income have a significant relationship with stunting. The study concludes that Parents with poor parental feeding style are predicted to increase the risk of stunting among under-five children and the prevalence of stunting is quite high in the study area. Family-based interventions that involve parenting styles in child feeding practices should be considered in reducing stunting among children.[62]

A study was conducted in Mozambique, to identify the key factors associated with acute malnutrition among 6- to 59-month-old children living in nine districts in rural Mozambique. The study results showed that experiencing diarrhoea was the only variable associated with acute malnutrition whereas diarrhea, experiencing shock in the household, cough and fever access to sanitation were the variables with significant association to acute malnutrition. Study findings confirm the association between acute malnutrition and child's health outcomes that are generally linked to independent effects of shocks and poor living conditions. The study concludes that programme to implement integrated, cross-sectoral approaches to tackling child acute malnutrition and the highlights the need for policy and particularly addressing community level conditions such as sanitation and water. [63]

A study was conducted in India by using the fourth round of the National Family Health Survey (NFHS-4) and the study focuses on child malnutrition and attempts to quantify the level of inequality as a contributing factor among Scheduled Castes and other population. The study results showed that the mother's body mass index and education were major determinants affecting child malnutrition. Media exposure, household wealth and mothers' education had a positive association with malnutrition among children of Scheduled Castes. The disparities in wealth were considerably high between the poorest and richest people. Prevalence of underweight children exhibits state-wise disparities among different caste groups. The study concludes that although the level of malnutrition decreased in India, Scheduled Castes continued to show higher malnutrition among children aged below five years. Furthermore, mothers' education, body mass index and the contribution of wealth was major contributing factors responsible for variation in malnutrition among children from Scheduled Castes and Others (General Population) in India.[64]

In Anambra State, Nigeria on 370 under-five HIV positive children, a descriptive cross-sectional survey was conducted to evaluate the relationship between socio demographic factors and malnutrition in the background of HIV. The study results showed that 147 (39.7%) were globally undernourished: The mean age of the children was 44.5±12.9 months. 162(43.8%) females and 208(56.2%) males. Males were significantly more stunted than females. Children of low SEC were more likely to be undernourished. 15.7.% (58) underweight, 13.3% (49) wasted and 27.9% (103) stunted and 77% (285) were of low socioeconomic class (SEC), 26% (96) were orphans, while 28.6% (106) were cared for by single parents. 47.3% (175) had advanced HIV disease, and 68.1% (252) had been on HAART for >12 months. Being on HAART for >12 months was associated with less undernutrition, while advanced

HIV disease seemed to enhance it. Introduction of complementary feeds at age 3mo or less, suboptimal feeding frequency, not having been breastfed and poor food variety increased susceptibility to undernutrition. Single parenthood predisposed to undernutrition and orphans were more wasted and stunted than underweight. The study concludes that HIV-infected children are vulnerable to malnutrition by virtue of the disease process and therefore, the health care provider to ensure a proactive growth monitoring and nutritional support, with prompt treatment of co-morbid debilitating infections.[65]

A Community-Based Cross-Sectional Study was conducted on 620 households in Western Ethiopia, with the aim to assess the prevalence of diarrhea and its associated factors in under-five children. The study results showed that prevalence of diarrhea among under-five children was 149 (24%) . Diarrhea was significantly associated with families with poor wealth index, being in the age group of 6–11 months , and 12–23 months, children who were not vaccinated against measles , poor knowledge of mothers/caretakers on diarrhea prevention methods, inappropriate liquid waste disposal, having two or more siblings and unsafe child fecal disposal. The study concludes that the prevalence of diarrhea among under-five children was high. The findings have a significant policy inference for childhood diarrheal disease prevention programs and therefore, safely disposing liquid waste, regular hand washing practice after disposing child feces, child spacing, vaccinating all eligible children against measles and educating mothers/caregivers on diarrheal disease prevention methods, should be a priority area of intervention for diarrheal disease prevention.[66]

To assess the prevalence of malnutrition, to identify the determinants and to analyse the relationship between socio-demographic characteristics and malnutrition among primary school going children, a cross sectional study was conducted among 400 children of aged 5–10 years in Kishoreganj district of Bangladesh. The study results showed that the prevalence of stunting, wasting and underweight were 39%, 54% and 45% among girls whereas the prevalence was 36%, 42% and 36% among the boys, respectively. 40.5% were underweight and 38% were stunted and around half (48%) of the total children were wasted and occurring stunting, wasting and underweight were found higher among female children than their male counterpart. Higher the number of children in the family and delay of giving complementary food after six months were also found associated with the higher odds of becoming malnourished. In contrary, increased meal frequency, solvency with land ownership were found associated with the reduced odds of becoming malnourished. The likelihoods of becoming malnourished were found to be increased with the increase ages of the children, from the ages 5–6 years. The study concludes that the prevalence is even higher among the female children and prevalence of malnutrition among primary school going is higher than its other geographical regions. Parents of the female children should be given priority and proper nutritional education of parents is important along with the supports for the parents who do not have the capacity to provide nutritional food for their children.[67]

A cross-sectional data from the Demographic and Health Survey, conducted between 2007 and 2017, for eight South and Southeast Asian countries was used to identify the sociodemographic factors associated with Double Burden Malnutririon. The study results showed that the prevalence of any of these DBM coexistences was 12.0% in all households and a total of 7,98,961 households were included in this

study. The pooled prevalence of overweight or obesity for the mother and stunted child was 10.0% , for OBM and wasted child, it was 7.0% , and for overweight or obese mother (OBM) and underweight child, it was 7.0%. The factors like mothers with a lower education,households with more than four members, a higher age of the mother, and the richest household quintile were found statistically significant. The study concludes that the promotion of education for women may aid in tackling the double burden on a household level. [68]

CHAPTER – II

MATERIALS AND METHODS

Research materials and methods are the techniques used by researchers to structure a study and to gather and analyze information relevant to research questions. It is a way to solve the research problem systematically. It involves a series of procedures in which the researcher start from initial identification of the problem to its final conclusion. Materials and methodology of research indicates the general pattern of organizing the procedure of a gathering valid and reliable data for the problem under investigation.

In research this term refers to a collection of specific techniques and procedures that are used to identify research methods, select samples and tools, process and analyse data collected about the current research topic. According to this section of the current study, the reader will be able to critically evaluate the overall validity of the study as well as the dependability of the research study carried out by the researcher in question. **(Polit and Beck)** [16]

This chapter unfolds methodology applied to acquire information pertaining to the research problem. It is discussed under the following headings: research approach, research design, variables under study, research setting, population, sample and sampling techniques, development of tool, procedure for data collection and data analysis plan.

The current research targeted only to find out "Determinants and Consequences of Malnourished underfive urban children: a cross sectional study"

Research approach

Selection of appropriate research approach that involves a general set of orderly, disciplined procedures to acquire information is of utmost importance in a research study.

Research approach indicates the procedure for conducting the study. It helps the researcher to know what data to collect and how to analyze it. It also suggests the possible conclusions to be drawn from the data.

In view of the nature of the problem selected for the present study and the objectives to be accomplished a descriptive approach was considered appropriate for the present study.

Research design

The research design of a study spells out the basic strategies that researcher adopt to develop evidence that is accurate and interpretable. The research design is the plan or blue print the researcher selects to carry out the study.[16]

The selection of design depends upon the purpose of the study, and variables to be studied. Since the study undertaken was aimed to study the determinants and consequences of malnourished underfive urban children, the research design used for the present study is a cross sectional study.

Study variables

In quantitative study, concepts are usually referred as variables, which are the central building blocks of the study. A variable is any phenomena or characteristic or

attribute under study. Variables are the measurable characteristics of a concept and consist of a logical group of attributes. (**Polit and Beck)**

An independent variable is a distinguishing characteristic or feature that differs or changes over the course of a research project. It is something that does not change over time that is stable, as opposed to something that does change over time.

The variables undertaken in the present study were:

Socio demographic variables: Age of the mother, Gender of the child, Head of household, Marital status of mother, Religion, Family size, Type of Family and Family income.

Determinants: as per the literature reviewed the factors considered are characteristics like Age of the child, Birth order, Place of delivery, Breastfeeding status and Sickness status.

Consequences: Variables like Pneumonia, Diarrhea, Fever and Recurrent respiratory tract infections were undertaken.

Extraneous variables were controlled by Randomisation. Randomization ensures that the expected values of the extraneous variables are identical under different conditions.

Research setting

Settings are the more specific places where data collection occurs based on the nature of the research question and the type of information needed to address it. The setting was selected based on the objectives of the study, practicability and subject

availability. The setting planned for the present study is urban areas of Belagavi city which includes 16 corporation wards.

The rationale behind for selection of above setting for research study is as follows:

- The researcher's familiarity with the setting;
- The availability of study participants; and
- The expected co-operation of participants from the previously mentioned setting.

Research population

A population is the set of people or entities to which the results of a research are to be generalized. The population is the entire aggregation of cases, in which a researcher is interested. People or non human animals may be included in the study population, and the study is not limited to human subjects.

The term target population refers to the total number of cases/subjects on which the findings of a research study can be applied in a broad sense by the researcher. (**Polit and Beck)**

In the present study the population consists of underfive children of urban areas of Belagavi.

Sample

A sample is the representative unit of a target population, which is to be worked upon by researchers during their study. Thus, it is a subset of the population elements. While conducting research, sampling refers to selecting process of

representative sample of the population and comparing it to that of entire research population to ensure that the conclusions are based on the findings of the investigation about the entire population.

The smallest and most fundamental component of the exploration process is the sample, where the majority of the information is gathered, and they are also most expensive. In nursing research studies, individuals are frequently used as case studies to illustrate points.

The sample chosen for the present study is underfive children of urban areas of Belagavi who are between age group of 6 months - 60 months.

Sampling technique

The process of selection of a small part of elements from the total number of population that have the feature of all original population is known as sampling technique. The sampling technique used for the present study was Cluster Sampling.

The sampling technique followed for the present study was as follows:

By computer generated random table 16 wards were selected by assuming 30% of underfive children malnourished from each ward, so from each ward 30 samples were drawn by using simple random sampling.

The wards were as follows: 2,4,5,6,7,9,10,13,27,31,33,37,42,45,50,51.

Criteria for selecting the sample

Among the all research population whom is selected for the exploratory study is to be determined by particular criteria by analyst is known as sampling criteria for determination of the examples.

The sample selection was based on the following inclusion and exclusion criteria.

Inclusion criteria

1. Underfive children of urban areas of Belagavi and their mothers who are willing to participate in the study.
2. Children age group ranges between 6 months - 60 months.
3. Mothers who understand Kannada and English.

Exclusion criteria

1. Children who are physically handicapped were excluded from the study.

Sample size

As per the published literature, prevalence of Malnutrition based on this sample size is calculated from the formula below.

Sample size (n) = $\frac{Z^2_{1-\alpha/2}}{d^2} SD^2$

Where

n- Sample size

$Z_{1-a/2}$ is one tail Standard Normal VariateAssuming sample size at 95% CI

SD - 10% error in estimation of mean ie,10% of SD.

'd' is tolerable error - 20% attrition for lost cases etc.

Considering the above formula the sample size is calculated as 460.

Data collection Instrument

Following steps were used for the development of structured data collection tool.

- Reviewing of research and non research literatures those are related to Prevalence, determinants of malnutrition and consequences of malnutrition.
- Opinions and suggestions taken from the experts in the field for the content to be included in the structured tools.
- Preparation of first draft of thestructured tools.
- Assessment of content validity and reliability of the structured tools.
- Final draft preparation of structured tools

Development of the tool

A predesigned, pretested and validated questionnaires were used to study the determinants and consequences of malnourished underfive children.

Description of the tool

The tool is divided into following sections:

- Section I: Prevalence and Demographic characteristics (08 items)
- Section II : Child characteristics (07 items)
- Section III : Feeding and Environmental characteristics (08 items)
- Section IV : Questionnaires on Effects of Malnutrition (05 items)

Content validity and Reliability of the tool

Content validity of tools:

All structured tools were subjected to content validation by being distributed to Five experts from the nursing field and one expert from medical practitioners in the

field of paediatrics. All of the experts were completely in agreement on all of the items on the list. However, a few suggestions for changes to some of the components were made, and these were incorporated into the final tool.

Reliability of the tool:

Reliability of the research instrument is the extent to which the instrument yields the same results on repeated measures. Test retest approach was used to determine the reliability. Reliability of the section of the tool consisting of questionnaires were tested by split half method, using Karl Pearson's co-efficient of correlation. Item analysis was done for each questionnaire and tool was used on first day and again on tenth day.The reliability computed was r=0.97, hence the tool was found reliable.

Reliability of weighing scale for the anthropometric measurements:

Calibration of the scale was done once a week, and documented on the calibration record form. Ensure that the scale is placed on an even, flat surface. Check whether the scale was level using the bubble on the far right-hand leg of the scale**.**

Measurements

The following measurements were used for the assessment of Malnutrition:

Height: The participant is allowed to stand straight without footwear, with heels, buttocks and back touching the wall and arm hanging by side. The height was measured from head to heel.[69]

Weight: Body weight was measured without any shoes, heavy clothing, using standard portable weighing machine with an error of $\pm$ 100gm.[69]

Mid upper arm circumference: Bend the left arm, find and mark with a pen the olecranon and acromion process, mark the mid-point between these two marks, with the arm hanging straight down, wrap a MUAC tape around the arm at the midpoint mark, measure to the nearest 1 mm.[69]

Delayed Growth & development is classified by measuring the Height, Weight and Mid Upper arm Circumference by using standard WHO scales.

Data collection Procedure

After making necessary modification, the data was collected for the main studybyfollowing steps

Ethical clearance

- The ethical clearance certificate was obtained from institutional ethics committee.
- Institutional Ethics Committee provided approval for the present study (Ref no: KLEU/EC/19-20/290619008

Obtaining administrative Permission from authority:

The institution's ethics committee gave their approval to the research. Formal administrative permission was obtained from KLE Academy of Higher Education & Research. A detailed permission letter was written to District Health officer by explaining in detail about the research study and objectives. Researcher personally met the DHO for getting the permission and explained in detail about research project and its objectives. After clarifying all the questions and doubts to authority regarding project the permission was granted for the study.

Data collection Procedure

- After obtaining Ethical permission from Institutional Ethical Committee, Permission was obtained from the DHO.
- Before enrolling the participants, they were given full subject information sheet on which material was explained.
- The purpose of the study was explained to mothers and consent was taken from every mother. They were also guaranteed that the information would be kept confidential.
- Anthropometric measurements were taken and predesigned, pretested and validated questionnaires were used to study the determinants and consequences of malnourished underfive children.
- All the participants were given their genuine responses for each question asked to them and same time their doubts regarding questions were cleared by researcher.
- Data collection process is ended by thanking each participant for their cooperation and interest shown towards the process of the study.

CHAPTER – III

DATA ANALYSIS PLAN

The data obtained was analysed in terms of the objectives of the study, using descriptive and inferential statistics.

Data was analyzed by using the following statistical methods:

- Initially master datasheet was prepared according to variables and scores obtained for all variables.
- Information was analysed in accordance with the investigation's purpose.
- Frequency distributions scores were computed.
- Association was checked by using chi square test and p values.
- Multiple logistic regression analysis was used to find out the significant association of variables to assess the determinants and consequences of malnutrition.

CHAPTER - IV

RESULTS

This chapter deals with the analysis and interpretation of data collected to study the determinants and consequences of malnutrition among urban underfive children. The data was analysed and interpreted in accordance with the study's objectives. Data was collected from 460 underfive children from the urban areas of Belagavi city, through structured questionnaires. The data were computed using descriptive and inferential statistics based on the objectives of the study.

The collected data was organized and presented in the following parts:

Section 1: Prevalence and Demographic characteristics

1. Prevalence of Malnutrition.
2. Frequency and percentage distribution of Demographic characteristics
3. Association between demographic characteristics with status of malnutrition
4. Multiple logistic regression analysis of status of malnutrition by demographic characteristics

Section 2: Child characteristics

1. Frequency and percentage distribution of child characteristics
2. Association between child characteristics with status of malnutrition
3. Multiple logistic regression analysis of status of malnutrition by child characteristics

Section 3: Feeding and Environmental characteristics

1. Frequency and percentage distribution of Feeding and Environmental characteristics
2. Association between Feeding and Environmental characteristics with status of malnutrition
3. Multiple logistic regression analysis of status of malnutrition by Feeding and Environmental characteristics

Section 4: Questionnaires on Effects of Malnutrition

1. Frequency and percentage distribution Effects of malnutrition
2. Association between Effects of Malnutrition with status of malnutrition
3. Multiple logistic regression analysis of status of malnutrition by Effects of Malnutrition

Section 1: Prevalence and Demographic characteristics

Table1: Prevalence of malnutrition among underfive children n=460

Status of malnutrition	No. of children	% of children
No malnourished	211	45.87
Malnourished	249	54.13
Total	460	100.0

The above table reveals that more than half of the children 249 (54.13%) being malnourished.

Fig 1: Prevalence of malnutrition among underfive children

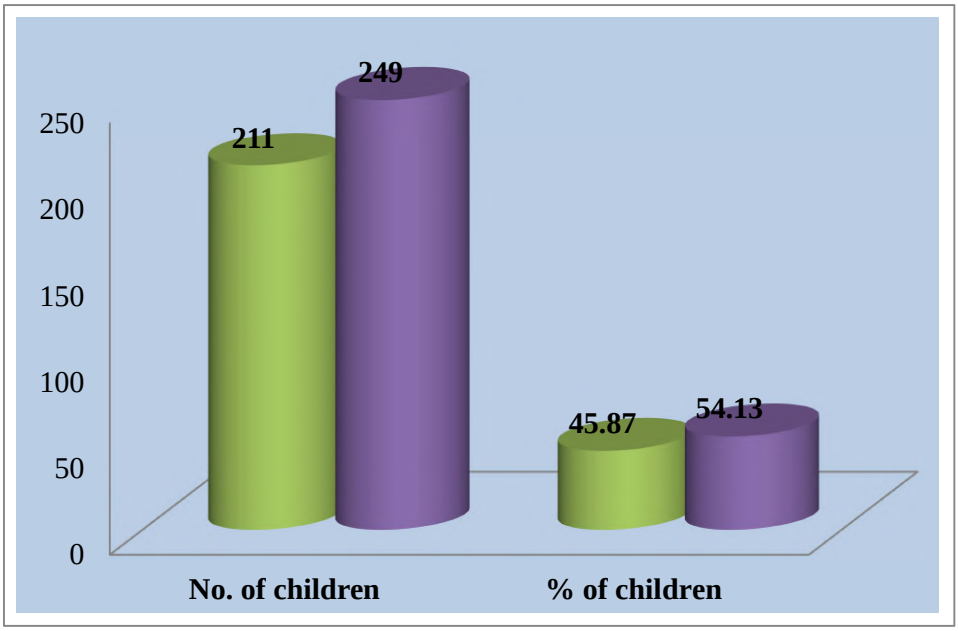
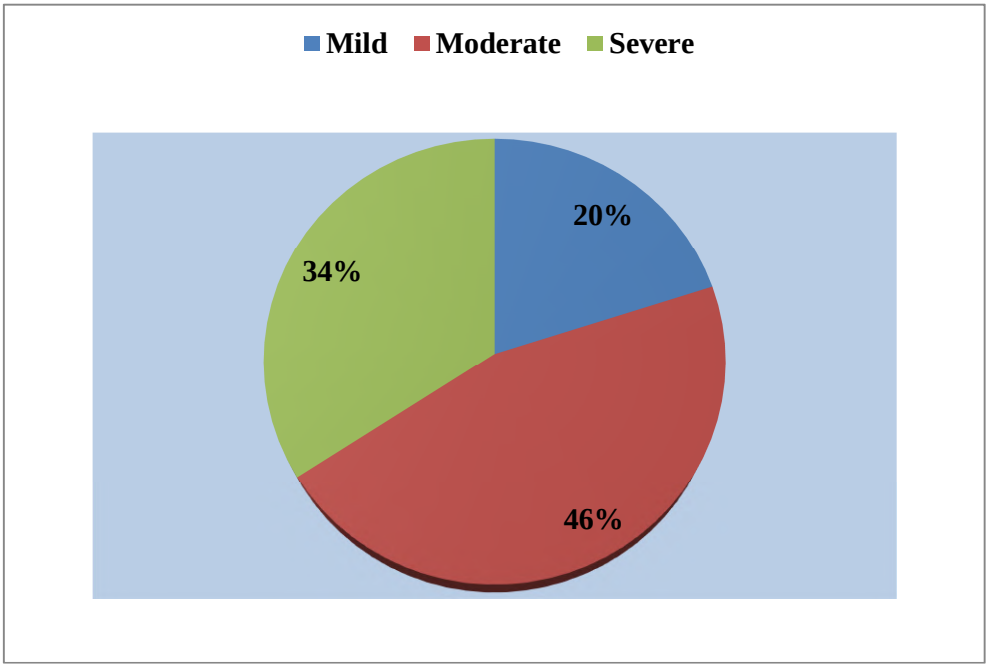


Table 2 : Degree of malnutrition

Degree of malnutrition	Frequency	Percentage
Mild	50	20.08
Moderate	114	45.78
Severe	85	34.13
Total	**249**	**100**

Fig 2:Degree of Malnutrition



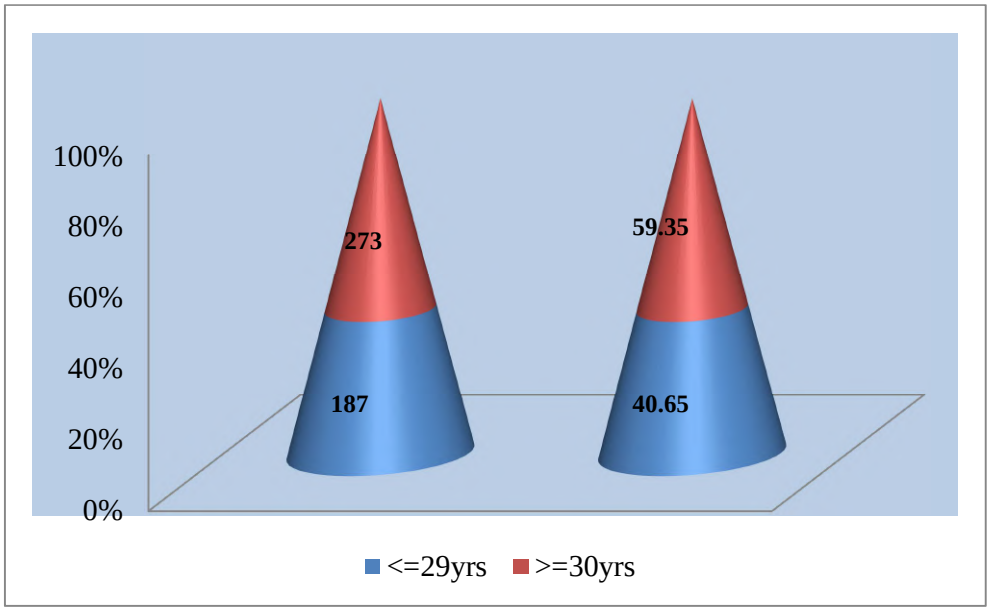
The above table represents degree of Malnutrition. It shows that majority of children 114 (45.78%) children were moderately malnourished, 85 (34.13%) were severe malnourished and 50 (20.08%) were mild malnourished.

Table 3: Demographic characteristics wise distribution

3.1: Frequency and Percentage distribution as per age of Mothers in years n=460

Profile	No of respondents	% of respondents
Age groups of Mothers		
<=29 years	187	40.65
>=30 years	273	59.35

Fig 3: Frequency and Percentage distribution as per age of Mothers in years

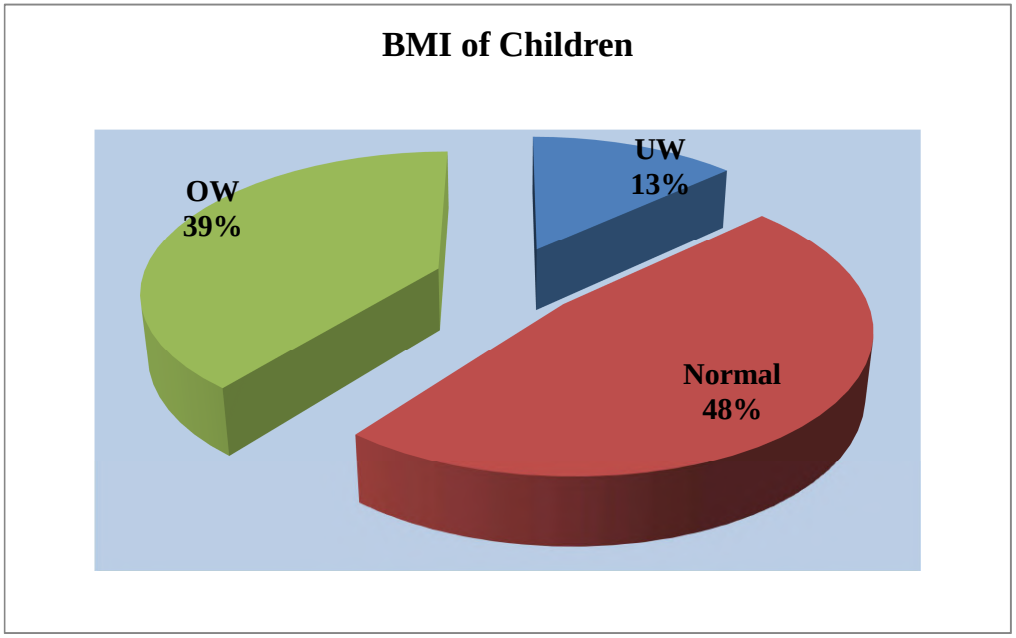


The data presented in table reveals age group of mothers in years. It shows that majority 273 (59.35%) of mothers were belonged to the age group of >=30yrs and 187 (40.65%) of mothers were belonged to the age group of <=29yrs.

3.2: Frequency and Percentage distribution as per BMI of child n=460

Profile	No. of respondents	% of respondents
BMI of child		
UW	61	13.26
Normal	218	47.39
OW	181	39.35

Fig 4: Frequency and Percentage distribution as per BMI of child

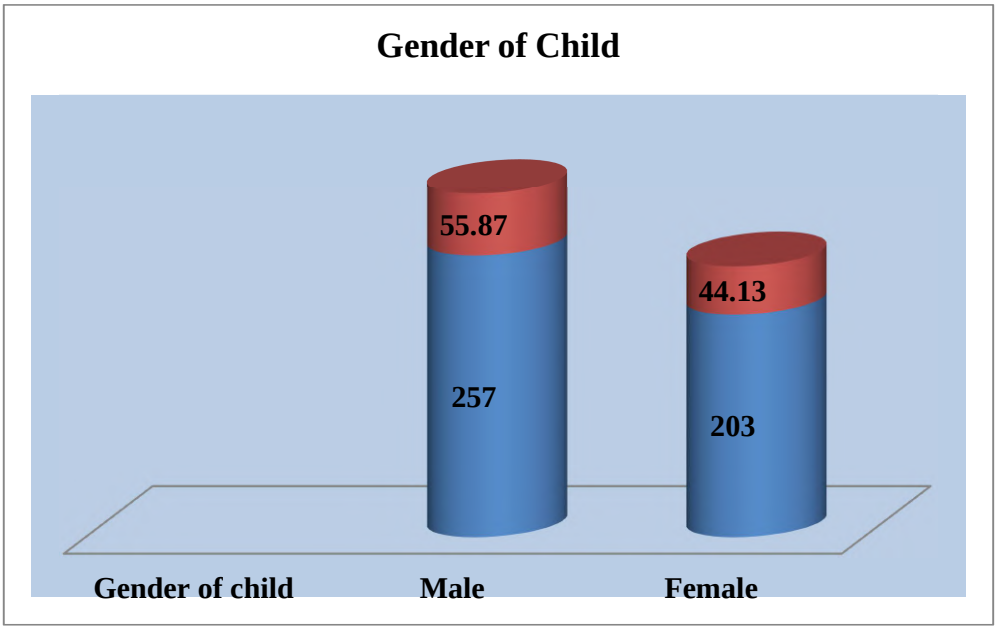


The data presented in table reveals BMI of Children. It Shows 218 (47.39%) children were having Normal BMI.181(39.35%) children were overweight and remaining 61 (13.26%) children were underweight.

3.3: Frequency and Percentage distribution as per Gender of child n=460

Profile	No of respondents	% of respondents
Gender of child		
Male	257	55.87
Female	203	44.13

Fig 5: Frequency and Percentage distribution as per Gender of child

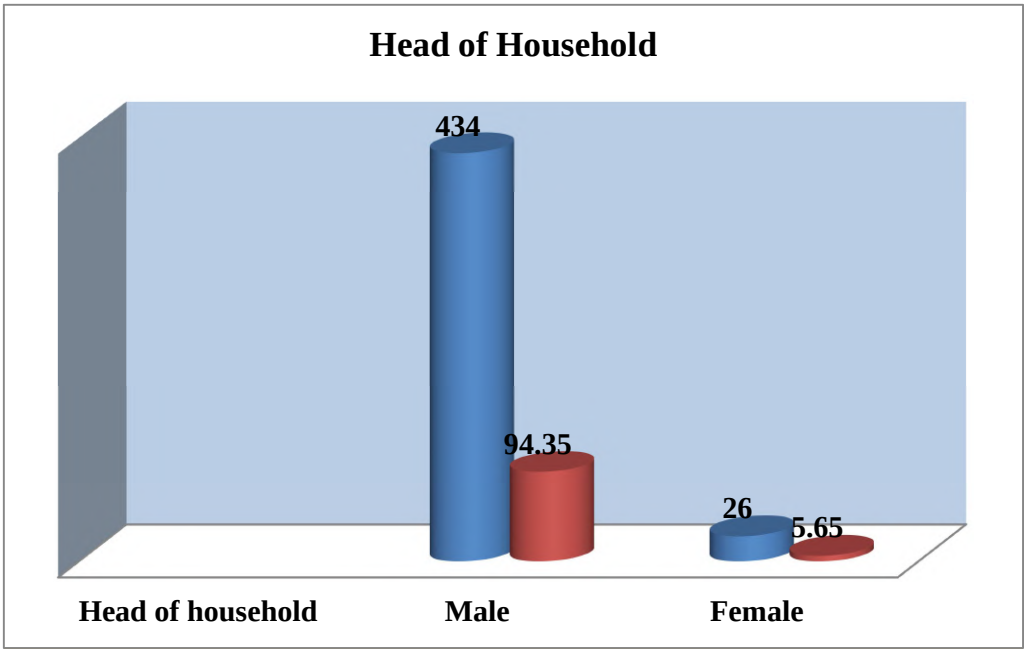


The data presented in the table reveals Gender of Child. It shows 257 (55.87%) children were Males and 203 (44.13%) children were females.

3.4: Frequency and Percentage distribution as per Head of Household

Profile	No of respondents	% of respondents
Head of household		
Male	434	94.35
Female	26	5.65

Fig 6: Frequency and Percentage distribution as per Head of Household n=460

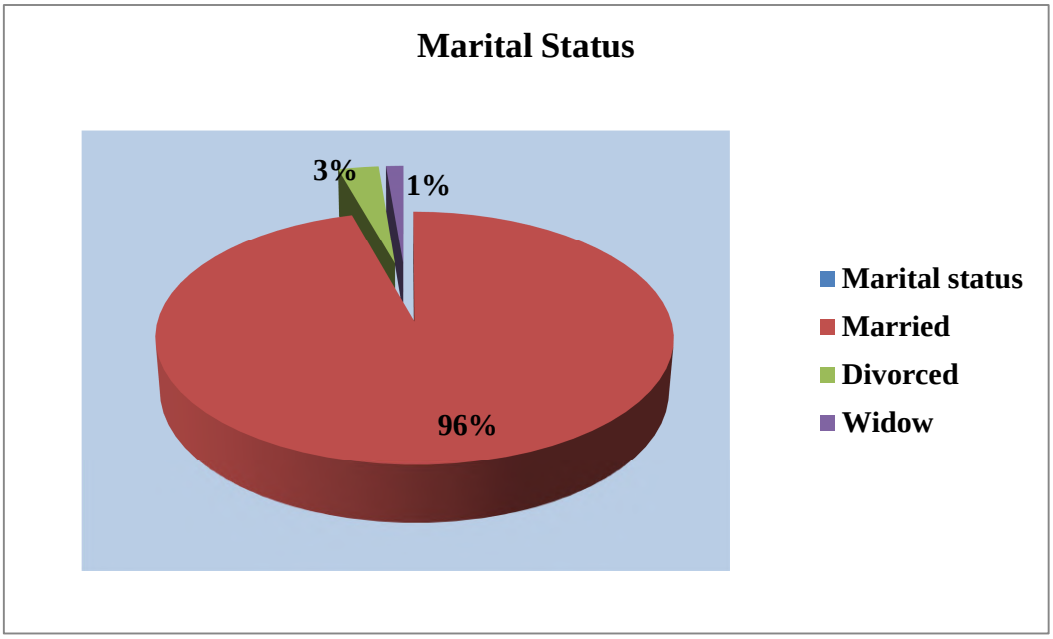


The data presented in the table reveals Head of Household. It shows majority 434 (94.35%) participants reveals Males as head of household and remaining 26 (5.65%) participants reveals females as head of household.

3.5: Frequency and Percentage distribution as per Marital status of Mother n=460

Profile	No. of respondents	% of respondents
Marital status of mother		
Married	440	95.65
Divorced	14	3.04
Widow	6	1.30

Fig 7: Frequency and Percentage distribution as per Marital status of Mother

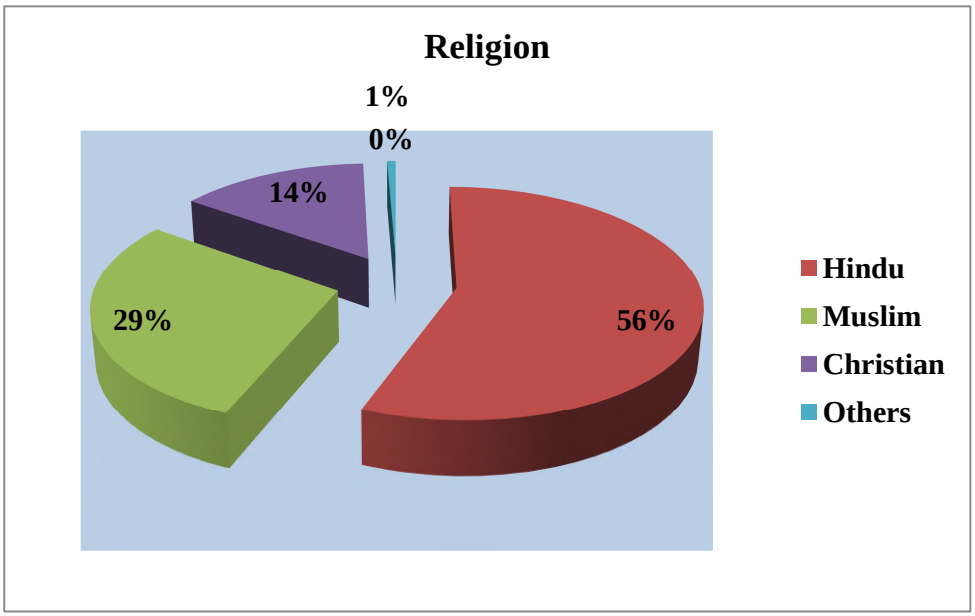


The data presented in the table reveals Marital status. It shows majority 440 (95.65%) of Mothers were married,14 (3.04%) of Mothers were divorced andremaining6 (1.30%) of Mothers were widows.

3.6: Frequency and Percentage distribution as per Religion n=460

Profile	No of respondents	% of respondents
Religion		
Hindu	258	56.09
Muslim	132	28.70
Christian	67	14.57
Others	3	0.65

Fig 8: Frequency and Percentage distribution as per Religion

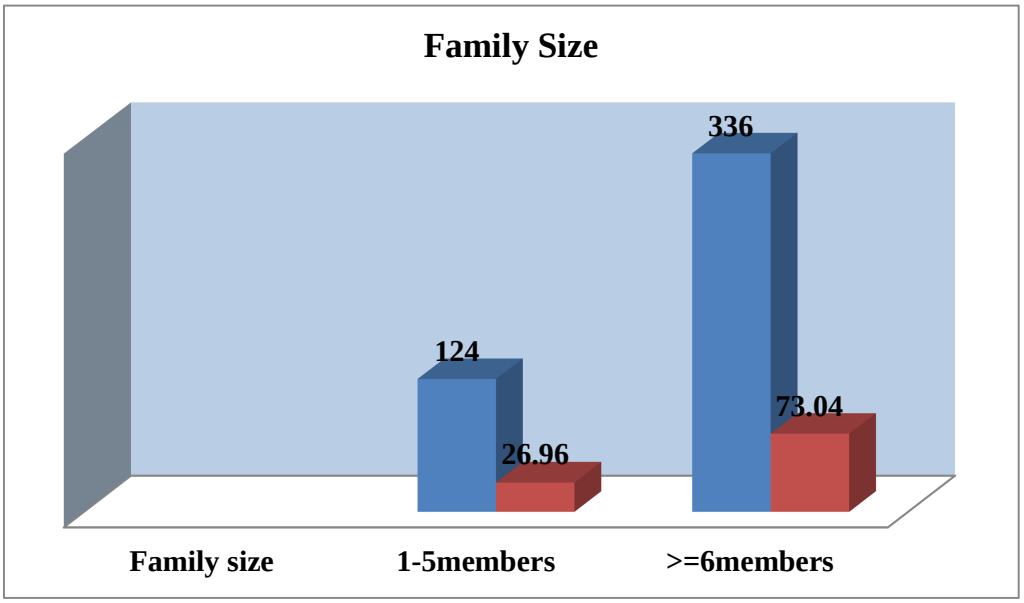


The data presented in the table reveals Religion. It shows majority 258 (56.09%) participants were belonged to Hindu religion, 132 (28.70%) were belonged to Muslim religion, 67(14.57%)were belonged to Christian religion and remaining 3 (0.65%)were belonged to Other religion.

3.7: Frequency and Percentage distribution as per size of the Family n=460

Profile	No of respondents	% of respondents
Family size		
1-5 members	124	26.96
>=6 members	336	73.04

Fig 9: Frequency and Percentage distribution as per size of the Family

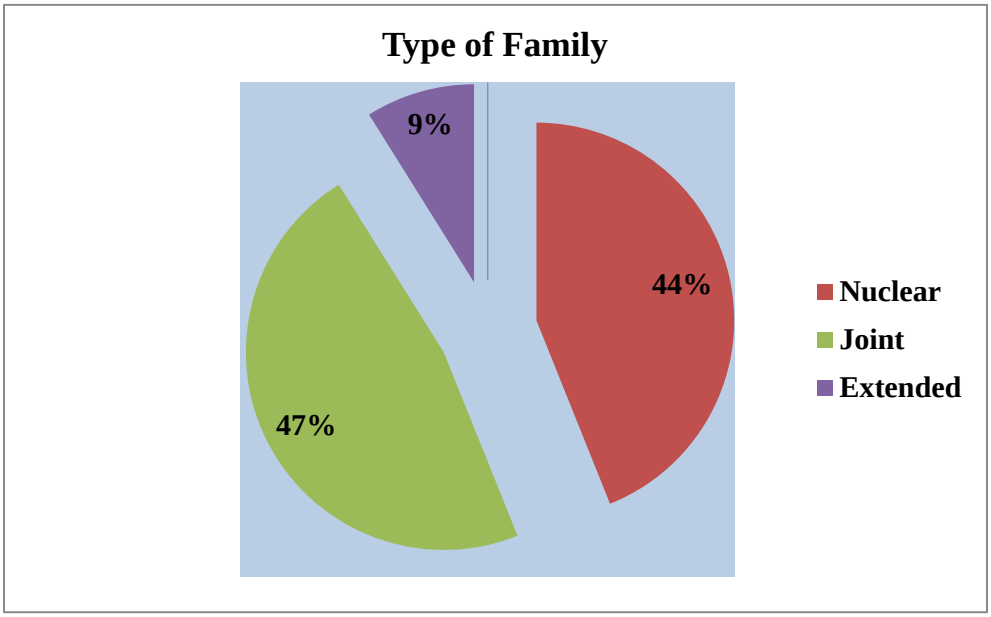


The data presented in the table reveals Family Size. It shows majority 336 (73.04%) participants were belonged to >=6members and remaining 124 (26.96%) participants were belonged to 1-5 members.

3.8: Frequency and Percentage distribution as per Type of Family n=460

Profile	No of respondents	% of respondents
Type of Family		
Nuclear	202	43.91
Joint	217	47.17
Extended	41	8.91

Fig 10: Frequency and Percentage distribution as per Type of Family

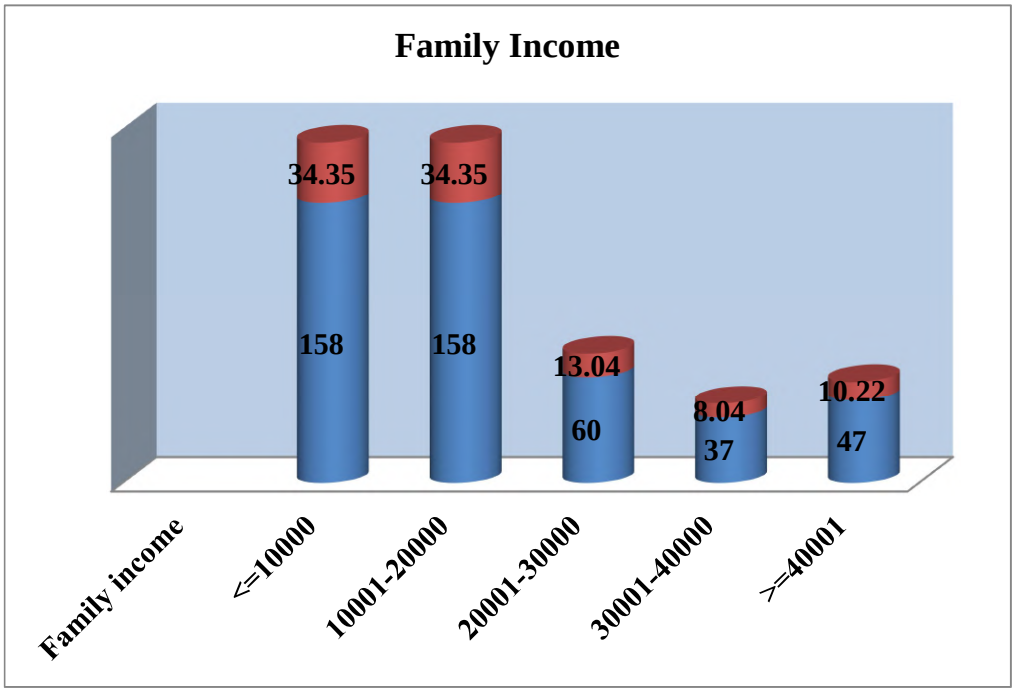


The data presented in the table reveals Type of Family. It shows majority 217 (47.17%) participants were belonged to Joint family, 202 (43.91%) participants were belonged to Nuclear family and remaining 41 (8.91%) participants were belonged to extended family.

3.9: Frequency and Percentage distribution as per Income of Family n=460

Profile	No of respondents	% of respondents
Family income		
<=10000	158	34.35
10001-20000	158	34.35
20001-30000	60	13.04
30001-40000	37	8.04
>=40001	47	10.22

Fig 11: Frequency and Percentage distribution as per Income of Family



The data presented in the table reveals Family income. It shows majority 158 (34.35%) of participants had income 10,000 to 20000, 60 (13.04%)of participants had income 20001-30000,47 (10.22%) of participants had income >=40001 and remaining 37 (8.04%) of participants had income 30001-40000.

Table 4: Association between demographic characteristics with status of malnutrition n=460

Profile	No malnourished	%	Malnourished	%	Total	%	Chi-square	p-value
Age Groups of mother								
<=29 yrs	31	16.58	156	83.42	187	40.65	108.8850	0.0001*
>=30 yrs	180	65.93	93	34.07	273	59.35		
BMI								
UW	7	11.48	54	88.52	61	13.26	62.1950	0.0001*
Normal	138	63.30	80	36.70	218	47.39		
OW	66	36.46	115	63.54	181	39.35		
Gender								
Male	118	45.91	139	54.09	257	55.87	0.0001	0.9830
Female	93	45.81	110	54.19	203	44.13		
Head of Household								
Male	199	45.85	235	54.15	434	94.35	0.0010	0.9760
Female	12	46.15	14	53.85	26	5.65		
Marital Status								
Married	200	45.45	240	54.55	440	95.65	0.7880	0.6740
Divorced	8	57.14	6	42.86	14	3.04		
Widow	3	50.00	3	50.00	6	1.30		
Religion								
Hindu	100	38.76	158	61.24	258	56.09	12.1740	0.0070*
Muslim	73	55.30	59	44.70	132	28.70		
Christian	36	53.73	31	46.27	67	14.57		
Others	2	66.67	1	33.33	3	0.65		
Family Size								
1-5members	23	18.55	101	81.45	124	26.96	51.0360	0.0001*
>=6members	188	55.95	148	44.05	336	73.04		
Family Income								
<=10000	43	27.22	115	72.78	158	34.35	66.6280	0.0001*
10001-20000	65	41.14	93	58.86	158	34.35		
20001-30000	49	81.67	11	18.33	60	13.04		
30001-40000	22	59.46	15	40.54	37	8.04		
>=40001	32	68.09	15	31.91	47	10.22		
Total	211	45.87	249	54.13	460	100.00		

***p<0.05**

The above table reveals association between demographic characteristics with status of malnutrition**.** Malnutrition was significantly associated with age <=29yrs (83.42%) (chi square 108.8, p = 0.0001), BMI with Underweight (88.52%) (chi square= 62.19 ,p=0.0001),Hindu religion (61.24%) (chi square= 12.17 ,p=0.0070), Family size 1-5 members (81.45%) (chi square=51.03 ,p=0.0001) and Family income <=10000 (72.78%) (chi square = 66.62 ,p=0.0001).Females (54.19%) were slightly highly malnourished, though this was not statistically significant (chi square = 0.0001,p=0.9830) at 0.05 level of significance. Malnutrition was negatively associated with Male as Head of Household (54.15%) (chi square = 0.0010 ,p=0.9760),and Married marital status (54.55%) (chi square =0.7880, p=0.6740).

Table 5: Multiple logistic regression analysis of status of malnutrition by demographic characteristics n=460

Profile	Malnourished	%	Adjusted OR	95% CI for OR		p-value
				Lower	Upper	
Age groups ofMother						
<=29 yrs	156	83.42	Ref.			
>=30 yrs	93	34.07	5.60	3.29	9.54	0.0001*
BMI						
UW	54	88.52	3.32	1.23	8.97	0.0180*
Normal	80	36.70	0.38	0.23	0.61	0.0001*
OW	115	63.54	Ref.			
Gender						
Male	139	54.09	1.31	0.81	2.11	0.2660
Female	110	54.19	Ref.			
Head of household						
Male	235	54.15	1.04	0.50	2.16	0.9120
Female	14	53.85	Ref.			
Marital status						
Married	240	54.55	0.38	0.08	1.87	0.2360
Divorced	6	42.86	0.47	0.06	3.64	0.4670
Widow	3	50.00	Ref.			
Religion						
Hindu	158	61.24	Ref.			
Muslim	59	44.70	0.40	0.23	0.70	0.0010*
Christian	31	46.27	0.53	0.26	1.05	0.0690
Others	1	33.33	0.33	0.00	35.03	0.6400
Family size						
1-5members	101	81.45	Ref.			
>=6members	148	44.05	3.62	1.97	6.65	0.0001*
Family income						
<=10000	115	72.78	Ref.			
10001-20000	93	58.86	1.33	0.63	2.80	0.4500
20001-30000	11	18.33	1.04	0.50	2.16	0.9200
30001-40000	15	40.54	0.21	0.08	0.54	0.0010*
>=40001	15	31.91	0.42	0.15	1.17	0.0960

***p<0.05**

The above table represents Multiple logistic regression analysis. It showed that age >=30yrs, Underweight children, Muslim children, >=6 family members and 30001-40000 family income is found to be positive and significant. It means that Malnutrition is positively influenced by these variables. It concludes that these variables are the best determinants of Malnutrition. Gender, Head of household and Marital status are found to be non significant.

Table 6 : Classification table

Observed Malnutrition status	**Predicted Malnutrition status**		
	No malnourished	**Malnourished**	**Percentage Correct**
No malnourished	156	55	73.90
Malnourished	56	193	77.50
Overall Percentage	212	248	75.90

The overall Multiple Logistic Regression model was able to classify / predict 75.9% of observation correctly. Among Non-malnourished the model was able to classify 73.9% correctly and among malnourished the model was able to predict 77.5% correctly.

Section2: Table 7 : Child characteristics wise distribution n=460

Child characteristics	No of children	% of children
Type of Family		
Nuclear	202	43.91
Joint	217	47.17
Extended	41	8.91
Age of the child		
6-11 mths	80	17.39
12-23 mths	148	32.17
24-35 mths	113	24.57
36-47 mths	119	25.87
Birth order		
1st birth	184	40.00
2nd birth	195	42.39
3rd birth	70	15.22
4th birth	11	2.39
Place of delivery		
Hospital	411	89.35
Home	49	10.65
Gestational age		
<37wks	155	33.70
37 wks	206	44.78
> 37 wks	99	21.52
Breastfeeding status		
Started immediately	193	41.96
Started within 30 min	137	29.78
Not fed as medically advised	24	5.22
Started very late	106	23.04
Sickness status		
Frequent occurrence	158	34.35
No frequent occurrence	302	65.65
Total	460	100.00

The above table reveals child characteristics wise distribution.

- It showed that majority 217 (47.17%) children belongs to joint family, 202 (43.91%) children belongs to nuclear family and remaining 41(8.91%) children belongs to extended family.
- Majority 148 (32.17%) children were in the age group of 12-23 mths, 119 (25.87%) children were in the age group of 36-47 mths, 113 (24.57%) children were in the age group of 24-35 mths and remaining 80 (17.39%) children were in the age group of 6-11 mths.

- Majority 195 (42.39%) children follows the 2nd birth order, 184 (40%) children follows the 1st birth order, 70 (15.22%) children follows the 3rd birth order and remaining 11(2.39%) children follows the 4th birth order.
- Majority 411 (89.35%) children were born in hospital and remaining 49 (10.65%) children were born in home.
- Majority 206 (44.78%) children were born at 37 weeks, 155 (33.70%) children were born at <37 weeks and remaining 99 (21.52%) children were born at >37 weeks of gestation.
- Majority 193 (41.96%) children were breastfed immediately, 137 (29.78%) children were breastfed within 30 min, 106 (23.04%) children were breastfed very late and remaining 24 (5.22%) children were not breastfed as per the medical advice.
- Majority 158 (34.35%) children had frequent sickness occurrence and remaining 302 (65.65%) children had non frequent sickness occurrence.

Table 8 : Association between Child characteristics with status of malnutrition

n=460

Child characteristics	No malnourished	%	Malnourished	%	Total	%	Chi-square	p-value
Type of Family								
Nuclear	106	52.48	96	47.52	202	43.91	18.7530	0.0001*
Joint	78	35.94	139	64.06	217	47.17		
Extended	27	65.85	14	34.15	41	8.91		
Age of the child								
6-11 mths	24	30.00	56	70.00	80	17.39	32.2760	0.0001*
12-23 mths	54	36.49	94	63.51	148	32.17		
24-35 mths	55	48.67	58	51.33	113	24.57		
36-47 mths	78	65.55	41	34.45	119	25.87		
Birth order								
1st birth	76	41.30	108	58.70	184	40.00	3.7500	0.2900
2nd birth	94	48.21	101	51.79	195	42.39		
3rd birth	37	52.86	33	47.14	70	15.22		
4th birth	4	36.36	7	63.64	11	2.39		
Place of delivery								
Hospital	204	49.64	207	50.36	411	89.35	22.0330	0.0001*
Home	7	14.29	42	85.71	49	10.65		
Gestational age								
<37wks	28	18.06	127	81.94	155	33.70	76.2690	0.0001*
37 wks	116	56.31	90	43.69	206	44.78		
> 37 wks	67	67.68	32	32.32	99	21.52		
Breastfeeding status								
Started immediately	93	48.19	100	51.81	193	41.96	75.9280	0.0001*
Started within 30 min	78	56.93	59	43.07	137	29.78		
Not fed as medically advised	24	100.0	0	0.00	24	5.22		
Started very late	16	15.09	90	84.91	106	23.04		
Sickness status								
Frequent occurrence	38	24.05	120	75.95	158	34.35	46.1430	0.0001*
No frequent occurrence	173	57.28	129	42.72	302	65.65		
Total	211	45.87	249	54.13	460	100.00		

***p<0.05**

The above table reveals Association between child characteristics with status of malnutrition**.** Malnutrition was significantly associated with Nuclear family (chi=18.7530,p=0.0001), 6=11 months child (chi=32.2760 ,p=0.0001),Hospital delivery (chi= 22.0330,p=0.0001), Gestational age <37wks (chi=76.2690 ,p=0.0001),breastfeeding started immediately (chi=75.9280 ,p=0.0001) and frequent occurrence of sickness. (chi=76.2690, p=0.0001) at 0.05 level of significance. Malnutrition was negatively associated with Birth order.

Table 9: Multiple logistic regression analysis of status of malnutrition by Child characteristics n=460

Child characteristics	Malnourished	%	Adjusted OR	95% CI for OR		p-value
				Lower	Upper	
Type of Family						
Nuclear	96	47.52	Ref.			
Joint	139	64.06	1.88	0.73	4.79	0.1890
Extended	14	34.15	5.42	2.14	13.70	0.0001*
Age of the child						
6-11 mths	56	70.00	Ref.			
12-23 mths	94	63.51	0.67	0.32	1.40	0.2870
24-35 mths	58	51.33	0.43	0.20	0.92	0.0310*
36-47 mths	41	34.45	0.17	0.08	0.39	0.0001*
Birth order						
1st birth	108	58.70	Ref.			
2nd birth	101	51.79	0.25	0.09	0.74	0.0120*
3rd birth	33	47.14	0.19	0.06	0.60	0.0050*
4th birth	7	63.64	0.12	0.04	0.39	0.0001*
Place of delivery						
Hospital	207	50.36	Ref.			
Home	42	85.71	6.01	1.85	19.54	0.0030*
Gestational age						
<37wks	127	81.94	8.95	4.23	18.92	0.0001*
37 wks	90	43.69	1.58	0.85	2.95	0.1490
> 37 wks	32	32.32	Ref.			
Breastfeeding status						
Started immediately	100	51.81	Ref.			
Started within 30 min	59	43.07	0.59	0.34	1.04	0.0670
Not fed as medically advised	0	0.00	-	-	-	-
Started very late	90	84.91	4.99	2.39	10.45	0.0001*
Sickness status						
Frequent occurrence	120	75.95	3.94	2.27	6.84	0.0001*
No frequent occurrence	129	42.72	Ref.			

***p<0.05**

The above table represents Multiple logistic regression analysis. It showed that extended family, 24-35 mths chidren, Home delivered children, <37wks gestation children, Breastfeeding started very late and Frequent occurrence of sickness are found to be positive and significant. It means that Malnutrition is positively influenced by these variables. It concludes that these variables are the best determinants of Malnutrition.

Table 10 : Classification table

Observed Malnutrition status	**Predicted Malnourish status**		
	No malnourished	**Malnourished**	**Percentage Correct**
No malnourished	161	50	76.30
Malnourished	42	207	83.10
Overall Percentage	203	257	80.00

The overall multiple Logistic Regression model was able to classify/predict 80% of observation correctly. Among Non-malnourished the model was able to classify 76.3% correctly and among Malnourished the model was able to predict 83.1% correctly.

Section3:Table 11 : Feeding and Environmental characteristics wise distribution

n=460

Variables	Frequency	Percentage
Feeding mode		
Breastfeeding	427	92.83
Bottle feeding	33	7.17
Daily feeding frequency		
< 5 times	69	15.00
5 times	114	24.78
> 5 times	277	60.22
Exclusive breastfeeding		
Given for 6 months	255	55.43
Not given for 6 months	205	44.57
Bottle treated before feeding		
Boiling	123	26.74
Not boiling	18	3.91
Just washing with water	32	6.96
Not given bottle	287	62.39
Source of drinking water		
River	84	18.26
Tap	220	47.83
Open well/Bore well	156	33.91
Water treatment before drinking		
Filtering	175	38.04
Boiling	111	24.13
Not filtering/Boiling	174	37.83
Place of fecal disposal		
Open field	25	5.43
Latrine	435	94.57
Cooking fuel		
Kerosene	11	2.39
Firewood	28	6.09
Gas stove	421	91.52
Total	**460**	**100.00**

The above table reveals Feeding and Environmental characteristics wise distribution.

- It showed that majority427 (92.83%) children had received breastfeeding and remaining 33 (7.17%) children had bottle feeding.
- Majority 277 (60.22%) children had daily feeding frequency > 5 times, 114 (24.78%) children had 5 times feeding frequency and remaining 69 (15%) children had feeding frequency < 5 times.
- Majority 255 (55.43%) children received exclusive breastfeeding for 6 months and remaining205 (44.57%) children didn't had exclusive breastfeeding for 6 months.
- Majority 287 (62.39%) children didn't had bottle feeding, 123 (26.74%) bottle was boiled,32 (6.96%) bottle washed with water and remaining 18 (3.91%) bottle was not boiling.
- Majority 220(47.83%) used tap water as main source of drinking water, 156 (33.91%) used borewell water and remaining 84 (18.26%) used river water.
- Majority 175 (38.04%) children used filtered water for drinking,174 (37.83%) children not used filtering/boiling water and remaining 111 (24.13%) children used boiled water for drinking.
- Majority 435 (94.57%) children had Latrine at home and remaining 25 (5.43%) children didn't had Latrine.
- Majority 421 (91.52%) children family use Gas stove for cooking, 28 (6.09%) use firewood and remaining 11 (2.39%) use kerosene.

Table 12: Association between Feeding and Environmental characteristics with status of malnutrition n=460

Variables	No malnourished	%	Malnourished	%	Total	%	Chi-square	p-value
Feeding mode								
Bottle feeding	187	43.79	240	56.21	427	92.83	10.3280	0.0010*
Breast feeding	24	72.73	9	27.27	33	7.17		
Daily feeding frequency								
< 5 times	15	21.74	54	78.26	69	15.00	22.1130	0.0001*
5 times	65	57.02	49	42.98	114	24.78		
> 5 times	131	47.29	146	52.71	277	60.22		
Exclusive breastfeeding								
Not given for 6 months	144	56.47	111	43.53	255	55.43		
Given for 6 months	67	32.68	138	67.32	205	44.57	25.8980	0.0001*
Bottle treated before feeding								
Boiling	50	40.65	73	59.35	123	26.74	2.3090	0.5110
Not boiling	9	50.00	9	50.00	18	3.91		
Just washing with water	17	53.13	15	46.88	32	6.96		
Not given bottle	135	47.04	152	52.96	287	62.39		
Source of drinking water								
River	31	36.90	53	63.10	84	18.26	3.5640	0.1680
Tap	103	46.82	117	53.18	220	47.83		
Open well/Bore well	77	49.36	79	50.64	156	33.91		
Water treatment before drinking								
Filtering	73	41.71	102	58.29	175	38.04	3.3040	0.1920
Boiling	49	44.14	62	55.86	111	24.13		
Not filtering/Boiling	89	51.15	85	48.85	174	37.83		
Place of fecal disposal								
Open field	11	44.00	14	56.00	25	5.43	0.0370	0.8470
Latrine	200	45.98	235	54.02	435	94.57		
Cooking fuel								
Kerosene	0	0.00	11	100.00	11	2.39	11.8140	0.0030*
Firewood	17	60.71	11	39.29	28	6.09		
Gas stove	194	46.08	227	53.92	421	91.52		

***p<0.05**

The above table reveals that Malnutrition was significantly associated withbottle feeding children (chi=10.3280,p=0.0010), daily feeding frequency < 5 times (chi=22.1130,p=0.0001) and Exclusive breastfeeding not given for six months (chi=25.8980 ,p=0.0001) and kerosene as cooking fuel (chi=11.8140,p=0.0030) at 0.05 level of significance. Malnutrition was negatively associated with Bottle treated before feeding, Source of drinking water, Water treatment before drinking and Place of fecal disposal.

Table 13: Multiple logistic regression analysis of status of malnutrition by Feeding and Environmental characteristics n=460

Variables	Malnourished	%	Adjusted OR	95% CI for OR		p-value
				Lower	Upper	
Feeding mode						
Bottle feeding	9	27.27	0.28	0.12	0.64	0.0030*
Breastfeeding	240	56.21	Ref.			
Daily feeding frequency						
< 5 times	54	78.26	3.38	1.79	6.37	0.0001*
5 times	49	42.98	0.68	0.44	1.06	0.0860
> 5 times	146	52.71	Ref.			
Exclusive breastfeeding						
Not given for 6 months	111	43.53	2.69	1.86	3.89	0.0001*
Given for 6 months	138	67.32	Ref.			
Bottle treated before feeding						
Boiling	73	59.35	0.65	0.23	1.89	0.4320
Not boiling	9	50.00	0.55	0.25	1.18	0.1220
Just washing with water	15	46.88	0.74	0.54	1.00	0.0500*
Not given bottle	152	52.96	Ref.			
Source of drinking water						
River	53	63.10	Ref.			
Tap	117	53.18	0.89	0.63	1.25	0.4910
Open well/Bore well	79	50.64	0.81	0.56	1.19	0.2860
Water treatment before drinking						
Filtering	102	58.29	1.56	1.07	2.26	0.0200
Boiling	62	55.86	1.39	0.88	2.21	0.1590
Not filtering/Boiling	85	48.85	Ref.			
Place of fecal disposal						
Open field	14	56.00	Ref.			
Latrine	235	54.02	0.90	0.31	2.57	0.8410
Cooking fuel						
Kerosene	11	100.00	Ref.			
Firewood	11	39.29	-	-	-	-
Gas stove	227	53.92	0.67	0.28	1.61	0.3690

***p<0.05**

The above table represents Multiple Logistic Regression analysis. It shows that Bottle feeding, Daily feeding frequency < 5 times, Exclusive breastfeeding not given for 6 months, Bottle washed only with water are found to be positive and significant. It means that Malnutrition is positively influenced by these variables.

Section 4: Table 14 : Effects of Malnutrition wise distribution n=460

Effects of Malnutrition	Number	Percentage
Diseases occurring commonly		
Pneumonia	84	18.26
Diarrhoea	173	37.61
Fever with infections	203	44.13
Presence of illness in last two weeks		
Yes	189	41.09
No	271	58.91
Habit of hand washing before meal		
Yes	368	80.00
No	92	20.00
Diarrhoeal episode		
Frequently	164	35.65
Not frequently	296	64.35
Respiratory Tract Infections frequency		
Once a month	219	47.61
Twice/thrice a month	87	18.91
Not frequently	154	33.48
Total	**460**	**100.00**

The above table reveals Effects of Malnutrition wise distribution.

- It showed that majority 203 (44.13%) of children had fever with infections, 173 (37.61%) of children had Diarrhoea and remaining 84 (18.26%) of children had Pneumonia commonly.
- Majority 271 (58.91%) of children didn't had illness in the last two weeks during the data collection and remaining 189 (41.09%) %) of children had illness in the last two weeks during the data collection.
- Majority 368 (80%) children has the habit of handwashing before meal and remaining 92 (20%) children didn't had the habit of handwashing before meal.
- Majority 296 (64.35%) children didn't had diarrheal episode frequently and remaining 164 (35.65%) children had diarrheal episode frequently.
- Majority 219 (47.61%) children had Respiratory Tract Infections once a month, 154 (33.48%) children didn't had RTI frequently and remaining 87 (18.91%) children had twice / thrice a month.

Table 15: Association between Effects of Malnutrition with status of malnutrition n=460

Effects of Malnutrition	No malnourished	%	Malnourished	%	Total	%	Chi-square	p-value
Diseases occurring commonly								
Pneumonia	50	59.52	34	40.48	84	18.26	41.7090	0.0001*
Diarrhoea	46	26.59	127	73.41	173	37.61		
Fever with infections	115	56.65	88	43.35	203	44.13		
Presence of illness in last two weeks								
Yes	60	31.75	129	68.25	189	41.09	25.7730	0.0001*
No	151	55.72	120	44.28	271	58.91		
Habit of hand washing before meal								
Yes	172	46.74	196	53.26	368	80.00	0.5600	0.4540
No	39	42.39	53	57.61	92	20.00		
Diarrhoeal episode								
Frequently	53	32.32	111	67.68	164	35.65	18.8530	0.0001*
Not frequently	158	53.38	138	46.62	296	64.35		
Respiratory Tract Infections frequency								
Once a month	111	50.68	108	49.32	219	47.61	33.1710	0.0001*
Twice/thrice a month	16	18.39	71	81.61	87	18.91		
Not frequently	84	54.55	70	45.45	154	33.48		
Total	211	45.87	249	54.13	460	100.00		

***p<0.05**

The above table reveals Association between Effects of Malnutrition with status of malnutrition**.** Malnutrition was significantly associated with Pneumonia (chi=41.7090,p=0.0001), Presence of illness in the last two weeks (chi=25.7730,p=0.0001),Frequent diarrheal episode (chi=18.8530,p=0.0001) and Respiratory Tract Infections once in a month (chi=33.1710,p=0.0001) at 0.05 level of significance. Malnutrition was negatively associated with habit of Handwashing before meal.

Table 16: Multiple logistic regression analysis of status of malnutrition by Effects of Malnutrition n=460

Effects of Malnutrition	Malnourished	%	Total	95% CI for OR		p-value
				Lower	Upper	
Diseases occurring commonly						
Pneumonia	34	40.48	2.63	1.51	4.59	0.0010*
Diarrhoea	127	73.41	0.88	0.53	1.45	0.6050
Fever with infections	88	43.35	Ref.			
Presence of illness in last two weeks						
Yes	129	68.25	2.19	1.44	3.33	0.0001*
No	120	44.28	Ref.			
Habit of hand washing before meal						
Yes	196	53.26	0.85	0.50	1.44	0.5450
No	53	57.61	Ref.			
Diarrhoeal episode						
Frequently	111	67.68	1.32	0.84	2.07	0.2310
Not frequently	138	46.62	Ref.			
Respiratory Tract Infections frequency						
Once a month	108	49.32	1.15	0.76	1.74	0.5180
Twice/thrice a month	71	81.61	4.20	2.19	8.05	0.0001*
Not frequently	70	45.45	Ref.			

***p<0.5**

The above table represents Multiple logistic regression analysis.It showed that Pneumonia, Presence of illness in last two weeks and Occurrence of Respiratory Tract Infections Twice/thrice a month are found to be positive and significant. It means that Malnutrition is positively influenced by these variables. It concludes that these variables are the consequences of Malnutrition.

Table 17 : Classification table

Observed Malnutrition status	Predicted Malnutrition status		
	No malnourished	**Malnourished**	**Percentage Correct**
No malnourished	134	77	63.50
Malnourished	65	184	73.90
Overall Percentage	199	261	69.10

The overall Multiple Logistic Regression analysis was able to predict/classify 69.10% of the observation correctly with respect to Malnutrition status. Among Non malnourished the above model was able to predict 63.5 % correctly as non malnourished and among malnourished the above model was able to predict 73.9 % as malnourished correctly.

CHAPTER – V

DISCUSSION

The objectives of the study was to study the causes and consequences of Malnutrition among underfive children in urban areas of Belagavi among 460 study participants. In order to better understand the determinants and consequences of malnutrition, chi square test and multiple logistic regression analysis was used and with these tests, we tried to come to some conclusions and compared these findings with the other research findings.

Discussion discussed under following headings:

Determinants of Malnutrition:

1. Demographic characteristics wise distribution

The study was conducted in a rapidly expanding metropolis in Karnataka. Despite having access to urban amenities like clean water, electricity, and easy access to the media, the respondents still faced a number of issues, including poor water supply, limited electricity, and some environmental pollution.

In the present study, majority 273 (59.35%) of mothers were belonged to the age group of >=30yrs and 187 (40.65%) of mothers were belonged to the age group of <=29 yrs respectively. In our study it is shown that 156 (83.42%) are malnourished whose mother's age >=30yrs is of (OR= 5.60, p=0.0001) age, which is found significant. This could be explained with the fact that increase in maternal age, less likely to have healthier children.

Secondly in the present study, 218 (47.39%) children were having Normal BMI. 181(39.35%) children were overweight and remaining 61 (13.26%) children were underweight. In the present study it is depicted that 54 (88.52%) (OR=3.32, p=0.0180) children are found to be underweight and which is significantly associated.This study was supported by Chukwuma et al, in Nigeria states that underweight children (28.6%) in 406 participants are malnourished more as compared with other children.(p=0.835)[70]and a study done in Bangladesh by Md Rashedul Islam et al also reported that underweight was found to be 61·8 %. (95%CI) [30]and community based study done in Maharashtra by Sujata Murarkar et al, also depicted that 35.4% children were underweight in urban slums. OR=0.886, 95% CI), which supports the present study findings.[31]This could be explained by the fact that this could be as a result of weaning and lower breast milk intakes, which make them prone to childhood malnutrition.

Similarly in our study 257 (55.87%) children were Males and 203 (44.13%) children were females. In the present study it is found that 139 (54.09%) (OR=1.31,p=0.2660) male children were malnourished, which is not significantly associated but a study done by Chukwuma et al, in Nigeria depicted that 68 (34.3%) male children are malnourished as compared with female children.(x2= 23.2 p=0.000) which was found significant [70]and a case control study done by Ahmad Hossain et al in Nepal on 256 participants which states that male children (AOR = 0.50, 95% CI = 0.27–0.92) are malnourished more[28] which supports the findings of the study. A cross sectional study done in Islamabad reported that gender of the child (30%,) p=0.0001) was significantly associated with nutritional status of the underfive children.[5]A study done in Bone regency states that 53.94% male children are malnourished.[61]Similarly a study done by Sakisaka K et al, in Nicaragua states that female gender of the child

(OR=1.884, P<0.05) are malnourished more. And a study done Daudi et al, reported that female children (49.6%) are less likely to be experience malnutrition as compared to male children [42]which shows no significant association. This could be explained with the fact that the exact reason was not known but it may be due to well known fact that male child is more affected by environmental stress than the female child.

In the present study, majority 434 (94.35%) participants reveals Males as head of household and remaining 26 (5.65%) participants reveals females as head of household. In the present study it depicts that 235(54.15%) (OR= 1.04,p=0.9120) children are more likely to be malnourished whose family head is a male but it didn't show any significant association but we are unable to reveal the exact cause for this.

Similarly 258 (56.09%) participants were belonged to Hindu religion, 132 (28.70%) were belonged to Muslim religion, 67 (14.57%) were belonged to Christian religion and remaining 3 (0.65%) were belonged to other religion. In the present study it is shown that 59 (44.70%) OR=0.40,p=0.0010) Muslim children are malnourished as compared to other religion children and also showed significant association. This could be explained by the fact that muslim community people tends to have more children in the family and hence the care and proper nutrition received by the children also gets reduces and this makes the children to be more prone to malnutrition.

In our study 336 (73.04%) participants were belonged to >=6members and remaining 124 (26.96%) participants were belonged to 1-5 members. 148 (44.05%) children are likely to be malnourished in which family members are more than 6 and which is found significantly associated. (OR=3.62,p=0.0001)This might be because of the fact that increased number of families placed a heavy burden on scarce household resources, particularly on financial and food. That might make difficult to fulfill the

dietary need of the children. Besides, the increased number of family might reduce the time and quality of care received by the children, these findings were comparable with some studies done in Ethiopia by Abay Kassa Tekile et al, reported that as the number of members increases in the family, the chance of getting malnourished more in children.[71]

Similarly in the present study 158 (34.35%) of participants had income 10,000 to 20000, 60 (13.04%) of participants had income 20001-30000, 47 (10.22%) of participants had income >=40001 and remaining 37 (8.04%) of participants had income 30001-40000. In our study it is found that 15 (40.54%) of children are likely to be malnourished whose family income is between 30001-40000 and which is also found significantly associated.(OR=0.21,p=0.0010) whereas a study done by Sujata Murarkar et al, in Maharashtra also depicted that low income of the family associated with ($p < 0.05$) underweight.[31]This can be explained by the fact that households with low income could not afforded to buy food for consumption which results in inadequate diet that leads to child malnutrition and also it is well known that socio economic status is one of the important determinant of wellbeing of children and health. Lower the socioeconomic status higher is the risk of malnutrition. With improvement in socioeconomic status malnutrition proportionately declines.

2.Child characteristics wise distribution

Likewise 217 (47.17%) participants were belonged to Joint family, 202 (43.91%) participants were belonged to Nuclear family and remaining 41 (8.91%) participants were belonged to extended family. In the present study, Prevalence of Malnutrition among underfive children was more in extended families (34.15%) (OR=5.42, p=0.0001, 95% CI) as compared to nuclear and joint families, were shown

to have the strongest association.This could be explained with the fact that due to improper handling of children in the large families as compared to smaller families and it also reduced the time and quality of care received by the children.

Similarly the present study depicts that children between 24-35 months (51.33%) (OR=0.43,p=0.0310,95% CI) and 36-47 mths 34.45%) (OR=0.17,p=0.0001) are malnourished more comparatively to other age groups and also shown the significant association.Likewise a cross sectional study done by Khan et al, from Pakistan supported that malnutrition was also observed more in children between 2-5 years. (48%) (OR=2.30, p= 0.029)[72,] similarly a study done by Ole Tankoi et al also depicted that 24-35 months (OR= 2.22; 95%CI: 0.22-22.3) children experience malnutrition more which supported our study.[18]It is clear from our study that, malnutrition was high in lesser age group, indicates relatively younger children are the common victims of the malnutrition. Under nutrition in younger age, especially between 1-3 years is likely to be due to low energy intake, because it might be due to children were not fed often with enough household food.

In our study it is also depicted that higher the birth order (63.64%) children are likely malnourished more and is greater (OR=0.12, p=0.0001, 95% CI) is also found statistically significant association. Our study found that higher the birth order, malnutrition is positively found significant and a community based cross sectional study done in Maharashtra by Purohit et al and others supported this which showed strong statistical significant association.[22] with chi square value 18.5 and p=0.05 level of significance. This might be due to the fact that, a mother having many children may get inadequate time to look after children than the mother with less number of children.

Overall in our study it is found that home delivered (85.71%) children (OR=6.01, p=0.0030, 95% CI) are likely to be malnourished more as compared to hospital delivered children which is also found significant association.

Research participants whose mothers delivered before 37 weeks of gestation (81.94%) experience greater chances of malnutrition (OR=8.95,p=0.0001, 95% CI) and this was found strong significant association in the present study. This could be due to premature deliveries makes the babies to be unhealthy more than the children who born at term gestation.

In our study it is also stated that mothers who started breastfeeding very late after birth (84.91%) (OR=4.99, p=0.0001, 95% CI) children are likely to have the chances of malnutrition more as compared to other children. It is also found in the current study that breastfeeding started very late after birth is found to be positive and significant. Study done by Abate Awoke et al, in Ethiopia which shows late initiation of breastfeeding has identified as one important determinant of Malnutrition. [23]

In the present study, it is also observed that children experience malnutrition oftenly who has frequent illness status (75.95%) (OR=3.94, p=0.0001, 95% CI).A study done in Ethiopia by Abate Awoke et al, reveals that frequent sickness status (AOR = 2.87,95% CI, 1.13–7.63), children are at high chances to be malnourished more and this supported our research.[23]and a case control study in Malaysia by HuiJie Wong et al on 137 cases and controls depicted that frequent illness status (AOR: 2.79, 95% CI: 1.06, 7.31) has positive impact on malnutrition in underfive children.[73]This could be explained by the fact that frequent illness status leads to lesser intake of nutrients which ultimately leads reduce weight and to be malnourished.

Furthermore, gender inequality within the family and community is a significant socio-cultural factor that contributes to the unequal feeding of female children in these households. A number of studies have contributed to the inequality that demonstrates the reasons behind starvation. Boys are often fed more nutrient-dense food than girls in Indian households, yet our research indicates that boys are nonetheless more likely than girls to be malnourished.

3.Feeding and Environmental characteristics wise distribution

In the present study it is showed that bottlefed children are malnourished more **(**56.21%) (OR=0.28, p=0.0030) as compared to breast fed children which shows significant association.Similarly a community based case control study done by Nilesh Kumar Pravana et al in Nepal also declared that bottle feeding (AOR 2.19, 95% CI 1.73 to 12.03); and not initiating complementary feeding at the age of 6 months (AOR 2.91, 95% CI 1.73 to 12.03) were significantly associated with Malnutrition.[20]

The latest study also reveals that daily feeding frequency less than 5 times **(**78.26%) (OR=3.38,p=0.0001) is found to be positive and significant whereas a study done by Geetanjali Sethy et al stated that frequency of feeding did not show significant relation with malnutrition.[21]

In our research study it is also found that exclusive breastfeeding not given for 6 months **(**43.53%) (OR=2.69,p=0.0001) are malnourished more as compared with breastfed children, whereas a study done by abuka T. et al, in Ethiopia, states that complimentary feeding started before 6 months or late after 6 months (AOR=4.4, CI=(1.6, 11.84)) identified as determinant of malnutrion.[19]Likewise a study done in

Odisha by Geetanjali Sethy et al also stated that children who have received complementary feeding in time are significantly less undernourished than those who had delay in receiving the same (87%) (x2= 0.3665. p-value=0.036652) and it also proves that frequency of feeding did not show significant relation with malnutrition.[21]A study done in Ethiopia by Abate Awoke et al, showed that nonexclusive breast feeding (AOR =5.81, 95% CI 1.80–18.79) was significantly associated with malnutrition.[23] Similarly a case control study done by Tigist Gebremaryum et al also showed that introduction of complementary feeding before six months [(AOR = 6.21, 95% CI: (1.44, -26.76)] were significant factors associated with severe acute malnutrition.[24]This could be explained by the fact that children who were not exclusively breastfed had lower chance of preventing infections as breast milk has many immunological properties that are likely to protect against infections in infancy and also lack of information on child feeding might lead to inappropriate child feeding practice which then could affect the nutritional status of the children. Exclusive breastfeeding acts as a protective factor against infection because it is rich in anti-infective factors which prevents many diseases. It also enhances the immunity of the child however it should be accompanied with timely weaning. If it is not implemented then child loses its benefits and become malnourished.

Similarly bottle just washed with water (46.88%) (OR=0.74,p=0.0500) has the higher chances of malnutrition as compared with other variables, which showed significant association. Besides, there might be contamination of bottles and foods that were early introduced to the child which contributes to higher risk of diarrheal disease in children.

In the present study it is stated that53 (63.10%) were using river as source of drinking water but did not show any significant association. (x^2= 3.56,p=0.1680) and a study done by Achadu Abraham Eleojo et al states thatmain source of drinking water for 50% is borehole.[74]

In our study it is found that 102 (58.29%) used filter as a method of water treatment before drinking (x^2= 3.30,p=0.19.) but a study done in Nigeria states that 52% of the population use wood as source of heat for cooking.[74]

In our study it is found that 14(56%) children using open defecation as place of fecal disposal but it has not shown any significant association.(x^2= 0.03,p=0.84).Similarly a study done in Nigeria by Achadu Abraham Eleojo et al states thatmore than half (52.2 %) of the mothers use bush as their primary method of refuse disposal. 41.3% make use of pit latrine.[74]Moreover, a study done by Swati Srivatsava et al also states that improved source of drinking water and practice of open defecation was also found to be associated with Malnutrition.[27]

Consequences of Malnutrition

Effects of Malnutrition wise distribution.

In the present study, it is depicted that Pneumonia (40.48%) is identified as main effect of Malnutrition (OR=2.63,p=0.0010,95% CI) and it is also depicted that presence of illness in the last two weeks during the data collection (68.25%) (OR=2.19,p=0.0001,95% CI) has the effect and it is found significantly associated.

The data from the research suggest that frequent diarrheal episodes (32.32%) (p=0.0001, 0.05 level) are common in children with malnutrition.The study identified diarrheal illnesses, as major effects of malnutrition. The onset of diarrhea

can be attributed to various infections that affect the gastro-intestinal tract such as E.coli, Salmonella and Vibro cholerae. These infections cause malnutrition in that they lead to malabsorption of nutrients as well as loss of nutrients through diarrhea. Therefore, there is need of coming up with programmes to educate people on how to prevent diarrhea and use of Oral Rehydration Salt Therapy, Despite the programmes that have been set up to alleviate the incidences of diarrhea such as use of Oral Rehydration Salt Therapy, Diarrhea is still a major challenge in India that is contributing to malnutrition. Few studies done in different parts of the world were supported the findings like a study done on 102 cases and 201 controls in North west Ethiopia by Bantamen Get al, represents that 39 (38.23%) of cases and 44(21.89%) of controls had history of diarrheal episode.[49] Also a study done by Maurice Mhango et al in Zambia depicts that history of Diarrhoea (OR=4.20, 95% CI [1.77,9.95] was significantly associated with Malnutrition.[53] Likewise a case control study done in Nepal by Ahmed Hossain et al, also states that children with a history of diarrhea (AOR = 1.75, 95% CI = 0.92–3.39) are more at risk to be malnourished.[28]Similarly a community based cross sectional study done by Sujata Murarkar et al, in Maharashtra also represents that diarrhea (p = 0.001) was associated with malnutrition.[31] A similar study done by Tomas Zaba et al, in Mozambique also states that Experiencing diarrhoea [(OR) = 4.54; P = 0.001] was the only variable associated with acute malnutrition.[63] A community based cross sectional study done by Kefalew Alemayehu et al in western Ethiopia also proves that there was a statistically significant association between diarrhea and age of the child(6-11 months (AOR = 1.546 (1.68, 3.52), and 12-23 months (AOR = 1.485 (1.84, 2.63)) [66]

In our study it is found that 196 (53.26%) children has the habit of handwashing before meal but it is not significantly associated, this might be due to the fact that poor hand washing practice might lead to contamination of foods and that might increase a risk of infections and diarrheal diseases that in turn might lead to poor appetite and poor absorption of nutrient and finally might expose the child to Malnutrition.Whereas similar findings were documented in some studies like a hospital based case control study in Bangladesh by Mustafa Kabir Musa et al found that irregular hand washing with soap or other cleaning agents before feeding (AOR = 0.317, 95% CI = 0.139–0.723) found to be associated with malnutrition.[50]Similarly a survey done by Adonia Damtew Nebro et al, in Ethiopia also represents that infrequent hand washing (AOR= 7.6 95% CI:2.44-23.6) has significant association with malnutrition.[24]

The present study results also shows that children who are malnourished, tend to experience Frequent Respiratory Tract Infection's (81.61%) (OR=4.20 ,p=0.0001,95% CI) which is found positive and significant.A cross sectional study done among 182 malnourished underfive children in Shivamogga by Ravindra B. Patil et al, represents that Malnutrition was responsible for respiratory tract infection (44%) and which was equally distributed in both boys and girls and but the difference was not significant.[51]Similarly a study done by Shailen Nandy et al, found that Malnutrition has the impact on development of Respiratory tract infections (OR = 1.39, 95% CI = 1.23–1.58).[75]This could be explained with the fact that malnutrition and infection form a vicious cycle; infection precipitates the acute bouts of malnutrition and malnutrition predisposes the children to infection. And also lack of knowledge of caretakers to assess these problems at the initial stage and to

treat them effectively and also could be due to as these are acute episodes which results in immediate weight loss.

Therefore mother's education in aspects like feeding and environmental sanitation is very essential because education improves the ability of mothers to implement simple health knowledge and facilitates their capacity to manipulate their environment, including health care facilities, interact more effectively with health professionals, comply with treatment recommendations, and keep their environment clean.

CHAPTER – VI

CONCLUSION

The afore mentioned results of the study indicate that malnutrition affects child's physical and mental health and is a serious public health concern in India. There is a strong relationship between a high prevalence of malnutrition and a few socioeconomic and demographic factors.

Male children are slightly more likely than female children to suffer from malnutrition, thus mothers and other caregivers should be made aware of the importance of providing for their children as well as how adopting healthy eating habits can help fight the problems caused by hunger. Malnutrition was found to be influenced by socioeconomic, demographic, and child-specific and feeding related factors. These findings are highly noteworthy because they offer potential paths of action that could be followed to improve child's nutritional status.

A mother in good health can give birth to a healthy child. This point of view states that mothers ought to get dietary counseling and have their diets properly assessed on a regular basis. Malnutrition is directly impacted by the creation and enhancement of government policies, with socioeconomic status being viewed as a key determinant.

We fully agree with previous recommendations in the literature that, in order to promote fairness and equality in child health and eradicate poor health outcomes, children in the majority of developing countries should have access to social and health protection programs.

Since children under five are the most weak and underprivileged group policymakers and health programmers need to alter child nutrition policies and interventions to place a greater emphasis on this age group.

Immediate treatments aimed at community management of malnutrition may be beneficial in managing undernutrition, which in the study community is a symptom of acute malnutrition.

The socioeconomic situation of a home has a major impact on the nutritional status of children, hence policies and programs aimed at reducing poverty may be a long-term solution to the problem.

Policy makers and community leaders can be involved in the development and implementation of health education programs for mothers based on the study's findings.

Implications of study

- **Scope for a society**

The study will contribute to raising awareness of malnutrition among parents and medical professionals. The public, groups, and various healthcare facilities can make use of these findings to support parents and medical authorities in addressing issues connected to malnutrition and to enhance the health of their children. The study also placed a strong emphasis on the causes of malnutrition and the variables that are linked to it.

- **Scope for Nursing Practice**

The findings of the present study can be used in different aspects of the nursing profession as follows-

- As per the results of the study, there is a critical need to avoid malnutrition because of its impact on the health of children under five years old, as well as other variables that they confront.
- The primary duty of all health professionals is to prevent health problems related to underfive children's malnutrition. The development, coordination and implementation of a wide range of health awareness programs for all societal groups, with a focus on vulnerable populations such as children under five and their mothers, in order to raise awareness of malnutrition and the factors that contribute to its effects.
- The results of this study can be used by nurses as a point of reference for creating different kinds of health education programs for both community and institutional settings.
- Because nursing practice has a strong theoretical base, community members, particularly families with children under five, can benefit from a variety of educational techniques that educate them about malnutrition and its related factors that impact their physical health and can help them form healthier eating habits.

- **Scope for Nursing Education**
  - Teaching nursing students how to plan, organize, and carry out health education programs on malnutrition and related concerns should be part of their curriculum.
  - Every nursing student should receive sufficient instruction in this area because the prevention of disease is given greater weight in nursing education than its treatment. Topics including the causes, treatments, and preventive measures of malnutrition to be covered in this workshop.
  - The study's conclusions can be used as instructional resources by nursing students and other students studying health professions.
- **Nursing Administration**
  - It is the duty of nursing administrators to provide staff development opportunities and programs to all nurses and to train them in the management of malnutrition issues, especially those pertaining to the underfive population.
  - When it comes to organizing and implementing programs for mothers with children under five, nursing administrators should take the initiative. Additionally, the administrator could notify higher authorities about the need for these programs in the community.
- **Nursing Research**
  - Malnutrition is highly prevalent in children, especially in the under-five population, which makes this topic crucial. Many disorders stem from not getting the right care when they were young.
  - The current study's findings demonstrate the importance of carrying out more research on malnutrition. Without a doubt, the current study will aid in the production of comparable results in future research endeavors.

Limitations of the Study

- Study is conducted in small geographical area limits the generalization of the findings.
- The relationship between the factors cannot be interpreted casually due to cross sectional nature of the study.

Recommendations

These are some of the conclusions that may be drawn from the results of this study:

- The findings should contribute to the development of theory in this field.
- The similar study can be done in other parts of Karnataka in a larger scale.
- To provide healthy environment in underfive population which will further promotes the health of underfive children.
- To understand the various determinants of malnutrition by parents will help to promote child health.
- The results can help policy makers and health authorities to develop and design health education programmes for underfive children and their mothers.
- A larger scale survey and prompt attempt to manage malnutrition can prevent malnutrition and other health problems among underfive children.

CHAPTER – VII

SUMMARY

Prevalence of malnutrition among under five children shows that more than half of the children 249 (54.13%) being malnourished.

Demographic characteristics distribution shows that (59.35%) mothers were belongs to >=30yrs, majority of the children had normal BMI (47.39%). Male children (55.87%) were slightly more than the female children (44.13%).Majority of the families (94.35%) had males as head of the families and (95.65%) females were married. Majority were belonged to Hindu religion (56.09%) and most of them (73.04 %) had >=6members. Family income was equally distributed (34.35%) for less than 10,000 and between 10,000 to 20,000.

The multiple logistic regression analysis by different demographic characteristics of underfive children shows that Age, Underweight children, Muslim religion, Family size >=6 members and Family income found to be associated. Other demographic characteristics like gender of child, head of household, and marital status are not associated.

Child characteristics distribution reveals that (47.17%) children belongs to joint family, (32.17%) were in the age group of 12-23 months,(42.39%) were in the 2^{nd}birthorder, majority (89.35%) mothers had hospital deliveries. (44.78%) mothers delivered at 37 weeks of gestation and (41.96%) babies were breastfed immediately after birth. Majority of the children(65.65%) didn't had frequent occurence of fever and diarrhea.

The multiple logistic regression analysis by different child characteristics of underfive children shows that the extended family,24-35 mths and 36-47 mths children, Home delivered children, <37wks of gestational week, delayed Breastfeeding found to be associated.

Effects of Malnutrition wise distribution reveals that majority (44.13%) had fever with infections, (58.91%) children didn't had any illness in last two weeks during data collection,(80%) children has the habit of Handwashing before meal, Majority (93.91%) and More than half (64.35%) didn't had frequent diarrheal episode and (47.61%) had RTI once in a month.

The multiple logistic regression analysis by Effects of Malnutrition shows that the Pneumonia,presence of illness in last two weeks and occurrence of RTI Twice/thrice a month found to be associated, these are considered as consequences.

CHAPTER - VIII

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ANNEXURE I

ETHICAL CLEARANCE CERTIFICATE

KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH
(Formerly known as KLE University)
(Deemed-to-be-University established u/s 3 of the UGC Act, 1956)
Accredited 'A' Grade by NAAC (2nd Cycle) Placed in Category 'A' by MHRD (GoI)
JNMC Campus, Nehru Nagar, Belagavi-590 010, Karnataka State, India
☎: 0831-2444444 FAX: 0831-2493777 Web: http://www.kledeemeduniversity.edu.in E-mail: info@kledeemeduniversity.edu.in

Ref.No.KAHER/EC/19-20/ 2906/908 28th June 2019

To,
Ms. Vaishali S. Bagewadi
Part-Time Ph.D. Research Scholar,
2018-19 Batch, Faculty of Nursing,
KAHER, Belagavi.

Dear Research Scholar

The KAHER Ethics Committee on Human Subjects for Ph.D. Research Project met on th **14th May 2019** to consider your application for approval of the research project **"Determinants and Consequences of malnourished under five urban Children: A cross sectional study."**

As there are no ethical issues involved in your proposed research project, the committee has provided approval for this research project.

You are requested to report to Ethical Committee of the following:

1. Any deviation from or change of the protocol.
2. Any changes in study documents.

(Dr. Anita Dalal)
Member-Secretary
Ethical Committee (Human) for Ph. D. Research
KAHER, Belagavi.

(Dr. B.C. Kotintot)
Chairman
Ethical Committee (Human) for Ph. D. Research
KAHER, Belagavi.

CC to: - The Director Research Foundation, KAHER, Belagavi.
- The Director Academic Affairs, KAHER, Belagavi.
- The Registrar, KAHER, Belagavi.
- Special Officer to Hon. Vice Chancellor, KAHER, Belagavi.

ANNEXURE II

PERMISSION LETTER

KLE
INSTITUTE OF NURSING SCIENCES
A Constituent Unit of
KLE Academy of Higher Education and Research
(Deemed-to-be-University)
Accredited 'A' Grade by NAAC (2nd Cycle) Placed in Category 'A' by MHRD (GoI)
NEHRU NAGAR, BELAGAVI – 590010, KARNATAKA, INDIA
Office: 091- 831– 2472303, Fax: 091- 831- 2475103, Email: principalnursingbgm@yahoo.com
Website: http:/klenursingbgm.edu.in
Recognized by : Indian Nursing Council (New Delhi) - Karnataka Nursing Council (Bengaluru, Karnataka)

Ref: No - 2019-20 - D - 1257 Date: 24/02/2020.

To,
District Health and Family Welfare Officer,
Hindu Nagar, Tilakwadi,
Belagavi - 590006

Sub: regarding seeking permission to conduct Ph.D. Research study

Respected sir,

With reference to the above cited subject I, Mrs.Vaishali S. Bagewadi working as Assistant Professor at KAHER, Institute of Nursing Sciences, is persuing Ph.D from KAHER, would like to ask permission to conduct the research study entitled **"determinants and consequences of malnourished underfive urban children : a cross sectional study"** among the underfive children residing in urban areas of Belagavi city. Kindly permit to conduct the research study and do the needful.

Thanking you,

Yours faithfully,

(Mrs. Vaishali S. Bagewadi)

KAHER INSTITUTE OF NURSING SCIENCES BELAGAVI

Signature of Guide

Sudha

Dean, Faculty of Nursing
Principal, Institute of Nursing Sciences,
Belagavi.

Office of the Dist. Health & Family Welfare Officer BELAGAVI

ANNEXURE III

Data Analysis Certificate

ANNEXURE

Data Analysis Certificate

This is to certify that the dissertation entitled **"Determinants and Consequences of malnourished underfive urban children: a cross sectional study"** is a bonafied and original research work done by **Mrs.Vaishali S. Bagewadi** for the award of degree of **Doctor Of Philosophy In Faculty Of Nursing** under the guidance of **Prof. Sumitra L.A** and for the same data analysis is done by me as per the objectives of the study. I wish this investigator grand success in endeavors.

Date: 16/11/2023

Prasad.

Name & Designation:

Dr. J. B. Prasad

Statistician

ANNEXURE IV

Language Editing Certificate

ANNEXURE

Language Editing Certificate

This is to certify that the dissertation entitled **"Determinants and Consequences of malnourished underfive urban children: a cross sectional study"** is a bonafied and genuine research work done by **Mrs.Vaishali S. Bagewadi** for the award of degree of **Doctor Of Philosophy In Faculty Of Nursing** under the guidance of **Prof. Sumitra L.A** and the same is edited by me. I wish this investigator grand success in endeavors.

Date: 21/12/2023

Name & Designation:

Prof. Sujata Pai

M.A (English)

CONSENT FORM

INFORMED CONSENT FORM FOR PARENTS OF UNDERFIVE CHILDREN PARTICIPATING IN RESEARCH

"Determinants and Consequences of malnourished underfive urban children: a cross sectional study"

Research Scholar: Mrs.Vaishali S.Bagewadi

Supervisor: Prof.Sumitra L.A.

Information sheet

Introduction:

We are requesting you to agree to participate you and your child in the study entitled Determinants and Consequences of malnourished underfive urban children conducted by Mrs.Vaishali S.Bageadi, Ph.D Research scholar at KLE university, Belagavi,under the guidance of Prof.Sumitra L.A, Professor & Head Dept of Child Health Nursing, KAHER, Institute of Nursing Sciences, Belagavi.

Explanation of the procedure:

In this study you will have to answer some prepared questions about general health information, socio-demographic details and then your child's height, weight will be recorded. You will be continued to fill out the questionnaires regarding dietary habits and diseases occurring frequently. This entire procedure will take 20-30 minutes.

Possible Benefits:

Malnutrition may leads to many serious consequences which can be prevented by understanding the determinants and also addressing the consequences of malnutrition may help to prevent nutritional disorders..

Risks:

The study does not involve any interventions hence the participation in this study will not cause any harmful effect on health

Confidentiality:

Your child's identity will not be revealed and the information collected will be coded.

Withdrawal:

Participation in study is voluntary. If you don't wish that your child should participate in the study you can refuse, which will not impact the child in relation to health matters.

Cost of participation:

The cost of the study will be borne by the researcher. There will be no additional cost to you for participating in this study.

Child Assent

In this research study you will have to answer some prepared questions related to your social, demographical aspects, reasons and effect of malnutrition. The time taken to

answer these questions will be 20 to 30 minutes. It is your choice that you can stop participating in the study at any time.

Questions: If you have any questions related to this study you can contact:

Mrs.Vaishali S.Bagewadi

Assistant Professor,

Dept.of Child Health Nursing

KAHER, Institute of Nursing Sciences,

Nehru Nagar, Belagavi-590010

Mobile No – 9964299877 / 9591297807

Email id- vsbagewadi@gmail.com

OR

Prof.Sumitra L.A

HOD, Dept of Child Health Nursing,

KAHER, Institute of Nursing Sciences,

Nehru Nagar, Belagavi-590010

Mobile No – 9845896114

Legal rights:

By signing this consent form you are not waiving any of your legal rights.

Publication right:

The results of the study will be used for publication however the identity of the participants will be kept confidential.

Participation information sheet

Code no:

"I Volunteer and consent for my child's participation in this study. I have read the content or it has been read to me in the languages i can understand and the study has been fully explained to me I may ask any questions at any time".

1. Name of the parent ----------

Signature/Thumb impression of the parent ----------

Phone No: Date: Place:

2. Signature of the investigator (Person obtaining consent) ----------

Name: ----------

Date: Place:

3. Signature of the witness: ----------

Name: ----------

Date: Place:

ಸಮ್ಮತಿ ಪತ್ರ

“ಶಿವರ್ಷದಒಳಗಿನಮಕ್ಕಳಲ್ಲಿಅಪೌಷ್ಟಿಕತೆಯ ಕಾರಣಗಳು ಮತ್ತು ಅದರ ದುಷ್ಪರಿಣಾಮಗಳು”

ಸಂಶೋಧಕರ ಹೆಸರು: **ವೈಶಾಲಿಬಾಗೇವಾಡಿ** ಮಾರ್ಗದರ್ಶಕರು:

ಪ್ರೊಫ್.ಸುಮಿತ್ರಾಎಲ್ಎ

ಸಂಶೋಧನೆಯ ಪರಿಚಯ :

ಇದು ಒಂದು ಪಿ.ಎಚ್.ಡಿ ಸಂಶೋಧನೆ. ನಿಮ್ಮ ಮಗನನ್ನು ಅಥವಾ ಮಗಳನ್ನು ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ನಿಮ್ಮ ಪರವಾನಗಿಯನ್ನು ಕೇಳುತ್ತಿದ್ದೇವೆ. ಶಿವರ್ಷದಒಳಗಿನಮಕ್ಕಳಲ್ಲಿಅಪೌಷ್ಟಿಕತೆಯ ಕಾರಣಗಳು ಮತ್ತು ಅದರ ದುಷ್ಪರಿಣಾಮಗಳ ಬಗ್ಗೆ ಸಂಶೋಧನೆಯನ್ನು ಮಾಡಲಿದ್ದೇವೆ.

ಪ್ರಕ್ರಿಯೆಯ ವಿವರಗಳು:

ಈ ಸಂಶೋಧನೆಗಾಗಿ ನಾವು ವಿದ್ಯಾರ್ಥಿಗಳಿಗಾಗಿ ಹಲವಾರು ಪ್ರಶ್ನಾವಳಿಗಳನ್ನು ಸಿಧ್ಧಪಡಿಸಿದ್ದು ಈ ಮೂಲಕ ಅಪೌಷ್ಟಿಕತೆಯ ಕಾರಣಗಳು ಹಾಗೂ ದುಷ್ಪರಿಣಾಮಗಳ ಬಗ್ಗೆ ಮಾಹಿತಿ ಪಡೆಯಲಿದ್ದೇವೆ. ಈ ಪ್ರಕ್ರಿಯೆಗಾಗಿ ನಾವು ನಿಮ್ಮಹಾಗು ನಿಮ್ಮ ಮಗುವಿನೊಂದಿಗೆ ೨೦ ರಿಂದ ೩೦ ನಿಮಿಷಗಳವರೆಗೆ ಚರ್ಚೆ ಮಾಡಿ ಮಾಹಿತಿ ಪಡೆದುಕೊಳ್ಳಲಿದ್ದೇವೆ. ಹಾಗುನಿಮ್ಮಮಗುವಿನಎತ್ತರಹಾಗುತೂಕವನ್ನುನೋಡಲಿದ್ದೇವೆ. ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ಮಾಹಿತಿ ಪಡೆಯಲು ಪ್ರಮಾಣೀಕೃತ ಪ್ರಶ್ನಾವಳಿಗಳನ್ನು ಬಳಸಿ ಶಿವರ್ಷದಒಳಗಿನಮಕ್ಕಳಲ್ಲಿಅಪೌಷ್ಟಿಕತೆ ಕಾರಣಗಳು ಮತ್ತು ಅದರ ದುಷ್ಪರಿಣಾಮಗಳನ್ನು ನಿರ್ಣಯಿಸಲಾಗುವುದು.

ಈ ಪೂರ್ಣ ಪ್ರಕ್ರಿಯೆಯು ನೋವುರಹಿತವಾಗಿರುವುದು. ನೀವು ಅನುಮತಿ ಕೊಟ್ಟು ನಿಮ್ಮ ಮಗನು ಅಥವಾ ಮಗಳು ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ಭಾಗವಹಿಸಲು ಸಮ್ಮತಿ ಕೊಟ್ಟಲ್ಲಿ ನಿಮ್ಮ ಮಗನನ್ನು ಅಥವಾ ಮಗಳನ್ನು ಸಂಶೋಧನೆಯಲ್ಲಿ ಸೇರಿಸಲಾಗುವುದು. ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ನಿಮಗೆ ಅಥವಾ ನಿಮ್ಮ ಮಗನಿಗೆ ಅಥವಾ ಮಗಳಿಗೆ ಈ ಸಂಶೋಧನೆಯ ಯಾವ ಹಂತದಲ್ಲಾದರೂ ಬಿಡಬೇಕೆನಿಸಿದ್ದಲ್ಲಿ ಸ್ವತಂತ್ರವಾಗಿ ಯಾವ ಹಂತದಲ್ಲಾದರೂ ಬಿಡಬಹುದು.

ಅಪಾಯ :

ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ಯಾವುದೇ ರೀತಿಯ ದೈಹಿಕ ಹಾಗೂ ಮಾನಸಿಕ ಹಸ್ತಕ್ಷೇಪ ಇರುವುದಿಲ್ಲ ಆದ್ದರಿಂದ ಈ ಸಂಶೋಧನೆಯು ಅಪಾಯರಹಿತವಾಗಿದೆ

ಆಗಬಹುದಾದ ಲಾಭಗಳು:

ಅಪೌಷ್ಟಿಕತೆಯಿಂದ ಉಂಟಾಗುವ ಗಂಭೀರ ಪರಿಣಾಮಗಳನ್ನು ನಿವಾರಿಸುವಲ್ಲಿ ಈ ಸಂಶೋಧನೆ ನೆರವಾಗಲಿದೆ. ಇದರೊಂದಿಗೆ ೫ವರ್ಷದಒಳಗಿನಮಕ್ಕಳಲ್ಲಿ ಉಂಟಾಗುವ ಅಪೌಷ್ಟಿಕತೆಯನ್ನುನಿಯಂತ್ರಿಸಬಹುದಾಗಿದೆ.

ಮಾಹಿತಿ ಗೌಪ್ಯತ್ಯೆ :

ನಿಮ್ಮಹಾಗು ನಿಮ್ಮ ಮಗನು ಅಥವಾ ಮಗಳ ಬಗ್ಗೆ ಗುರುತು ಹಾಗೂ ಎಲ್ಲಾ ಮಾಹಿತಿ/ವಿವರಗಳನ್ನು ಗೌಪ್ಯವಾಗಿ ಇಡಲಾಗುವುದು.

ಹಿಂತೆಗೆಯುವಿಕೆ :

ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ಭಾಗವಹಿಸುವುದು ಪೂರ್ಣವಾಗಿ ಸ್ವ ಇಚ್ಛೆಯಿಂದ, ನೀವು ಭಾಗವಹಿಸಲು ಇಚ್ಚಿಸದೆ ಇದ್ದರೆ ನಿಮ್ಮ ಮಗನು ಅಥವಾ ಮಗಳಿಗೆ ಆರೋಗ್ಯದ ವಿಷಯದಲ್ಲಿ ಯಾವುದೇ ತರಹದ ಪರಿಣಾಮ ಬೀರುವುದಿಲ್ಲ.

ಭಾಗವಹಿಸುವ ಖರ್ಚು :

ಈ ಸಂಶೋಧನೆಯ ಖರ್ಚು–ವೆಚ್ಚುಗಳನ್ನು ಸಂಶೋಧನೆಯ ಶೋಧಕಿಯು ವಹಿಸಿಕೊಳ್ಳುತ್ತಾ ಳೆ.

ಮಗುವಿನ ಮಾಹಿತಿಗಾಗಿ :

ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ನೀವುಹಾಗುನಿಮ್ಮಮಗು ಭಾಗವಹಿಸಲು ಇಚ್ಚಿಸಿದ್ದರೆ ಮಾತ್ರ ನಿನಗೆ ಸೇರಿಸಲಾಗುವುದು. ಅಪೌಷ್ಟಿಕತೆಯ ಕಾರಣಗಳು ಹಾಗೂ ದುಷ್ಪರಿಣಮಗಳ ಬಗ್ಗೆ ನಿನ್ನ ಅನಿಸಿಕೆಗಳನ್ನು ಸಿದ್ಧಪಡಿಸಿದ ಪ್ರಶ್ನೆಗಳ ಮೂಲಕ ಪಡೆಯಲಾಗುವುದು. ಈ ಎಲ್ಲ ಪ್ರಕ್ರಿಯೆಯು ಪೂರ್ಣವಾಗಿ ನೋವುರಹಿತವಾಗಿರುವುದು. ಈ ಸಂಶೋಧನೆಯ ಪ್ರಕ್ರಿಯೆಯಲ್ಲಿ ನಿನಗೆ ಯಾವ ಹಂತದಲ್ಲಾದರೂ ಭಾಗವಹಿಸುವಿಕೆ ಬೇಡ ಎನಿಸಿದ್ದಲ್ಲಿ ನೀವು ಬಿಡಲು ಸ್ವತಂತ್ರವಾಗಿರುತ್ತಿ ರೀ.

ವಿವರಗಳಿಗಾಗಿ:

ನಿಮಗೆ ಈ ಸಂಶೋಧನೆಯ ಬಗ್ಗೆ ಏನಾದರೂ ವಿವರಗಳು ಬೇಕಾದ್ದಲ್ಲಿ ಈ ಕೆಳಗೆ ತಿಳಿಸಿದ ಸಂಶೋದಕರನ್ನು ಸಂಪರ್ಕಿಸಬಹುದು.

ವೈಶಾಲಿಬಾಗೇವಾಡಿ

ಉಪನ್ಯಾಸಕರು,

ಕೆ.ಎಲ್.ಇ. ಶೂಶ್ರಷ ಮಹಾವಿದ್ಯಾಲಯ,

ಬೆಳಗಾವಿ–೫೯೦ ೦೧೦

ಮೊಬೈಲ್ ಸಂಖ್ಯೆ: 9964299877

ಅಥವಾ

ಪ್ರೊಫ್.ಸುಮಿತ್ರಾಎಲ್ಎ

ಉಪ ಪ್ರಾಂಶುಪಾಲರು,

ಕೆ.ಎಲ್.ಇ. ಶೂಶ್ರಷ ಮಹಾವಿದ್ಯಾಲಯ,

ಬೆಳಗಾವಿ–೫೯೦ ೦೧೦.

ಮೊಬೈಲ್ ಸಂಖ್ಯೆ:9845896114

ಕಾನೂನಿನ ಹಕ್ಕುಗಳು:

ಈ ಸಮ್ಮತಿ ಪತ್ರ ಸಹಿ ಮಾಡುವುದರಿಂದ ನೀವು ಯಾವುದೇ ಕಾನೂನಿನ ಹಕ್ಕುಗಳಿಂದ ವಂಚಿತರಾಗುವುದಿಲ್ಲ.

ಪ್ರಕಟಣೆ ಹಕ್ಕುಗಳು:

ಈ ಸಂಶೋಧನೆಯ ಪರಿಣಾಮವನ್ನು ಪ್ರಕಟಿಸಲಾಗುವುದು. ಆದರೆ ಭಾಗವಹಿಸಿದ ಮಕ್ಕಳ ಗುರುತನ್ನು ಗುಪ್ತವಾಗಿಡಲಾಗುವುದು.

ಮಾಹಿತಿಯುಕ್ತ / ತಿಳುವಳಿಕೆಯುಕ್ತ ಸಮ್ಮತಿ ಪತ್ರ

ನಾನು ಸ್ವ–ಇಚ್ಛೆಯಿಂದ ನನ್ನ ಮಗನ್ನನ್ನು/ಮಗಳನ್ನು ಈ ಸಂಶೋಧನೆಯಲ್ಲಿ ಭಾಗವಹಿಸಲು ಸಮ್ಮತಿಸುತ್ತೇನೆ. ನಾನು ಈ ಮೇಲೆ ಕೊಟ್ಟ ಮಾಹಿತಿ ಓದಿದ್ದೇನೆ. ಅಥವಾ ಈ ಮಾಹಿತಿಯನ್ನು ನನಗೆ ತಿಳಿಯುವಂತಹ ಭಾಷೆಯಲ್ಲಿ ಓದಿ ತಿಳಿಸಲಾಗಿದೆ. ಈ ಸಂಶೋಧನೆಯ ಕುರಿತ ಸಂಪೂರ್ಣ ಮಾಹಿತಿ ನನಗೆ ತಿಳಿಸಲಾಗಿದೆ ಮತ್ತು ನಾನು ಈ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದಂತೆ ಸಂಬಂಧಪಟ್ಟ ಪ್ರಶ್ನೆಗಳನ್ನು ಯಾವ ಸಮಯಕ್ಕೆ ಬೇಕಾದರೂ ಕೇಳಬಹುದು.

೧. **ಪಾಲಕರ** ಸಹಿ _____

ಮತ್ತು ಹೆಸರು _____

ಫೋನ ನಂ _____

೨. **ಸಂಶೋಧಕಿಯ** ಸಹಿ _____

ಮತ್ತು ಹೆಸರು _____

ತಾರೀಖು _____

ಸ್ಥಳ: _____

೩. **ಸಾಕ್ಷಿಯ** ಸಹಿ _____

ಮತ್ತು ಹೆಸರು _____

ತಾರೀಖು _____

ಸ್ಥಳ: _____

ANNEXURE V

PROFORMA

Study title: Determinants and Consequences of malnourished underfive urban children: a cross sectional study

Investigator: Mrs.Vaishali S. Bagewadi

(note: all the personal information provided during the study will be kept confidential) **Code no:**

I. ANTHROPOMETRIC MEASUREMENTS

Height:

Weight:

Mid arm circumference:

II. DEMOGRAPHIC CHARACTERISTICS

1. Age groups of Mothers

a.<=29 years

b. >=30 years

2. BMI of child

a. UW

b. Normal

c. Overweight

3. Gender of child

a. Male

b. Female

4.Head of household

a. Male

b. Female

5. Marital status

a.Married

b.Divorced

c.Widow

6. Religion

a.Hindu

b.Muslim

c.Christian

d.Others

7. Family size

a.1-5 members

b. >=6 members

8.Family income:

a.<=10000

b. 10001-20000

c. 20001-30000

d. 30001-40000

e. >=40001

III. Child characteristics wise distribution

1.Type of Family

a. Nuclear

b. Joint

c. Extended

2.Age of the child:

a.6-11 months

b.12-23 months

c.24-35 months

d.36-47 months

3.Birth order:-------

a.1st birth

b.2nd birth

c.3rd birth

d. 4th birth

4. Place of delivery

a. Hospital

b. Home

5. Gestational age:

a. Less than 37 weeks

b.37 weeks

c. More than 37 weeks

6. Breastfeeding status

a. Started immediately after birth

b. Started within 30 min

c. Not fed as medically advised

d. Started very late

7.Sickness status

a. Frequent occurrence of fever & diarrhea

b. No frequent occurrence of fever & diarrhea

IV.Feeding and Environmental characteristics

1.Feeding mode

a. Breastfeeding

b. Bottle feeding

2. Daily feeding frequency

a. Less than 5 times

b.5 times

c. More than 5 times

3.Exclusive breast feeding

a. Given for 6 months

b. Not given for 6 months

4.Bottle treated before feeding

a. Boiled

b. Not boiled

c. Just washing with water

d. Not given bottle

5.Source of drinking water

a. River

b.Tap water

c. Open well/Borewell water

6. Water treatment before drinking

a.Filtering

b.Boiling

c.Not boiling/ Filtering

7.Place of fecal disposal

a.Open field

b.Latrine

8. Cooking fuel

a.Kerosene

b.Firewood

c.Gas stove

V. Effects of Malnutrition

1.Diseases commonly occurring to the child are

a.Pneumonia

b.Diarrhea

c.Fever with Infections

2. Presence of Illness/infection in the last two weeks prior to the survey

a.Yes

b.No

3.Habit of hand washing before going to meal

a.Yes

b.No

4.Diarrheal episode.

a. Frequently

b. Not frequently

5.Frequency of respiratory tract infections

a.Once a month

b.Twice/thrice in a month

c. Not frequently

LIST OF VALIDATORS FOR THE CONTENT VALIDITY OF THE TOOL

Sr no.	Name of the Experts
1.	Prof.Sumitra L.A. Professor, Department of Pediatrics, KAHER, Belagavi.
2.	Dr.Sangeeta Kharde Vice principal & HOD KAHER, INS, Belagavi.
3.	Dr.Gavi Salimath Professor & HOD KAHER, INS, Belagavi.
4.	Dr.Shashikumar, Professor & HOD Yenapoya college of Nursing, Mangalore.
5.	Prof.Gayatri Professor & HOD Sri Devraj urs college of Nursing, Kolar.
6.	Dr. Shriharsha B Professor & HOD SDM College of Medical Sciences, Dharwad.

ANNEXURE VI

CERTIFICATES

JSS Mahavidyapeetha

JSS COLLEGE OF NURSING

M.G. Road, Mysuru.

QS I·GAUGE INDIAN UNIVERSITY RATING GOLD

International Conference On

REFORMING NURSING SCIENCE WITH ADVANCED PRACTICE AND RESEARCH

- A PARADIGM SHIFT

Certificate

Dr./Mr/Mrs. VAISHALI BAGEWADI

has Presented ~~Paper~~ / ~~Poster~~ on Title ...Determinants of malnutrition among under five children : a cross sectional study... for the **International Conference** on "**Reforming Nursing Science with Advanced Practice and Research - A Paradigm Shift**" on 18th and 19th August 2023, organized by JSS College of Nursing, Mysuru.

Mrs. Mamatha G.
Organizing Secretary

Prof. AswathyDevi M.K.
Organizing Chairperson

Sri. Mahesh R.
Director, Medical Education Division
JSS Mahavidyapeetha

ANNEXURE VII

PUBLICATIONS

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Determinants and Consequences of malnourished underfive urban children: a cross sectional study.

1.Mrs.Vaishali Bagewadi, Ph.D Scholar, KAHER, Institute of Nursing Sciences, Belagavi.

Email: vsbagewadi@gmail.com

2. Prof. Sumitra L.A, Professor

Email: lasumitra@gmail.com

Abstract:

Malnutrition has become most common nutritional disorder and it is one of the main reason for underfive mortality and morbidity throughout the world. In India, itself more than one third of global malnourished children are existing. More than half of children below 3 years are considered as underweight amongst these. It is considered as one of the most burning issue and the common effect of malnutrition is in the form of late physical growth and intellectual development. **The aim** of this study was to assess the determinants of malnutrition among underfive children. **Study design:**A cross sectional study with key informant interview to identify the determinant factors of malnutrition.460 children with their mothers participated in the study. Odds ratio with 95% confidence interval was used to identify the determinants of Malnutrition among underfive children using multivariate logistic regression.

Key words: Malnutrition, Determinants, Underfive, Children

Introduction

Nowadays in the developing countries, malnutrition has become most common nutritional disorder and it is one of the main reason for underfive mortality and morbidity throughout the world. In India, itself more than one third of global malnourished children are existing. More than half of children below 3 years are considered as underweight amongst these.[1] It is considered as one of the most burning issue and the common effect of malnutrition is in the form of late physical growth and intellectual development.[2]

Amongst the global malnourished children, the majority of these children are basically found in India, which alarms that there is a need to take action on the improving the health policies and main focus is to be on decreasing health and social discrimination.

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Since last ten years, there is gross reduction in infant mortality and underfive mortality rate in India, but it is also said that 50% of world's malnourished children are in India. The underweight prevalence is more (38%) in the rural areas as compared to urban areas (29%). As per some reports many children consume non- nutritious, non balanced food in the form of under nutrition or deficient micronutrients. The availability of nutrition rich food in markets has an important role in prompting the community to make the right choices. [3] In Karnataka 38% are underweight, which takes into account both chronic and acute under nutrition. [4]

The main reason for the malnutrition in India is lack of equality in socio economic status and it affects some population groups as their diet lacks in both quality and quantity. The unhealthy mothers are prone to have unhealthy babies. Nutrition deficiency accompany long term effects on individual and the society. Nutrition deficient people are prone to get infectious diseases like pneumonia, tuberculosis which usually have higher mortality rates. [5]

The prolonged duration of malnutrition is very harmful to children and cause delayed growth and development which ultimately has severe effect on society and its future. In future malnutrition makes the child's health weak, the ability of learning becomes slow and it also leads to have the unhealthy children of their own. Some studies have also shown that many parents are unaware of fact that various food varitiestobe given to their child and some are also unaware about the importance of breastfeeding. [6]

Nutrition is a fundamental factor of good health and is essential for survival, to maintain the good quality of life and safety and protection of human life. Sufficient nutrition is required for the proper growth, good organ formation and functioning, robust immune system and favourable neurological and intellectual development. [7]

Need for the study

Malnutrition affects each and every aspect of human health and development. The WHO South-East Asia Region (SEAR) has high prevalence of child undernutrition, the main reason behind this is some of the socioeconomic, biological and social determinants. Malnutrition is a condition that arises when not sufficient nutrients are consumed or too many nutrients leads to many health problems.

Some studies were done in the community setting wherein too many children had problems with undernutrition, low weight etc. Many studies have concentrated on the rural aspect and hence the present

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study is undertaken to findout the determinants and consequences of Malnutrition among underfive children in urban areas of Belagavi.

Objectives

The objectives of the present study are

1. To study the determinants of Malnutrition among urban underfive children.

2. To study the consequences of Malnutrition among urban underfive children .

Subjects and Methods

Research approach

In view of the nature of the problem selected for the present study and the objectives to be accomplished a descriptive approach was considered appropriate for the present study.

Research design

The selection of design depends upon the purpose of the study, research approach and variables to be studied. The research design used for the present study is a cross sectional study.

Research setting

Settings are the more specific places where data collection occurs based on the nature of the research question and the type of information needed to address it.The setting planned for the present study is urban areas of Belagavi.

Research population

In the present study the population consists of underfive children of urban areas of Belagavi.

Sample

A sample is the representative unit of a target population, which is to be worked upon by researchers during their study. Thus, it is a subset of the population elements. The sample chosen for the present study is underfive children of urban areas of Belagavi.

Sample size

As per the published literature, prevalence of Malnutrition based on this sample size is calculated from the formula below.

Sample size (n) = $\frac{Z^2_{1-\alpha/2}}{d^2} SD^2$

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Where

n- Sample size

$Z_{1-a/2}$ is one tail Standard Normal VariateAssuming sample size at 95% CI

SD - 10% error in estimation of mean ie,10% of SD.

'd' is tolerable error - 20% attrition for lost cases etc.

Considering the above formula the sample size is calculated as 460.

Criteria for selecting the sample

The sample selection was based on the following inclusion and exclusion criteria.

Inclusion criteria

1.Underfive children of urban areas of Belagavi.

2.Underfive children& their mothers who are willing to participate in the study.

Exclusion criteria

Children who are physically handicapped.

Sampling technique : Cluster Sampling

By computer generated random table 16 wards are selected by assuming 30% of underfive children malnourished from each ward, so from each ward 30 samples are drawn by taking from centre of the each ward in only one direction by using simple random sampling.

Data collection

The sanction was taken from the Institutional Ethical Committee and from District Health Authority.

Data collection procedure

Approval from the Institutional Ethics Committee is obtained.

- Development of the tool

A predesigned, pretested and validated questionnaires are used to study the determinants and consequences of malnourished underfive children.

- Description of the tool

The tool consists of:

- Section I: Socio-demographicvariables .
- Section II A: Items on determinants of Malnutrition.

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- Section II B: Items on consequences of Malnutrition.
- The purpose of the study is explained to mothers and consent is taken from every mother .

Operational definitions:

Malnutrition: refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients.[7]

Underfive: children who are less than five years old, especially those who are not in full-time education.

Determinant :a determinant is a factor or cause that makes something happen or leads directly to a decision. In the present study determinants refers to the factors or variables which determines the condition of Malnutrition.

Consequences: a result or effect typically one that is unwelcome or unpleasant.

In the present study it refers to the immediate health effects of Malnutrition in underfive children.

Measurements

Height: The participant is allowed to stand straight without footwear, with heels, buttocks and back touching the wall and arm hanging by side. The height will be measured from head to heel.[8]

Weight: Body weight will be measure without any shoes, heavy clothing, using standard portable weighing machine with an error of $\pm$ 100gm.[8]

Mid upper arm circumference: Bend the left arm, find and mark with a pen the olecranon process and acromion ,mark the mid-point between these two marks,with the arm hanging straight down, wrap a MUAC tape around the arm at the midpoint mark, measure to the nearest 1 mm.[9]

Delayed Growth & development (stunting, wasting , underweight) is classified by measuring the Height,Weight and Mid Upper arm Circumference by using standard WHO scales.[10]

Data analysis: Data will be analyzed by using the following statistical methods

- Measures of central tendency and dispersion
- Analysis of variance will be done along with "t" and "Z" test for significance
- Regression models specifically logistic regression models and multiple regression models will be used.

Effects of Malnutrition among Urban Under-Five Children: A Cross Sectional Study

Vaishali Bagewadi [1], Prof. Sumita L.A [2], Dr. Sangeeta Kharde [3]

[1] Assistant Professor, KAHER Institute of Nursing Sciences, Belagavi, Karnataka, India

[2] Professor, Vijaya Institute of Nursing Sciences, Belagavi, Karnataka, India

[3] Vice Principal, KAHER Institute of Nursing Sciences, Belagavi, Karnataka, India

Email: [1] vsbagewadi@gmail.com

Abstract

Malnutrition is now the most prevalent nutritional condition in poor nations, and it is a major contributor to under-five mortality and morbidity globally. More than one third of the world's malnourished youngsters are found in India alone. Among them, more than half of young children under the age of 3 are seemed to be underweight. The bulk of the world's malnourished children are mostly located in India, raising warnings about the need to improve health policies with a primary focus on reducing social and physical inequality. This study's goal was to evaluate the consequences of malnutrition in children under the age of five. Study design: To determine the consequences of malnutrition, a cross-sectional study using key informant interviews was used. 460 kids and their mothers took part in the investigation. Using multivariate logistic regression, odds ratios with a 95% confidence interval were utilised to determine the consequences of malnutrition in children under the age of five.

Results: among 460 children, (44.13%) had fever with infections and malnutrition was significantly associated with Pneumonia, Presence of illness in the last two weeks, Frequent diarrheal episodes and Respiratory Tract Infections once in a month ($p<0.05$).

Conclusion: Malnutrition has become a more widespread issue, and it can be prevented by providing children with the proper care and upbringing when they are younger. Additionally, educating mothers about the value of good nutrition for their children can help to solve the malnutrition issue in our community.

Keywords: Malnutrition, Consequences, Underfive, Children, Respiratory tract infections, Pneumonia and Diarrhea.

1. Introduction

In India, undernutrition among children under the age of five has emerged as a major public health issue. The nutritional condition of children under five is also being impacted by the eating habits of the current generation, which is leading to an increase in the incidence of non-communicable illnesses such obesity, diabetes, hypertension, and coronary heart disease etc.

Around 815 million people worldwide (11% of the population) are undernourished as of 2017. 176 million fewer individuals than in 1990, when 23% of the world's population was underweight. India is said to be the country where 60 million underweight children reside, and it is also where 80 percent of the world's malnourished children reside.

Malnutrition is now the most prevalent nutritional condition in poor nations, and it is a major contributor to under-five mortality and morbidity globally. More than one third of the world's malnourished youngsters are found in India alone. Among them, more than half of young children under the age of 3 are seemed to be underweight. [1] Malnutrition is regarded as one of the most urgent problems, and one of its main effects is delayed physical and intellectual development. [2]

The bulk of the world's malnourished children are mostly located in India, raising warnings about the need to improve health policies with a primary focus on reducing social and physical inequality. [1]

According to certain surveys, a lot of kids eat unbalanced, unnutritious diet that leaves them undernourished or lacking in certain micronutrients. The community's capacity to make the best decisions is significantly influenced by the availability of nutrient-dense foods in marketplaces. [3] 38% of people in Karnataka are underweight, which accounts for both acute and chronic malnutrition. [4]

Babies born to unwell mothers are more likely to be unwell themselves. Long-term repercussions on people and society are associated with nutritional deficiencies. People who don't obtain enough nutrition are more likely to get infectious illnesses like pneumonia and TB, which often have higher fatality rates. [5]

Numerous studies have also revealed that many parents are ignorant of the benefits of breastfeeding and the idea that different food types should be offered to their kid. [6]

For survival, to maintain a high standard of living, and to ensure the security and protection of human life, nutrition is a crucial component of good health. For healthy development, correct organ formation and function, a strong immune system, and favourable neurological and cerebral growth, enough nourishment is necessary. [7]

The most vulnerable age group for malnutrition is children under two, and preventing its appearance is one strategy to lessen the impact of malnutrition. The goal of acute malnutrition prevention is to stop malnourished children from progressing to moderate acute malnutrition and to stop children with moderate acute malnutrition from becoming worse and becoming severely malnourished.

2. Materials and Methods

Using the cluster sampling technique, a cross-sectional study was conducted on 460 children under the age of five and their mothers in the urban districts of Belagavi city. With the assumption that each ward has 30% malnourished children under the age of five, 16 wards were chosen at random by computer, and 30 samples were taken from each ward using simple random sampling. The formula below was used to determine the sample size.

Sample size (n) = $\frac{Z^2_{1-\alpha/2}}{d^2} SD^2$

Where

n- Sample size, $Z_{1-\alpha/2}$ is one tail Standard Normal Variate Assuming sample size at 95% CI, SD - 10% error in estimation of mean ie, 10% of SD. ‘d’ is tolerable error - 20% attrition for lost cases etc.

The sample size was determined as 460 using the formula above. The District Health Authority and Institutional Ethical Committee both approved the study. The reason of the study was explained to mothers and mothers were asked to give consent to carry out the

study. Data collection was done by using predesigned, pretested and validated questionnaires. For ease of comprehension, these questions were translated into the local language, and anthropometric measurements such as height, weight, and mid upper arm circumference were taken using established WHO scales. Children with physically handicapped and seriously ill during survey were excluded from the study. A simple random sample method was used to gather information from mothers and their under-five-year-olds. Data was cleaned and analysed by using SPSS software. Chi square test was adopted to find out the association and Multiple regression method was used to findout the determinants of Malnutrition. The power of association was checked by using odds ratio with 95% confidence interval.

3. Results

Table 1: Effects of Malnutrition wise distribution

Effects of Malnutrition	Number	Percentage
Diseases occurring commonly		
Pneumonia	84	18.26
Diarrhoea	173	37.61
Fever with infections	203	44.13
Presence of illness in last two weeks		
Yes	189	41.09
No	271	58.91
Habit of hand washing before meal		
Yes	368	80.00
No	92	20.00
Latrine at home		
Yes	432	93.91
No	28	6.09
Diarrhoeal episode		
Frequently	164	35.65
Not frequently	296	64.35
RTI frequency		
Once a month	219	47.61
Twice/thrice a month	87	18.91
Not frequently	154	33.48
Total	**460**	**100.00**

Table 1 reveals that majority (44.13%) had fever with infections,(58.91%) children didn't had any illness in last two weeks during data collection,(80.%) children has the habit of Handwashing before meal, Majority (93.91%) had Latrine at home, More than half (64.35%) didn't had frequent diarrheal episode and (47.61%) had RTI once in a month.

Table 2 : Association between Effects of Malnutrition with status of malnutrition

Effects of Malnutrition	No malnourished	%	Malnourished	%	Total	%	Chi-square	p-value
Diseases occurring commonly								
Pneumonia	50	59.52	34	40.48	84	18.26	41.7090	0.0001*
Diarrhoea	46	26.59	127	73.41	173	37.61		
Fever with infections	115	56.65	88	43.35	203	44.13		
Presence of illness in last two weeks								
Yes	60	31.75	129	68.25	189	41.09	25.7730	0.0001*
No	151	55.72	120	44.28	271	58.91		
Habit of hand washing before meal								
Yes	172	46.74	196	53.26	368	80.00	0.5600	0.4540
No	39	42.39	53	57.61	92	20.00		
Latrine at home								
Yes	197	45.60	235	54.40	432	93.91	0.2050	0.6510
No	14	50.00	14	50.00	28	6.09		
Diarrhoeal episode								
Frequently	53	32.32	111	67.68	164	35.65	18.8530	0.0001*
Not frequently	158	53.38	138	46.62	296	64.35		
RTI frequency								
Once a month	111	50.68	108	49.32	219	47.61	33.1710	0.0001*
Twice/thrice a month	16	18.39	71	81.61	87	18.91		
Not frequently	84	54.55	70	45.45	154	33.48		
Total	211	45.87	249	54.13	460	100.00		

*p<0.05

Table 2 reveals that Malnutrition was significantly associated with Pneumonia (chi=41.7090,p=0.0001), Presence of illness in the last two weeks (chi=25.7730,p=0.0001),Frequent diarrheal episode (chi=18.8530,p=0.0001) and RTI once in a month (chi=33.1710,p=0.0001) at 0.05 level of significance. Malnutrition was negatively associated with habit of Handwashing before meal and Latrine at Home.

Table 3: Multiple logistic regression analysis of status of malnourish by Effects of Malnutrition

Effects of Malnutrition	Malnourished	%	Total	95% CI for OR		p-value
				Lower	Upper	
Diseases occurring commonly						
Pneumonia	34	40.48	2.63	1.51	4.59	0.0010*
Diarrhoea	127	73.41	0.88	0.53	1.45	0.6050
Fever with infections	88	43.35	Ref.			
Presence of illness in last two weeks						
Yes	129	68.25	2.19	1.44	3.33	0.0001*
No	120	44.28	Ref.			
Habit of hand washing before meal						
Yes	196	53.26	0.85	0.50	1.44	0.5450
No	53	57.61	Ref.			
Latrine at home						
Yes	235	54.40	0.51	0.27	0.96	0.0360*
No	14	50.00	Ref.			
Diarrhoeal episode						
Frequently	111	67.68	1.32	0.84	2.07	0.2310
Not frequently	138	46.62	Ref.			
RTI frequency						
Once a month	108	49.32	1.15	0.76	1.74	0.5180
Twice/thrice a month	71	81.61	4.20	2.19	8.05	0.0001*
Not frequently	70	45.45	Ref.			

*p<0.5

Table 3 The multiple logistic regression analysis of total of malnutrition scores by Effects of Malnutrition shows that Pneumonia is significant of 2.63 odds (95% CI, p=0.0010) as compared to Diarrhea and Fever with infections.

Presence of illness in last two weeks is significant of 2.19 odds (95% CI, p=0.0001) as compared to non presence of illness during data collection.

Availablity of Latrine at home is significant of 0.51odds (95% CI, p=0.0360) as compared to non availability of Latrine.

Occurrence of RTI Twice/thrice a month is significant of 1.15 odds(95% CI, p=0.0001) as compared to occurrence of RTI once a month.

4. Discussion

The findings of the study showed that presence of Pneumonia, increases the risk of malnutrition and this was supported by study conducted in Public Health Centers in Banjarnegara, Kebumen, Jepara, and Pekalongan districts of Indonesia, [10]

It was also observed that underfive children with frequent diarrheal episodes are prone to develop malnutrition and study done in Pakistan supported this. [11]
Recurrent respiratory tract infections plays a vital role in children has significant association with malnutrition and this was supported by one study. [12] [13]

5. Conclusion

The above findings of the study, it can be concluded that malnutrition is one of the major public health problem in India which affects both Physical and Mental health of children. Some socio economic and health related factors are significantly found associated with severe effects of Malnutrition. Hence mothers/caregivers should be sensitized towards the importance of child care and proper nutritional and health practices helps to overcome the problems associated with malnutrition. A healthy mother can give birth to healthy child. In this view, nutritional counseling to be done for mothers and evaluated properly time to time.

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Nil

Conflicts of interest

There are no conflicts of interest

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Determinants of malnutrition among under five children: A cross sectional study in urban Belgaum, India

Vaishali Bagewadi, L. A. Sumita, Sangeeta Kharde[1]

Abstract:

INTRODUCTION: Malnutrition has become the most common nutritional disorder, and it is one of the main reasons for under-five mortality and morbidity worldwide. In India itself, more than one-third of the global malnourished children are existing. More than half of the children below 3 years are considered underweight among these. It is considered one of the most burning issues, and the common effect of malnutrition is in the form of late physical growth and intellectual development. The aim of this study was to assess the determinants of malnutrition among under-five children.

STUDY DESIGN: This was a cross-sectional study with a key informant interview to identify the determinant factors of malnutrition. Four hundred and sixty children with their mothers were participated in the study. Odds ratio with a 95% confidence interval was used to identify the determinants of malnutrition among under-five children using multivariate logistic regression.

RESULTS: Among 460 children, more than half of the children, 249 (54.13%), was malnourished. Of these 249 children, 142 were female, while 107 were male. Mother's age, religion, family size, and family income were significantly associated with malnutrition ($P < 0.05$).

CONCLUSION: Malnutrition was higher in female children than male children, and a proper girl child care and educating the mothers regarding the importance of nutrition for their children help overcome the malnutrition problem in our locality.

Keywords:

Children, determinants, malnutrition, under-five

Nowadays, in developing countries, malnutrition has become the most common nutritional disorder, and it is one of the main reasons for under-five mortality and morbidity throughout the world. In India itself, more than one-third of the global malnourished children are existing. More than half of the children below 3 years are considered underweight among these.[1] It is considered one of the most burning issues, and the common effect of malnutrition is in the form of late physical growth and intellectual development.[2]

Among the global malnourished children, the majority of these children are basically found in India, which alarms that there is a need to take action on the improving the health policies and the main focus is to be on decreasing the health and social discrimination.

Since the past 10 years, there is a gross reduction in infant mortality and under-five mortality rate in India, but it is also said that 50% of world's malnourished children are in India. The underweight prevalence is more (38%) in the rural areas compared to urban areas (29%). As per some reports, many children consume nonnutritious, nonbalanced food in the form of under

Department of Child Health Nursing, KLE Academy of Higher Education and Research Institute of Nursing Sciences, [1]Department of OBG Nursing, Vijaya Institute of Nursing Sciences, Belagavi, Karnataka, India

Address for correspondence:
Mrs. Vaishali Bagewadi, KLE Academy of Higher Education and Research Institute of Nursing Sciences, Nehru Nagar, Belagavi, Karnataka, India.
E-mail: vsbagewadi@gmail.com

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nutrition or deficient micronutrients. The availability of nutrition-rich food in markets has an important role in prompting the community to make the right choices.[3] In Karnataka, 38% are underweight, which takes into account both chronic and acute under nutrition.[4]

The main reason for the malnutrition in India is the lack of equality in socioeconomic status, and it affects some population groups as their diet lacks in both quality and quantity. The unhealthy mothers are prone to have unhealthy babies. Nutrition deficiency accompanies long-term effects on the individual and society. Nutrition-deficient people are prone to get infectious diseases such as pneumonia and tuberculosis, which usually have a higher mortality rates.[5]

The prolonged duration of malnutrition is very harmful to children and causes delayed growth and development, which ultimately has a severe effect on the society and its future. In future, malnutrition makes the child's health weak, the ability of learning becomes slow, and it also leads to have the unhealthy children of their own. Some studies have also shown that many parents are unaware of the fact that various food varieties to be given to their child and some are also unaware of the importance of breastfeeding.[6]

Nutrition is a fundamental factor of good health and is essential for survival to maintain the good quality of life and safety and protection of human life. Sufficient nutrition is required for proper growth, good organ formation and functioning, robust immune system, and favorable neurological and intellectual development.[7]

Subjects and Methods

A cross-sectional study was done on 460 under-five children with their mothers in the urban areas of Belagavi city using cluster sampling technique. By a computer-generated random table, 16 wards were selected by assuming 30% of under-five children malnourished from each ward, and from each ward, 30 samples were drawn using simple random sampling. The sample size was calculated from the formula below.

$$\text{Sample size (n)} = \frac{Z_1^{2} - a/2}{d^2} SD^2$$

where,

n –Sample size, $Z_{1-a/2}$ is one tail standard normal variate assuming sample size at 95% confidence interval (CI), standard deviation (SD) – 10% error in estimation of the mean, i.e., 10% of SD "d" is tolerable error – 20% attrition for lost cases, etc.

Considering the above formula, the sample size was calculated as 460. The sanction was taken from the Institutional Ethical Committee and from the District Health Authority. The reason of the study was explained to mothers, and mothers were asked to give consent to carry out the study. Data collection was done using predesigned, pretested, and validated questionnaires. These questionnaires were translated into the local language for easy understanding, and anthropometric measurements such as height, weight, and mid-upper arm circumference were measured using the standard WHO scales. Children who are physically challenged and seriously ill during the survey were excluded from the study. Using simple random sampling, data were collected from under-five children with their mothers. Data were cleaned and analyzed using SPSS software. Chi-square test was adopted to find out the association, and multiple regression method was used to find out the determinants of malnutrition. The power of association was checked using odds ratio with 95% CI.

Anthropometric measurements

Height

The participant was allowed to stand straight without footwear with the heels, buttocks, and back touching the wall and arm hanging by the side. The height was measured from the head to the heel.[8]

Weight

Body weight will be measured without any shoes and heavy clothing, using the standard portable weighing machine with an error of ± 100 g.[8]

Mid-upper arm circumference

Bend the left arm, find and mark with a pen, the olecranon process and acromion process, mark the midpoint between these two marks, with the arm hanging straight down, wrap a mid-upper arm circumference tape around the arm at the midpoint mark, and measure to the nearest 1 mm.[9]

Results

Table 1 reveals that 59.35% of mothers were belonged to ≥30 years; majority of the children had normal body mass index (BMI) (47.39%). Male children (55.87%) were slightly more than female children (44.13%). Majority of the families (94.35%) had males as the head of the families and (95.65%) females were married. Majority were belonged to the Hindu religion (56.09%), and most of them (73.04%) had ≥6 members. Family income was equally distributed (34.35%) for <10,000 and between 10,000 and 20,000. 47.17% of children belonged to joint family, 32.17% were in the age group of 12–23 months, 42.39% were in the 2nd order birth, and majority (89.35%)

Table 1: Socioeconomic and demographic characteristics wise distribution

Profile	Number of respondents (percentage of respondents)
Age groups of mother (years)	
≤29	187 (40.65)
≥30	273 (59.35)
BMI of children	
UW	61 (13.26)
Normal	218 (47.39)
OW	181 (39.35)
Gender of child	
Male	257 (55.87)
Female	203 (44.13)
Head of household	
Male	434 (94.35)
Female	26 (5.65)
Marital status	
Married	440 (95.65)
Divorced	14 (3.04)
Widow	6 (1.30)
Religion	
Hindu	258 (56.09)
Muslim	132 (28.70)
Christian	67 (14.57)
Others	3 (0.65)
Family size (members)	
1-5	124 (26.96)
≥6	336 (73.04)
Family income	
≤10,000	158 (34.35)
10,001-20,000	158 (34.35)
20,001-30,000	60 (13.04)
30,001-40,000	37 (8.04)
≥40,001	47 (10.22)
Type of family	
Nuclear	202 (43.91)
Joint	217 (47.17)
Extended	41 (8.91)
Age of the child (months)	
6-11	80 (17.39)
12-23	148 (32.17)
24-35	113 (24.57)
36-47	119 (25.87)
Birth order	
1st birth	184 (40.00)
2nd birth	195 (42.39)
3rd birth	70 (15.22)
4th birth	11 (2.39)
Place of delivery	
Hospital	411 (89.35)
Home	49 (10.65)
Gestational age (weeks)	
<37	155 (33.70)
37	206 (44.78)
>37	99 (21.52)
Breastfeeding status	
Started immediately	193 (41.96)
Started within 30 min	137 (29.78)
Not fed as medically advised	24 (5.22)
Started very late	106 (23.04)
Sickness status	
Frequent occurrence	158 (34.35)
No frequent occurrence	302 (65.65)

Contd...

Table 1: Contd...

BMI=Body mass index, UW=Underweight, OW=Overweight

of mothers had hospital deliveries. 44.78% of mothers delivered at 37 weeks of gestation, and 41.96% of babies were breastfed immediately after birth. Majority of the children (65.65%) did not had frequent occurrence of fever and diarrhea.

Table 2 reveals that the prevalence of malnutrition was higher with age ≤29 years (83.42%) ($\chi^2 = 108.8$, $P = 0.0001$), BMI with underweight (88.52%) ($\chi^2 = 62.19$, $P = 0.0001$), Hindu religion (61.24%) ($\chi^2 = 12.17$, $P = 0.0070$), family size of 1–5 members (81.45%) ($\chi^2 = 51.03$, $P = 0.0001$), and family income ≤10,000 (72.78%) ($\chi^2 = 66.62$, $P = 0.0001$). Females (54.19%) were slightly highly malnourished, though this was not statistically significant ($\chi^2 = 0.0001$, $P = 0.9830$). Nuclear family ($\chi^2 = 18.7530$, $P = 0.0001$), 6 = 11 months child ($\chi^2 = 32.2760$, $P = 0.0001$), hospital delivery ($\chi^2 = 22.0330$, $P = 0.0001$), gestational age <37 weeks ($\chi^2 = 76.2690$, $P = 0.0001$), breastfeeding started immediately ($\chi^2 = 75.9280$, $P = 0.0001$), and frequent occurrence of fever and diarrhea ($\chi^2 = 76.2690$, $P = 0.0001$) at 0.05 level of significance.

Malnutrition was negatively associated with male as the head of household (54.15%) ($\chi^2 = 0.0010$, $P = 0.9760$), and married marital status (54.55%) ($\chi^2 = 0.7880$, $P = 0.6740$) and 1st birth order ($\chi^2 = 3.7500$, $P = 0.2900$)

Table 3 reveals that multiple logistic regression analysis of the total of malnutrition scores by different demographic characteristics of under-five children shows that the age ≥30 years was significant of 5.6 odds compared to ≤29 years (95% CI, $P = 0.0001$).

Underweight children, i.e., 3.32 odds (95% CI, $P = 0.0180$), and normal BMI children, i.e., 0.38 odds (95% CI, $P = 0.0001$), were malnourished compared to overweight children.

Muslim children with odds 0.40 (95% CI, $P = 0.0010$) were malnourished compared to the Hindu religion.

The family size ≥6 members with odds 3.62 (95% CI, $P = 0.0001$) was malnourished compared with 1–5 members.

Table 2: Association between socioeconomic and demographic characteristics with the status of malnutrition

Profile	No malnourished (%)	Malnourished (%)	Total (%)	χ^2	*P*
Age groups of mother (years)					
≤29	31 (16.58)	156 (83.42)	187 (40.65)	108.8850	0.0001*
≥30	180 (65.93)	93 (34.07)	273 (59.35)		
BMI of children					
UW	7 (11.48)	54 (88.52)	61 (13.26)	62.1950	0.0001*
Normal	138 (63.30)	80 (36.70)	218 (47.39)		
OW	66 (36.46)	115 (63.54)	181 (39.35)		
Gender of child					
Male	118 (45.91)	139 (54.09)	257 (55.87)	0.0001	0.9830
Female	93 (45.81)	110 (54.19)	203 (44.13)		
Head of household					
Male	199 (45.85)	235 (54.15)	434 (94.35)	0.0010	0.9760
Female	12 (46.15)	14 (53.85)	26 (5.65)		
Marital status					
Married	200 (45.45)	240 (54.55)	440 (95.65)	0.7880	0.6740
Divorced	8 (57.14)	6 (42.86)	14 (3.04)		
Widow	3 (50.00)	3 (50.00)	6 (1.30)		
Religion					
Hindu	100 (38.76)	158 (61.24)	258 (56.09)	12.1740	0.0070*
Muslim	73 (55.30)	59 (44.70)	132 (28.70)		
Christian	36 (53.73)	31 (46.27)	67 (14.57)		
Others	2 (66.67)	1 (33.33)	3 (0.65)		
Family size (members)					
1-5	23 (18.55)	101 (81.45)	124 (26.96)	51.0360	0.0001*
≥6	188 (55.95)	148 (44.05)	336 (73.04)		
Family income					
≤10,000	43 (27.22)	115 (72.78)	158 (34.35)	66.6280	0.0001*
10,001-20,000	65 (41.14)	93 (58.86)	158 (34.35)		
20,001-30,000	49 (81.67)	11 (18.33)	60 (13.04)		
30,001-40,000	22 (59.46)	15 (40.54)	37 (8.04)		
≥40,001	32 (68.09)	15 (31.91)	47 (10.22)		
Type of family					
Nuclear	106 (52.48)	96 (47.52)	202 (43.91)	18.7530	0.0001*
Joint	78 (35.94)	139 (64.06)	217 (47.17)		
Extended	27 (65.85)	14 (34.15)	41 (8.91)		
Age of the child (months)					
6-11	24 (30.00)	56 (70.00)	80 (17.39)	32.2760	0.0001*
12-23	54 (36.49)	94 (63.51)	148 (32.17)		
24-35	55 (48.67)	58 (51.33)	113 (24.57)		
36-47	78 (65.55)	41 (34.45)	119 (25.87)		
Birth order					
1st birth	76 (41.30)	108 (58.70)	184 (40.00)	3.7500	0.2900
2nd birth	94 (48.21)	101 (51.79)	195 (42.39)		
3rd birth	37 (52.86)	33 (47.14)	70 (15.22)		
4th birth	4 (36.36)	7 (63.64)	11 (2.39)		
Place of delivery					
Hospital	204 (49.64)	207 (50.36)	411 (89.35)	22.0330	0.0001*
Home	7 (14.29)	42 (85.71)	49 (10.65)		
Gestational age (weeks)					
<37	28 (18.06)	127 (81.94)	155 (33.70)	76.2690	0.0001*
37	116 (56.31)	90 (43.69)	206 (44.78)		
>37	67 (67.68)	32 (32.32)	99 (21.52)		

Contd...

Table 2: Contd...

Profile	No malnourished (%)	Malnourished (%)	Total (%)	χ^2	*P*
Breastfeeding status					
Started immediately	93 (48.19)	100 (51.81)	193 (41.96)	75.9280	0.0001*
Started within 30 min	78 (56.93)	59 (43.07)	137 (29.78)		
Not fed as medically advised	24 (100.0)	0 (0.00)	24 (5.22)		
Started very late	16 (15.09)	90 (84.91)	106 (23.04)		
Sickness status					
Frequent occurrence	38 (24.05)	120 (75.95)	158 (34.35)	46.1430	0.0001*
No frequent occurrence	173 (57.28)	129 (42.72)	302 (65.65)		

BMI=Body mass index, UW=Underweight, OW=Overweight

Table 3: Multiple logistic regression analysis of the status of malnutrition by socioeconomic and demographic characteristics

Profile	Malnourished (%)	Adjusted OR	95% CI for OR		*P*
			Lower	Upper	
Age group of mother (years)					
≤29	156 (83.42)	Reference			
≥30	93 (34.07)	5.60	3.29	9.54	0.0001*
BMI of children					
UW	54 (88.52)	3.32	1.23	8.97	0.0180*
Normal	80 (36.70)	0.38	0.23	0.61	0.0001*
OW	115 (63.54)	Reference			
Gender of child					
Male	139 (54.09)	1.31	0.81	2.11	0.2660
Female	110 (54.19)	Reference			
Head of household					
Male	235 (54.15)	1.04	0.50	2.16	0.9120
Female	14 (53.85)	Reference			
Marital status					
Married	240 (54.55)	0.38	0.08	1.87	0.2360
Divorced	6 (42.86)	0.47	0.06	3.64	0.4670
Widow	3 (50.00)	Reference			
Religion					
Hindu	158 (61.24)	Reference			
Muslim	59 (44.70)	0.40	0.23	0.70	0.0010*
Christian	31 (46.27)	0.53	0.26	1.05	0.0690
Others	1 (33.33)	0.33	0.00	35.03	0.6400
Family size (members)					
1-5 members	101 (81.45)	Reference			
≥6 members	148 (44.05)	3.62	1.97	6.65	0.0001*
Family income					
≤10,000	115 (72.78)	Reference			
10,001-20,000	93 (58.86)	1.33	0.63	2.80	0.4500
20,001-30,000	11 (18.33)	1.04	0.50	2.16	0.9200
30,001-40,000	15 (40.54)	0.21	0.08	0.54	0.0010*
≥40,001	15 (31.91)	0.42	0.15	1.17	0.0960
Type of family					
Nuclear	96 (47.52)	Reference			
Joint	139 (64.06)	1.88	0.73	4.79	0.1890
Extended	14 (34.15)	5.42	2.14	13.70	0.0001*
Age of the child (months)					
6-11	56 (70.00)	Reference			
12-23	94 (63.51)	0.67	0.32	1.40	0.2870
24-35	58 (51.33)	0.43	0.20	0.92	0.0310*
36-47	41 (34.45)	0.17	0.08	0.39	0.0001*

Contd...

Table 3: Contd...

Profile	Malnourished (%)	Adjusted OR	95% CI for OR		*P*
			Lower	Upper	
Birth order					
1st birth	108 (58.70)	Reference			
2nd birth	101 (51.79)	0.25	0.09	0.74	0.0120*
3rd birth	33 (47.14)	0.19	0.06	0.60	0.0050*
4th birth	7 (63.64)	0.12	0.04	0.39	0.0001*
Place of delivery					
Hospital	207 (50.36)	Reference			
Home	42 (85.71)	6.01	1.85	19.54	0.0030*
Gestational age (weeks)					
<37	127 (81.94)	8.95	4.23	18.92	0.0001*
37	90 (43.69)	1.58	0.85	2.95	0.1490
>37	32 (32.32)	Reference			
Breastfeeding status					
Started immediately	100 (51.81)	Reference			
Started within 30 min	59 (43.07)	0.59	0.34	1.04	0.0670
Not fed as medically advised	0	-	-	-	-
Started very late	90 (84.91)	4.99	2.39	10.45	0.0001*
Sickness status					
Frequent occurrence	120 (75.95)	3.94	2.27	6.84	0.0001*
No frequent occurrence	129 (42.72)	Reference			

BMI=Body mass index, UW=Underweight, OW=Overweight, CI: Confidence interval, OR: Odds ratio

The family income of 30,001–40,000 with odds 0.21 (95% CI, $P = 0.0010$) was significant compared to other family incomes.

The extended family was significant at 5.42 odds compared to nuclear families (95% CI, $P = 0.0001$). 24–35 months children, i.e., 0.43 odds (95% CI, $P = 0.0310$), and 36–47 months, i.e., 0.17 odds (95% CI, $P = 0.0001$), were malnourished compared to 6–11 months.

Home-delivered children, i.e., 6.01 odds (95% CI, $P = 0.0030$), were malnourished compared to hospital-delivered children.

Less than 37 weeks children with odds 8.95 (95% CI, $P = 0.0001$) were malnourished compared to > 37 weeks of gestation.

Breastfeeding started very late with odds 4.99 (95% CI, $P = 0.0001$) was malnourished compared with breastfeeding started immediately.

Frequent occurrence of fever and diarrhea with odds of 3.94 (95% CI, $P = 0.0001$) was malnourished compared with no frequent occurrence of fever and diarrhea.

Discussion

The findings of the study show that the higher the birth interval, increases the risk of malnutrition, and this was supported by several studies.[10] Similarly, malnutrition was also observed more in children between 2 and 5 years, and this was supported by some studies.[10]

Our study found that children living with more family members consisting of more than six family members are prone to be malnourished, and several studies conducted around different parts of the globe have proved.[11] Our study also depicted that female children are likely to be malnourished more compared to male children, and studies done in Ethiopia, Kenya, and Bangladesh have supported.[12-14] This study also demonstrated that frequent sickness status is an important determinant for child malnutrition, and these results are consistent with studies done in Laos, Nicaragua, Vietnam, and Malaysia.[15-18]

In addition, another important determinant found in the sociocultural aspect is gender inequality in the family and the community which leads to the unequal provision of food to female children in the families. Some of the studies contributed to this inequality prove the causes of malnutrition.[19-21] In many Indian families, boys are given more nutritious food than girls, and girls are more prone to be malnourished than boys, and this was shown in our study.

Conclusion

From the above findings of the study, it can be concluded that malnutrition is one of the major public health problems in India, which affects both physical and mental health of children. Some socioeconomic

and demographic factors are significantly found to be associated with the high prevalence of malnutrition. It can be concluded that malnutrition is slightly higher in female children than in male children; hence, mothers/caregivers should be sensitized toward the importance of girl child care, and proper nutrition practice helps overcome the problems associated with malnutrition. A healthy mother can give birth to a healthy child. In this view, nutritional counseling should be done for mothers and evaluated properly from time to time. Population explosion and socioeconomic status are considered important factors, and development and improvement of the government policies have a direct effect on malnutrition.

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Conflicts of interest
There are no conflicts of interest.

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ANNEXURE VIII

DATA COLLECTION PHOTOS

Master sheet

						Anthropometric measurements		
Code no	**Groups**	**Age of the mother**	**Height of mother**	**Weight of mother**	**Gender of child**	**Height**	**Weight**	**Mid arm Circumference**
1	0	19	150 cms	50 kg	2	72 cms	6 kg	17 cm
2	0	27	146	49	2	65	6.1	16
3	0	21	148	45	1	64	7.8	18
4	0	33	150	46	2	70	5.2	15
5	0	22	147	56	1	71	8	16
6	0	24	150	55	2	69	6	15
7	0	22	142	45	1	105	15.5	18.5
8	0	28	154	60	1	90	13	16
9	0	22	142	45	1	70	9.5	19
10	0	24	158	60	1	110	17	20
11	0	24	152	60	2	90	12.5	16.5
12	0	30	160	65	1	92	13	17
13	0	26	147	58	1	72	10	17
14	1	32	150	58	2	88	12	10
15	1	28	154	60	1	92	10	12
16	1	30	152	54	1	76	10	13
17	0	25	158	52	2	68	7.5	15
18	0	24	150	45	1	72	9.8	16
19	0	21	165	62	2	83	9.5	14.5
20	1	23	149	52	2	105	12	11
21	0	30	152	80	2	90	9	14
22	0	24	150	50	1	79	8	14
23	0	38	150	40	2	82	10	15
24	0	30	152	53	1	92	14	16
25	0	24	150	48	1	100	15	17.5
26	0	32	145	46	2	86	11	14
27	0	32	154	52	2	69	10	16.5
28	0	25	145	50	1	78	10	14.5
29	0	25	148	52	1	102	15	18
30	1	28	150	45	2	64	7	13
31	0	35	148	50	2	67	6	15
32	0	35	145	50	1	93	11	15.5
33	0	24	152	43	1	82	10	15.5
34	0	25	151	56	2	106	16	17.5
35	0	25	154	58	1	80	10	16
36	0	28	157	64	1	90	11	15
37	0	23	154	64	1	65	6	13.5

38	0	31	149	71	1	63	7	14.5
39	0	30	150	60	1	78	12	15.5
40	0	22	156	55	2	70	11	16
41	0	21	148	34	1	68	9	15.5
42	0	24	156	49	2	84	12	14.5
43	0	24	154	49	2	73	9	14.5
44	0	28	153	49	1	60	7	16
45	0	35	150	55	1	72	10	14
46	0	26	153	47	2	71	9	15
47	0	24	152	42	1	83	10	15.5
48	0	21	149	56	1	100	12	16
49	0	32	157	75	2	92	12	15
50	0	24	145	42	2	108	16	20
51	0	26	154	47	2	97	11	14.5
52	0	29	150	63	2	78	10	15
53	0	34	150	65	2	75	11	14
54	0	29	148	58	1	90	13	15.5
55	0	29	152	61	1	92	12	16.5
56	1	26	151	50	2	75	6	11
57	1	25	153	76	2	70.5	8	13
58	0	24	157	43	1	96	14	16
59	0	32	149	62	1	75	10	14
60	0	23	147	50	1	79	10	15
61	0	24	153	69	2	73	9	17
62	1	23	149	58	1	64	7	10
63	0	28	149	60	1	79	10	14
64	1	25	150	39	1	72	9	13
65	0	28	153	60	2	75	8	15
66	0	22	149	59	1	70	10	14
67	1	29	153	59	2	76	11	13
68	1	30	148	60	1	71	12	12
69	0	31	151	62	2	80	16	15
70	0	27	149	55	1	75	9	14
71	1	27	167	62	2	76	8	13
72	1	25	152	53	1	70	8	11
73	0	26	167	58	1	92	13	15
74	0	30	165	63	2	90	14	14
75	1	25	155	63	1	74	9	13
76	0	26	161	57	1	93	15	15
77	0	30	167	65	1	73	12	15
78	1	28	152	60	1	88	14	12
79	1	23	164	58	2	92	14	13
80	1	25	158	57	1	91	13	12
81	1	30	164	62	2	88	12	10
82	0	24	158	56	1	98	16	18
83	0	28	161	59	1	95	14	17
84	0	23	158	53	1	99	14	17
85	0	24	152	41	2	89	11	14.5

86	1	30	158	62	1	90	12	13
87	0	33	162	63	1	92	16	16
88	1	27	155	54	1	61	7	10
89	0	33	164	63	2	98	16	15
90	1	22	158	58	1	70	10	12
91	0	29	167	60	1	82	15	15
92	1	28	155	57	1	78	17	14
93	0	27	156	59	1	82	16	15
94	1	32	152	55	1	79	15	14
95	1	29	146	50	2	65	12	13
96	0	31	164	62	1	80	18	16
97	0	28	164	59	2	92	20	16
98	0	26	158	60	1	82	15	16
99	1	27	152	57	2	62	8	10
100	1	27	152	55	1	69	10	12
101	0	31	161	59	1	73	20	17
102	0	28	167	60	2	67	16	18
103	0	27	155	53	2	70	22	19
104	0	28	155	55	1	72	25	18
105	1	27	164	60	1	62	14	13
106	0	26	158	52	2	67	18	14
107	0	24	167	62	1	70	20	18
108	0	27	167	59	1	75	25	16
109	0	25	161	58	2	70	20	15
110	1	22	155	58	1	60	15	13
111	0	24	158	60	2	68	16	14
112	0	26	164	62	2	65	18	19
113	1	21	161	52	1	55	10	9
114	1	27	152	57	2	65	14	10
115	1	26	155	55	1	66	13	12
116	1	31	161	60	1	60	9	10
117	0	32	164	62	1	75	15	14
118	1	30	158	59	2	69	14	12
119	0	28	157	61	1	71	13	14
120	1	27	164	57	1	68	10	13
121	1	23	152	52	2	58	7	10
122	1	27	161	62	1	67	10	12
123	1	26	160	51	1	65	9	13
124	1	24	162	70	1	55	7	12
125	0	24	160	70	1	65	11	14
126	1	31	164	56	1	64	9	13
127	0	26	157	65	1	74	14	16
128	0	30	163	70	2	71	16	15
129	0	28	158	62	1	80	17	14
130	0	26	170	82	1	90	20	17
131	0	24	160	58	2	100	22	17
132	0	25	155	61	2	75	15	16
133	0	22	170	70	1	72	12	14

134	1	31	157	60	2	80	16	12
135	1	23	162	58	1	62	8	9
136	1	30	162	68	1	71	15	11
137	1	26	152	53	1	68	11	13
138	1	35	161	68	1	61	7	9
139	0	22	162	57	2	81	17	15
140	0	29	160	52	1	90	18	16
141	1	29	160	51	1	81	12	13
142	0	32	155	64	2	91	17	15
143	1	30	160	48	2	89	13	11
144	1	26	159	61	1	85	15	13
145	0	33	162	59	1	80	18	15
146	1	30	167	80	2	70	11	10
147	1	33	162	59	1	79	15	12
148	1	34	160	57	1	68	13	12
149	1	27	158	62	1	72	10	10
150	1	32	168	70	2	76	13	12
151	1	30	167	58	1	92	15	13
152	1	35	152	60	1	70	11	10
153	1	26	161	53	2	68	13	12
154	1	30	152	60	1	75	16	12
155	1	25	147	39	1	71	10	9
156	1	25	162	69	2	83	17	13
157	1	29	161	60	2	85	15	12
158	1	30	157	61	1	79	12	10
159	1	30	159	56	1	81	10	9
160	1	22	160	50	2	79	13	12
161	1	28	159	52	1	76	14	12
162	1	31	156	62	1	81	15	11
163	1	28	165	70	1	87	8	12
164	1	24	168	70	2	68	6	11
165	1	46	156	56	1	78	4	9
166	1	29	163	56	1	65	5	8
167	1	42	159	52	1	92	8	9
168	1	36	154	46	2	75	6	8
169	1	28	165	62	2	78	6	8
170	1	26	155	52	1	57	4	8
171	1	36	161	48	2	80	10	9
172	1	29	155	49	1	67	9	8
173	1	27	164	45	1	68	11	9
174	1	31	163	40	2	90	13	10
175	1	30	159	48	2	81	10	12
176	1	24	160	50	1	78	12	10
177	1	30	157	46	1	75	10	12
178	1	28	168	58	1	76	13	10
179	1	31	158	45	2	86	14	10
180	1	33	161	50	1	80	12	13
181	1	31	158	64	2	87	15	12

182	1	22	160	51	1	79	9	10
183	0	21	156	49	1	92	18	15
184	1	27	155	60	2	60	7	9
185	1	28	157	51	2	75	10	9
186	1	25	168	62	1	87	14	12
187	1	23	150	55	1	77	9	9
188	1	34	161	58	2	61	8	9
189	1	30	154	45	1	90	14	11
190	1	26	159	61	2	80	12	10
191	1	23	160	50	1	75	10	9
192	1	31	152	52	2	90	12	10
193	1	27	149	44	1	58	6	9
194	1	32	165	51	2	92	15	11
195	1	30	167	59	1	60	6	9
196	1	22	150	45	2	87	14	10
197	1	20	157	56	1	89	10	10
198	1	36	169	70	2	78	12	10
199	1	28	160	65	1	82	15	11
200	1	25	154	49	2	68	9	9
201	1	30	159	64	1	68	10	9
202	1	24	151	65	2	71	9	9
203	1	28	161	67	2	74	12	10
204	1	21	159	49	1	60	6	9
205	1	31	160	56	1	65	8	9
206	1	27	166	67	2	98	17	12
207	1	35	154	60	1	65	6	9
208	1	23	168	62	2	67	7	9
209	1	29	160	48	2	70	10	9
210	1	34	153	50	1	68	9	9
211	1	28	162	57	1	80	14	12
212	1	25	154	65	2	82	10	9
213	1	32	149	46	1	83	12	10
214	1	29	158	51	2	88	14	11
215	1	24	161	49	1	61	7	9
216	1	36	159	65	1	74	10	9
217	1	31	160	48	2	64	7	9
218	1	23	156	54	2	55	5	8
219	1	29	167	72	2	60	7	8
220	1	26	155	64	2	57	9	9
221	1	27	169	70	1	69	10	8
222	1	32	165	55	2	75	8	8
223	0	34	156	49	1	110	18	14
224	1	25	159	56	2	98	15	12
225	1	23	154	46	2	84	10	9
226	1	29	162	58	2	80	12	10
227	1	31	156	49	2	85	13	10
228	1	26	165	59	1	77	11	10
229	1	21	156	60	1	86	13	10

230	1	25	159	53	2	84	10	9
231	1	28	165	60	1	68	12	10
232	1	37	160	72	1	78	13	11
233	1	26	150	56	1	68	12	10
234	1	24	169	65	1	70	11	9
235	1	32	159	49	2	85	12	10
236	1	24	154	57	1	90	16	11
237	1	28	161	55	1	76	10	11
238	1	27	161	59	1	67	9	8
239	1	26	158	47	1	87	11	9
240	1	39	162	59	2	76	10	8
241	1	28	159	63	2	77	11	10
242	1	25	162	69	2	80	12	9
243	1	30	154	47	1	81	14	10
244	1	25	158	65	1	76	12	10
245	1	30	167	58	1	70	10	9
246	1	23	152	58	1	59	5	8
247	1	25	160	61	2	86	13	10
248	1	28	151	59	1	62	9	8
249	1	23	168	55	1	60	8	8
250	1	32	155	61	1	65	10	8
251	1	30	159	56	2	79	11	9
252	1	37	151	49	2	60	8	8
253	1	40	165	61	1	60	7	8
254	1	25	161	63	2	68	8	9
255	1	27	158	64	2	71	10	9
256	1	28	163	74	2	65	8	8
257	1	28	159	48	1	70	11	9
258	1	22	167	58	1	64	10	8
259	1	23	159	54	1	65	9	9
260	1	25	165	62	2	70	8	8
261	1	28	155	42	2	60	7	8
262	1	23	162	55	2	65	8	9
263	1	25	157	50	1	68	9	8
264	1	25	167	61	2	70	11	9
265	1	28	155	48	1	72	12	9
266	0	23	161	50	1	68	13	17
267	0	28	155	60	2	65	10	16
268	0	25	162	68	2	69	11	14
269	0	24	170	64	2	71	12	14
270	0	26	163	52	1	69	10	16
271	0	22	158	47	1	73	13	17
272	0	30	165	59	1	87	17	15
273	0	34	160	58	1	90	14	16
274	0	30	156	60	2	79	12	16
275	0	32	160	A	2	69	11	14
276	0	28	165	60	2	67	12	15
277	0	29	170	68	1	69	10	14

278	0	24	170	61	1	62	8	15
279	1	31	156	51	2	71	10	13
280	0	32	167	68	1	69	11	14
281	0	21	159	55	2	64	10	15
282	1	26	160	70	1	70	12	13
283	0	25	176	59	2	69	7	15
284	1	26	152	50	1	84	9	10
285	0	25	157	54	2	69	7	15
286	1	26	149	50	1	73	9	10
287	0	30	143	54	1	80	11	15
288	1	29	148	51	1	57	7	10
289	1	27	152	60	1	63	8	10
290	0	26	158	50	1	57	8	14
291	0	28	155	56	1	82	10	16
292	0	26	140	48	1	73	9	14
293	1	30	151	55	2	68	10	12
294	0	23	150	49	2	89	12	14
295	1	26	158	62	2	52	8	10
296	1	32	160	72	1	62	14	13
297	0	29	152	58	1	80	15	16
298	1	28	159	65	2	74	12	13
299	1	22	160	54	2	70	9	12
300	1	36	159	67	1	64	12	10
301	1	30	152	48	2	81	10	12
302	1	21	149	51	2	73	9	11
303	0	35	159	61	1	64	10	16
304	1	26	143	54	2	69	12	10
305	1	25	148	51	1	69	9	12
306	0	22	157	63	2	88	13	14
307	0	31	159	50	2	90	13	16
308	1	32	161	59	1	92	15	12
309	1	24	147	55	1	74	10	11
310	0	21	154	63	2	69	16	14
311	1	34	160	74	1	75	15	11
312	1	24	155	39	1	69	9	10
313	1	28	143	51	2	69	8	11
314	1	29	155	62	1	63	14	10
315	1	36	150	60	2	62	10	8
316	1	31	149	49	2	67	14	10
317	1	27	155	67	1	60	12	10
318	1	30	158	61	2	62	15	12
319	1	34	160	59	1	59	6	10
320	1	38	154	65	2	70	10	12
321	1	35	156	59	1	62	7	13
322	0	23	148	53	2	54	8	17
323	0	27	145	56	1	72	12	15
324	0	29	159	73	1	70	13	17
325	0	22	162	68	2	82	10	16

326	0	29	158	69	1	86	16	18
327	0	37	160	76	2	70	15	16
328	0	22	159	43	2	59	11	15
329	0	39	162	59	1	70	14	17
330	0	21	155	65	2	65	13	14
331	0	28	160	52	2	60	12	15
332	0	36	150	48	1	73	18	15
333	0	29	154	50	2	68	9	14
334	0	25	146	56	2	89	15	17
335	0	24	151	49	1	69	10	16
336	0	28	145	55	1	74	10	14
337	0	32	154	49	1	69	9	18
338	0	26	156	48	2	75	12	15
339	0	30	162	59	1	69	11	16
340	0	26	154	65	1	89	13	15
341	0	29	151	55	2	57	8	14
342	0	32	150	54	1	92	17	15
343	0	26	157	67	1	67	12	14
344	1	29	155	59	2	63	8	12
345	0	25	154	68	1	68	12	14
346	0	20	155	45	2	72	12	16
347	1	25	152	55	2	57	9	13
348	0	27	159	65	1	63	12	17
349	0	28	158	50	2	63	8	14
350	0	28	168	74	2	74	9	17
351	0	24	152	48	1	69	12	15
352	0	28	149	60	1	70	10	16
353	0	23	155	58	2	62	8	15
354	0	36	154	63	2	70	12	18
355	0	32	161	70	1	70	10	14
356	0	34	158	59	2	63	8	18
357	0	22	154	57	1	62	15	15
358	0	31	142	65	1	65	12	14
359	0	24	165	75	2	68	15	16
360	1	35	158	60	1	68	6	12
361	0	30	149	50	2	89	14	16
362	0	35	165	55	1	100	18	15
363	1	26	156	50	1	64	8	12
364	0	21	150	48	2	69	9	16
365	0	37	158	62	1	65	12	14
366	0	28	165	70	2	70	15	18
367	0	26	164	68	1	68	14	15
368	0	38	156	71	2	80	15	18
369	1	29	152	58	1	60	8	10
370	0	32	170	66	1	68	12	14
371	1	27	158	60	2	62	10	12
372	0	20	152	68	2	73	15	16
373	1	26	166	56	1	65	9	12

374	0	32	152	60	1	70	14	16
375	0	38	165	76	2	87	18	16
376	1	32	174	68	1	74	10	12
377	0	21	154	56	1	69	12	14
378	0	30	166	62	2	75	15	17
379	1	22	158	64	1	73	14	12
380	0	26	160	64	1	69	16	15
381	0	31	168	73	2	70	13	15
382	1	20	166	59	1	68	11	13
383	0	34	168	71	1	73	18	15
384	0	26	158	60	2	80	15	14
385	0	29	165	70	1	76	13	14
386	0	35	154	46	2	81	18	15
387	1	23	165	55	2	60	10	12
388	0	28	170	64	1	68	14	15
389	0	35	155	46	1	74	14	14
390	0	39	160	56	2	82	12	15
391	1	22	154	48	1	65	13	12
392	1	30	163	65	2	70	15	12
393	1	25	168	72	1	65	9	10
394	1	28	149	39	2	68	10	13
395	0	23	160	54	1	70	15	16
396	0	21	165	56	2	92	19	20
397	0	28	143	37	1	70	15	14
398	1	34	150	54	2	65	10	12
399	0	30	148	57	1	69	14	15
400	1	24	156	63	2	71	15	13
401	1	29	160	55	2	55	10	12
402	0	32	149	47	1	70	15	15
403	1	35	153	60	2	68	12	13
404	1	26	158	65	1	52	8	12
405	1	21	144	58	1	58	10	13
406	0	26	158	65	2	62	9	14
407	0	29	160	72	2	70	13	15
408	0	37	154	59	1	76	15	16
409	0	22	150	62	2	70	12	14
410	1	26	148	58	1	64	10	13
411	0	21	155	65	1	78	13	15
412	0	30	159	68	2	80	15	14
413	0	39	146	48	1	85	17	15
414	1	25	155	60	2	60	8	10
415	1	30	160	49	1	65	10	12
416	1	22	151	50	2	55	7	10
417	1	28	160	67	1	65	10	13
418	0	35	155	56	2	76	16	15
419	1	21	158	62	1	65	9	12
420	1	27	160	58	2	70	12	12
421	1	24	155	60	1	68	9	11

422	1	36	162	59	2	71	12	13
423	0	25	168	76	2	92	16	15
424	1	32	155	60	1	85	15	13
425	0	29	160	56	1	89	18	16
426	1	32	146	54	2	60	9	12
427	0	30	152	60	1	70	12	14
428	0	25	162	52	2	82	15	14
429	1	36	148	55	1	67	10	12
430	0	28	152	60	2	70	14	15
431	0	25	147	56	1	87	16	15
432	0	27	154	60	2	90	15	14
433	1	29	159	70	1	80	14	12
434	1	32	160	45	2	74	12	13
435	0	30	148	52	2	94	20	16
436	0	29	154	60	1	70	17	15
437	0	35	161	70	2	82	14	14
438	1	24	155	48	1	75	10	12
439	1	21	159	54	2	55	9	11
440	0	30	150	60	1	89	18	15
441	1	26	148	54	2	60	10	12
442	1	30	156	60	1	70	12	11
443	1	24	160	58	2	61	10	11
444	1	26	158	65	1	58	9	11
445	1	35	149	50	2	66	11	13
446	1	32	154	60	1	72	12	13
447	1	29	160	57	2	65	10	11
448	1	31	154	60	2	72	12	13
449	0	25	149	54	1	89	15	14
450	1	32	156	60	2	70	12	11
451	1	23	155	45	1	56	8	10
452	1	28	145	39	2	60	10	11
453	0	25	154	60	1	75	14	15
454	1	32	160	65	1	92	16	13
455	1	29	154	60	2	70	12	11
456	1	36	161	68	1	65	10	12
457	1	28	159	62	2	71	13	11
458	1	32	165	70	1	69	10	12
459	1	23	150	56	2	56	7	11
460	1	38	165	60	1	73	11	13

Groups :
Code 0: Non Malnourished
Code1: Malnourished

Gender:
1=Male
2=Female

"DETERMINANTS AND CONSEQUENCES OF MALNOURISHED UNDERFIVE URBAN CHILDREN: A CROSS SECTIONAL STUDY"

An Errata submitted to

KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH

Placed in 'A' Category by MHRD (GoI)

Accredited **'A+' Grade** by NAAC

[Declared as Deemed-to-be-University u/s 3 of the UGC Act, 1956 vide Govt. of India Notification No.F.9-19/2000-U.3 (A)]

Under the Guidance of

PROF.SUMITRA L.A

Professor & HOD

Dept. of Child Health Nursing

Co-Guide

DR. SANGEETA KHARDE **M.Sc. (N), Ph.D.**

Professor & Vice Principal,

KAHER Institute Of Nursing Sciences, Belagavi

By

MRS.VAISHALI S. BAGEWADI

Registration No: KLEU/Ph.D./DO1218005/Year:2018-19

May 2024

Errata submisssion of the thesis (Examiner 1)

Title: Determinants and consequences of Malnourished underfive urban children: a cross sectional study

Sl. No.	Observations	Clarifications	Correction undertaken (page no. in the thesis)
1.	Abstract conclusion part can be elaborated in depth	As per univeristy guidelines abstract must be within 400 words, so indepth it is not elaborated	Xiii, xiv
2.	Citations in the abstract is missing	The corrections have been made with appropriate reference	Xiii
3.	Vancouver style reference in text citations is missing	The corrections have been made with appropriate reference	Bibliography section
4.	Operational definitions add key terms	Key terms added in operational definitions	10
5.	Malnutrition operational definition with grades	corrections made, added with grades	10
6.	Conceptual framework adopted from UNICEF whether same is implemented and what are the actual results	Same was adopted and results are written with reference to present study undertaken	12,13, 14
7.	What is the scope of the study and how it will be useful to community	Described appropriately in detail in need for the study part	7-9
8.	Letter seeking permission from DHO sign and stamp is missing	Corrections made	120
9.	Researcher has written bibliography as per which format not clear	Written as per Vancouver style	Bibliography section
10.	Master sheet is not attached	Corrections made, master sheet attached	161-170
11.	Fig 3,5,6,9,11 n=? total sample size is missing	Corrections made, total sample size added in the tables	60,62,63,66,68
12.	Hypothesis and assumptions not mentioned in the study	corrections made, added Hypothesis and assumptions	11
13.	Extraneous variables not mentioned, how it can be affected study findings can be mentioned	corrections made	47
14.	Is blinding proposed and what type needs to be disclosed	Not applicable for the present study	

15.	Content validity index could have been drawn	Yes, corrections made	137
16.	Reliability of instruments missing	Corrections made, reliability of instruments added	51, 52
17.	Reliability of different tools used for data collections can be stated seperately	Corrections made	51, 52
18.	Code numbers not mentioned on data collection sheets and consent forms	Corrections made, code numbers mentioned	126,132
19.	Consequences of malnourished urban underfive children, how it is measured.	Measured by using questionnaires	Results section
20.	Education provided by the researcher, whether lesson plan of the same is prepared or not	Since it is a cross sectional study, lesson plan is not prepared but orally mothers were educated in aspects like dietary pattern and feeding practices to overcome malnutrition in children	--
21.	Page 49, withdrawal criteria can be added	Withdrawal criteria cannot be added due to cross sectional nature of the study	49
22.	Letter for language editing missing	Corrections made, added letter added	122
23.	Letter certificate from statistics missing	Corrections made, added letter added	121

Date:

Prof.Sumitra LA.
Guide

Dr.Sangeeta Kharde
Co-guide

Mrs.Vaishali Bagewadi
Research Scholar

"DETERMINANTS AND CONSEQUENCES OF MALNOURISHED UNDERFIVE URBAN CHILDREN: A CROSS SECTIONAL STUDY"

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Professor & Vice Principal,
KAHER Institute Of Nursing Sciences, Belagavi

By

MRS.VAISHALI S. BAGEWADI

Registration No: KLEU/Ph.D./DO1218005/Year:2018-19

May 2024

Errata submisssion of the thesis (Examiner 2)

Title: Determinants and consequences of Malnourished underfive urban children: a cross sectional study

Sl. No.	Observations	Clarifications	Correction undertaken (page no. in the thesis)
1.	**Introduction**		
	The table for malnutrition in India statewise doesn't specify for which year statistics and which age group it is applicable	Corrections made and specified in the table	3
	Operational definition : the word excess may not be applicable to malnutrition and it can be removed in the malnutrition definition	Corrections made	10
	Assumptions and Hypothesis may be included	corrections made, added Hypothesis and assumptions	11
	Conceptual framework: the year and reference are not included in the conceptual framework adopted from UNICEF	Corrections made	13,110
2.	**Review of Literature**		
	Latest reviews in India and Karnataka can be added more	Yes, it is added as per suggestions	17,18,21,23,2526, 29,31,33, 36,37,40
3.	**Methodology**		
	Setting needs more explaination	Corrections made	47,48
	There is no difference in the population and sample ,same statement is mentioned for both	Corrections made	48, 49
	Inclusion criteria no.2 can be removed and modify criteria	The sentence has been reframed and modified as per suggestions	50
	Why children who are handicapped excluded? give justification	It may associated with malnutrition already because of improper feeding practices, improper care and negligency and this can have effect. So handicapped children are excluded	--

	Description of the tool is not described with total no.of items	Corrections made and total no.of items added.	51
	Under reliability mention the caliberation of weighing scale	The caliberations are mentioned as per suggestions	51, 52
	As the participants are children, assent also needs to be taken along with consent.	Yes, assent is already mentioned in the consent form.	124, 125
4.	**Results**		
	Frequency and percentage distribution of demographic data is duplicated in the table and figures. Keep either table or figure	Yes, because graphs are self explainatory	--
	Write the full form of RTI wherever applicable	Corrections made	84,85,86,87
5.	**Discussion**		
	Page no.88: write in past tense, discussion will be discussed under following headings.	Corrections made, written in past tense	89
	Supportive studies should be written with a seperate subheadings, it needs to be incorporated for each objectives results	Yes, it is written under seperate subheadings and incorporated for each objectives results	89,92,95,97
6.	**References**		
	Needs to be revised as per vancouver style of writing.	Corrections made	Bibliography section
7.	**Annexure**		
	Language editing certificate to be included	Corrections made, added letter	122
	Report of plagiarism check must be included	Plagiarism certificate is there in the beginning part of thesis	iii

Date:

Prof.Sumitra LA.
Guide

Dr.Sangeeta Kharde
Co-guide

Mrs.Vaishali Bagewadi
Research Scholar