NUTRITIONAL STATUS AND MORBIDITY PATTERN OF UNDERFIVE CHILDREN IN BENIN CITY, EDO STATE

SUBMITTED BY

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DEDICATION

I dedicate this project work to my wonderful supervisor, Prof. V.O Omuemu, for her guidance, continuous assistance and for making this research work a reality.

DECLARATION

I hereby declare that this is an original research work done by me and that it has neither been published nor is it being considered for publication in any other place.

……………………………

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CERTIFICATION

I certify that MBONU HELEN SOCHIMA carried out this study titled "Nutritional Status and Morbidity Pattern of Under-five Children in Benin-City, Edo State, Nigeria" under my supervision. This is for Partial Fulfillment for the Award of Master of Public Health of the University of Benin, Nigeria.

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LIST OF ABBREVIATIONS

DANIDA	Danish International Development Agency
IDA	Iron Deficiency Anemia
IDD	Iodine Deficiency
IYCF:	Infant Young Child Feeding
LGA:	Local Government Area
MICS	Multiple Indicator Cluster Survey
MUAC:	Mid Upper Arm Circumference
NCD	Non-Communicable Diseases
NDHS:	Nigeria Demographic and Health Survey
PEM	Protein Energy Malnutrition
SAM	Severe Acute Malnutrition
UNICEF:	United Nations International Children’s Emergency Fund
U5MR:	Under-five Mortality rate
VAD	Vitamin A deficiency
WHO:	World Health Organization

DEFINITION OF TERMS

Acute Respiratory Infection: is a serious infection that prevents normal breathing function. It usually begins as viral infection in the nose, trachea (windpipe), or lungs if the infection is not treated, it can spread to the entire respiratory system. Its symptoms include cough accompanied by short, rapid breathing that is chest related and/or difficult breathing that is chest related.

Anthropometry is the study of the measurement of the human body in terms of the dimensions of bone, muscle, and adipose (fat) tissue. The word "anthropometry" is derived from the Greek word "anthropo" meaning "human" and the Greek word "metron" meaning "measure."

Breast-milk substitute: any food being marketed or otherwise represented as a partial or total replacement for breast milk, whether it is suitable for that purpose.

Complementary feeding: the process starting when breast milk alone or infant formula alone is no longer sufficient to meet the nutritional requirements of an infant, and therefore other foods and liquids are needed along with breast-milk or a breast-milk substitute. The target range for complementary feeding is generally considered to be 6–23 months**.**

Diarrhea is the passage of loose, liquid or watery stools more than three times a day and it drains water and minerals from body, resulting to dehydration, delayed healing of mucosa and decreased absorptive capability of intestine.

Dietary diversity is used to ascertain the adequacy of the nutrient content of the food (not including iron) consumed. For dietary diversity, seven food groups were created for which a child consuming at least four of these is considered to have a better-quality diet. In most populations, consumption of at least four food groups means that the child has a high likelihood of consuming at least one animal-source food and at least one fruit or vegetable, in addition to a staple food (grain, root or tuber).

Dietary pattern: represents a general profile of food and nutrient consumption, characterized on the basis of the usual eating habits.

Exclusive breastfeeding: infant receives only breast milk (including breast milk that has been expressed or from a wet nurse) and nothing else, even water or tea. Medicines, oral rehydration solution, vitamins and minerals, as recommended by health providers, are allowed during exclusive breastfeeding.

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

Fever: is a cardinal response to infection and inflammatory disease and this response is executed by integrated physiological and neuronal circuitry and confers a survival benefit during infection. Fever is a major manifestation of malaria and other acute infections in children.

Health: Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

Malnutrition: refers to a state of deficient or excess intake of nutrients (protein, carbohydrates, fat, vitamins and minerals) in relation to requirements. Two major types - undernutrition or over-nutrition.

Minimum dietary diversity is defined as receiving foods from at least 4 of 7 food groups: 1) Grains, roots and tubers, 2) legumes and nuts, 3) dairy products (milk, yogurt, cheese), 4) flesh foods (meat, fish, poultry and liver/organ meats), 5) eggs, 6) vitamin-A rich fruits and vegetables, and 7) other fruits and vegetables.

Micronutrient: essential vitamins and minerals required by the body throughout the lifecycle in miniscule amounts.

Micronutrient deficiency: occurs when the body does not have sufficient amounts of a vitamin or mineral due to insufficient dietary intake and/or insufficient absorption and/or suboptimal utilization of the vitamin or mineral.

Moderate acute malnutrition: defined as weight for height between minus two and minus three standard deviations from the median weight for height of the standard reference population.

Morbidity pattern: refers to the level of sickness and disability characterizing a population in a geographical locality. It also refers to the health status of an individual or population.

Minimum acceptable diet for breastfed children age 6-23 months is defined as receiving the minimum dietary diversity and the minimum meal frequency, while for non-breastfed children; it is defined as receiving at least 2 milk feedings, minimum meal frequency and the minimum dietary diversity.

Minimum meal frequency among currently breastfeeding children is defined as children who also received solid, semi-solid, or soft foods 2 times or more daily for children age 6-8 months and 3 times or more daily for children age 9-23 months. For non-breastfeeding children age 6-23 months it is defined as receiving solid, semi-solid or soft foods, or milk feeds, at least 4 times.

Neuronal Circuitry: refers to an interconnected system of neurons, as in the brain or other parts of the nervous system.

Nutrient: or "Food Factor" is the organic and inorganic complexes contained in food. They are divided broadly into micronutrient and macro nutrients.

Undernutrition occurs when there is inadequate intake of one or more nutrients. The body does not have enough of the right kind of food to meet its macronutrients and micronutrients needs.

It is further sub-divided into:

- Multi-nutrient undernutrition which causes underweight, stunting and wasting - PEM
- Specific micronutrient deficiencies - IDA, VAD, IDD

It is the outcome of insufficient food intake, inadequate care and infectious diseases. It includes being underweight for one's age, too short for one's age (stunting), dangerously thin for one's height (wasting) and deficient in vitamins and minerals (micronutrient deficiencies).

Underweight: a composite form of undernutrition that includes elements of stunting and wasting and is defined as weight for age below minus two standard deviations from the median weight for age of the standard reference population.

Severe acute malnutrition: defined as weight for height below minus three standard deviations from the median weight for height of the standard reference population, mid-upper arm circumference (MUAC) less than 115 mm, visible severe thinness, or the presence of nutritional edema.

Stunting: is defined as height for age below minus two standard deviations from the median height for age of the standard reference population.

Supplementary feeding: additional foods provided to vulnerable groups, including moderately malnourished children.

Wasting: is defined as weight for height below minus two standard deviations from the median weight for height of the standard reference population. A child can be moderately wasted (between minus two and minus three standard deviations from the median weight for height) or severely wasted (below minus three standard deviations from the median weight for height).

ABSTRACT

BACKGROUND:

Malnutrition is the single biggest contributor to under-five mortality due to greater susceptibility to infections and slow recovery from illness. Every year, an estimated 2.5 million under-five children in Nigeria suffer from severe acute malnutrition and this makes them vulnerable and nine times more likely to die from diarrhea, acute respiratory tract infection and fever. This interaction between malnutrition and infection creates a potentially lethal cycle of worsening illness and deteriorating nutritional status.

OBJECTIVE: To assess the association between the nutritional status and morbidity pattern of under-five children in Benin-City, Edo State Nigeria.

METHODS: This was a community-based cross-sectional study carried out among 771 mother-child pairs that were selected using a multi-stage sampling technique. A structured, pre-tested, interviewer-administered questionnaire was used to collect information on demographic and socio-economic characteristics, dietary pattern, morbidity pattern and child health practices while nutritional status was assessed using anthropometric methods. Focus group discussions guide was used to collect data on maternal knowledge, attitude and practices on child health and infant and young child feeding. Data was analyzed using Software Statistical Package for Scientific Solutions (SPSS) version 20.0 manufactured by IBM incorporated and the level of statistical significance was set at a $p < 0.05$.

RESULTS: A total of 771 mother-child pair participated in this study. The mean age of the participants was 27.3 ±15.9 months. The results showed that 215 (27.9%) mothers had introduced complementary foods to their children at the appropriate time. The most consumed food were foods made from grains, roots and tubers; 26.9% among breastfeeding children and 73.1% among non-breastfeeding children. Only 113 (14.7%) of children had an adequately diverse diet, in which they

had been given foods from at least five food groups, and 82 (10.6%) had been fed the minimum number of times appropriate for their age. Overall, only a little above one-third, (33.6%) of the children were fed according to the appropriate complementary feeding practice in the 24 hours preceding the interview. Factors associated with child feeding index were mothers' level of education ($p = 0.001$), number of under-fives' in the household ($p = 0.035$), average monthly household income ($p = 0.003$), age of under-five ($p = 0.001$) and wealth quintile ($p = 0.016$). Almost half of the children were stunted (42.8%), 10.7% were overweight, 10.1% were underweight and 4.9% were wasted. Factors associated with the nutritional status were wealth quintile, average monthly household income, child age, number of under-five in household, birth order, child feeding index and mothers skill level. History of illness in the two weeks preceding the survey was 34.2%; fever (15.4%), ARI (14.5%) and diarrhea (5.1%). Factors associated with history of illness were mother and father's level of education, mother's age, child's age, sex of under-five, birth order and average monthly household income. There was an association between the classification of under-nutrition using the MUAC ($p < 0.0001$) and Weight for Age ($p = 0.027$) and the morbidity status of under-fives'. MUAC and Weight for age are indicators for wasting.

CONCLUSION: There was a strong association between the nutritional status and morbidity pattern of under-fives in this study. This association was found between wasting and morbidity status. Wasting is a major health problem and owing to its associated risks for morbidity requires urgent attention.

KEYWORDS: Malnutrition, Morbidity pattern, Under-fives, Infant feeding.

CHAPTER ONE

INTRODUCTION

1.1 Background

Good nutrition is the bedrock for child survival, health and development. Well-nourished children are better able to grow and learn, to participate in and contribute to their communities and to be resilient in the face of diseases, disasters and other global crises.[1]

As infants grow, their nutrient needs grow with them. After the first six months of life, an infant's nutrient demands start to exceed what breast milk alone can provide and complementary foods are necessary to meet those needs. If complementary foods are not introduced around the age of 6 months, or if they are given inappropriately, the child will become malnourished.[2]

Malnutrition is more than a lack of food; it also encompasses overconsumption of low-quality food. The causes of undernutrition and overweight and obesity are similar and intertwined. Poverty, lack of access to adequate diets, poor infant and young child feeding practices, and the consumption of unhealthy foods and drinks can lead to undernutrition as well as to overweight and obesity. Malnutrition is a violation of a child's right to survival and development – and its consequences often remain invisible until it's too late.[3]Childhood obesity is associated with a higher chance of obesity, premature death and disability in adulthood.[4] But in addition to increased future risks, obese children experience breathing difficulties, increased risk of fractures, hypertension, early markers of cardiovascular disease, insulin resistance and psychological effects.[4]Chronic undernutrition early in life leads to stunting, which prevents children's bodies and brains from growing to reach their full potential. The damage caused by stunting is irreversible and has far reaching consequences. Children who do not reach their optimum height or consistently experience bouts of weight loss during childhood are affected in

the long term in numerous ways; they do not reach their optimum size as adults (and so may have less physical capacity for work), their brains are affected (resulting in lower IQs) and they are at greater risk of infection (which kills many children during their early years).[5]

Child malnutrition is the single biggest contributor to under-five mortality due to greater susceptibility to infections and slow recovery from illness. [5]An estimated 2.5 million Nigerian children under the age of five suffer from Severe Acute Malnutrition (SAM) every year – an extremely dangerous condition that makes children nine times more likely to die from common childhood illnesses, such as such as diarrhea, pneumonia, and malaria. Every year, nearly 420,000 children under-five die because of this deadly combination in Nigeria.[6] The interplay between the two most significant immediate causes of malnutrition - inadequate dietary intake and illness -- tends to create a vicious circle: a malnourished child, whose resistance to illness is compromised, falls ill, and malnourishment worsens. Children who enter this malnutrition-infection cycle can quickly fall into a potentially fatal spiral as one condition feeds off the other; malnutrition lowers the body's ability to resist infection by undermining the functioning of the main immune-response mechanisms. This leads to longer, more severe and more frequent episodes of illness. Infections cause loss of appetite, mal-absorption and metabolic and behavioral changes. These, in turn, increase the body's requirements for nutrients, which further affects young children's eating patterns and how they are cared for.[7]

Children represent the future, and ensuring their healthy growth and development is a prime concern of all societies.[8] In order to avert irreversible cumulative growth and development deficits that compromise child health and survival, it is critical to prevent malnutrition as early as possible across the life cycle.[9]

1.2 Statement of Problem

Every year, millions of children under five years of age die, mostly from preventable causes such as acute respiratory infections, mostly pneumonia, diarrhea and malaria. In 2016, about 6 million children died before their fifth birthday – among them 3 million (46 per cent) died in the first month of life. Pneumonia (16%), diarrhea (8%) and malaria(5%) remained among the leading causes of death among children under age 5 – accounting for almost a third of global under-five deaths, and about 40 per cent of under-five deaths in sub-Saharan Africa.[10] The findings of the 2017 multiple indicator cluster survey indicate that, in Nigeria, about 120/1000 children have the probability of dying between birth and their fifth birthday and about 14 percent of these children were presenting with diarrhea, 3% had symptoms of ARI and 25% had an episode of fever, of this proportion, in the south-south regions 22% had fever, 5% had diarrhea and 1% had ARI. In Edo State 9% had an episode of fever, 3% had diarrhea and 1% had symptoms of ARI.[11]In almost half of the cases, malnutrition played a role, while unsafe water, sanitation and hygiene were also significant contributing factors.[10]

According to the 2016 key findings of the Joint Child Malnutrition Estimates, globally, stunting affects an estimated 23 percent (155 million) of under-five children, 6% (41 million) are overweight and wasting continues to threaten the lives of about 8% (nearly 52 million).[12] Children in low- and middle-income countries are more vulnerable to inadequate pre-natal, infant, and young child nutrition. At the same time, these children are exposed to high-fat, high-sugar, high-salt, energy-dense, and micronutrient-poor foods, which tend to be lower in cost but also, lower in nutrient quality. These dietary patterns, in conjunction with lower levels of physical activity, result in sharp increase in childhood obesity while undernutrition issues remain unsolved.[5]

In lower-middle income countries, 66% of children under-five were stunted, 44% were overweight and 75% were wasted. In the developing world, Africa and Asia bear the greatest share of all forms of malnutrition among under-five children; with stunting rates at 56% in Asia and 38% in Africa, overweight at 49% in Asia and 24% in Africa and wasting rates at 69% in Asia and 27% in Africa. Five sub-regions have stunting rates that exceed 30 per cent; Oceania at 38%, Eastern Africa at 37%, Southern Asia at 34%, Middle Africa at 33% and West Africa at 31%. In three sub-regions, at least one in every ten children under five is overweight: Southern Africa 12%, Central Asia 11% and Northern Africa 10%. Wasting was highest in Southern Asia 15%, Oceania 9% and Western Africa 9%.[12] In 2017, a multiple indicator cluster survey was conducted in Nigeria, the findings indicated that 11% of children under five were wasted , 2% were overweight, 32% were underweight and 44% were stunted; in the south-south zone, 19% were stunted, 7% were wasted 14% were underweight and 1% were overweight; in Edo State, 14% of under-five children are stunted, 10% are underweight, 7% are wasted and 1% were overweight. The findings from Africa and Nigeria show an increased prevalence of stunting.[11]

Stunting remains a problem of greater magnitude than overweight, underweight or wasting, and it more accurately reflects nutritional deficiencies and illnesses that occur during the most critical periods for growth and development in early life. Stunting and other forms of undernutrition are clearly a major contributing factor to child mortality, disease and disability.[13]More than a third of the children who died from pneumonia, diarrhea and other illnesses could have survived if they had not been undernourished. The consequences associated with undernutrition can be devastating. In the short term, undernutrition increases the risk of mortality and morbidity, and in the longer term, the consequences of stunting extends to adulthood, increasing risk of poor pregnancy outcomes (including newborns who are small for

gestational age), impaired cognition that results in poor school performance, reduced economic productivity and earnings, and future risk for overweight and subsequently NCDs such as hypertension and cardiovascular disease.[14]This epidemiological transition could create new economic and social challenges in many low- and middle-income countries where stunting is prevalent, especially among poorer population groups.[13] Social, economic, and political factors can have a long-term influence on maternal and childhood undernutrition. Moreover, chronic undernutrition can lead to poverty, creating a vicious cycle, [14] influencing nutrient intake and the presence of disease.[13]

1.3 Justification

This study will provide information on the dietary pattern of under-five children in Benin-City to aid in nutrition-specific and nutrition-sensitive interventions to effect a more holistic sustainable response to improving child nutrition.

Children may appear to be healthy even when they face grave risks associated with undernutrition; not recognizing the urgency, will lead to irreversible long-term consequences of nutritional deprivation. This study will aid in the early detection of malnutrition among under-five children in Benin-City by providing data on their current nutritional status. It will also aid in the planning and implementation of food intervention programs.

Child undernutrition is caused not just by the lack of adequate, nutritious food, but also by frequent illness which is characterized as an immediate cause. Children who are weakened by nutritional deficiencies cannot stave off illness for long, and the frequent and more severe bouts of illness they experience make them even weaker. An undernourished child struggles to withstand an attack of pneumonia, diarrhea or other illness – and illness often prevails. Therefore, this study will provide information on the morbidity pattern of under-fives in Benin-city.

A child's dietary intake and exposure to disease are affected by underlying factors, including household food insecurity (lack of availability of, access to, and/or utilization of a diverse diet), inadequate care and feeding practices for children, unhealthy household and surrounding environments, and inaccessible and often inadequate health care which are all influenced by a basic cause; poverty.[14] The NDHS reports shows that only 7 percent of children in Edo State are fed in compliance with the IYCF recommendations of consuming breast milk or other milk products, having the minimum dietary diversity, and having the minimum meal frequency.[2] This high prevalence of non-compliance with IYCF practices is a major contributor

to childhood morbidity and undernutrition. Also, in the 2017 multiple indicator cluster survey conducted in Nigeria, it was observed that, there was an inverse relationship between household wealth and stunting; children in the poorest households were three times more likely to be stunted (54 percent) than children in the wealthiest households (18 percent).[11]This was identified as one of the factors affecting the key findings. Therefore, this study will identify the specific factors affecting the dietary pattern, nutritional status and morbidity pattern of under-five children in Benin-City.

There is a dearth of knowledge on the relationship between the nutritional status and morbidity pattern of under-five children within Edo State, particularly in Benin-City, therefore this study will provide baseline data.

Given what is now known about the serious, long-lasting impact of malnutrition, this study is therefore necessary, to obtain an up-to-date statistical data on the child population under-five years of age that is at risk of faltered growth, disease, impaired mental development, and death in Benin-city and this falls in line with achieving the sustainable development goals by 2030 with emphasis on zero hunger, good health and well-being.

1.4 Research questions

1. What is the dietary pattern of under-five children in Benin-City?
2. What is the nutritional status of under-five children in Benin-City?
3. What is the morbidity pattern of under-five children in Benin-City?
4. What are the factors associated with the dietary pattern, nutritional status and morbidity pattern of under-five children in Benin-City?
5. Is there an association between the morbidity pattern and the nutritional status of under-five children in Benin-City?

1.5 General objective

The aim of this study is to assess the association between the morbidity pattern and nutritional status of under-five children in Benin-City to contribute to baseline data.

1.6 Specific objectives

1. To assess the dietary pattern of under-five children in Benin-City.
2. To assess the nutritional status of under-five children in Benin-City.
3. To determine the morbidity pattern of under-five children in Benin-City.
4. To identify the factors associated with the dietary pattern, nutritional status, and morbidity pattern of under-five children in Benin-City.
5. To determine the relationship between the morbidity pattern and the nutritional status of under-five children in Benin-City.

CHAPTER TWO

LITERATURE REVIEW

This chapter reviews previous research on the dietary pattern, nutritional status, morbidity pattern of under-five children and the factors associated with them. Many studies have shown that the cause of malnutrition is multifactorial, but this study will look at morbidity pattern as an immediate cause of malnutrition and its relationship with the nutritional status of under-fives.

2.1 Dietary pattern of under-five children

Breastfeeding and complementary feeding are critical factors in child survival, growth, and development. Breast milk is also an important source of energy and nutrients for under-fives. It can provide half or more of a child's energy needs between the ages of 6 and 12 months, and one third of energy needs between 12 and 24 months. Breastfeeding should be combined with safe, age-appropriate feeding of solid, semi-solid and soft foods.[2]Children are fed small quantities of solid and semi-solid foods while continuing to breastfeed up to age 2 or beyond. It is recommended that breastfeeding children should be fed from three or more different food groups. Moreover, infants' age 6-8 months should be fed at least twice a day and children age 9-23 months should be fed at least three times a day. Non-breastfeeding children age 6-23 months should be fed milk or milk products every day; in addition, they should be fed from at least four food groups and they should be fed four or more times a day. [15]The IYCF recommendations for children takes into account feeding practices that meet minimum standards with respect to: food diversity (the number of food groups consumed), feeding frequency (the number of times the child is fed) and consumption of breast milk or other types of milk or milk products.[16]The approach for collecting information on dietary diversity as described in the FAO guideline is a

qualitative 24 hour recall of all the foods and drinks consumed by the respondent (individual level) or the respondent and/or any other household member (household level).[17]Studies have been carried out to assess the dietary pattern and feeding practices of children under-five years:

A population-based demographic and health survey was conducted in 2007 to assess the infant and young child feeding practices of 15,066 children age 6 – 23 months in India. A multistage sampling technique was employed to recruit 15,066 mother-child pairs. Data was collected using a 24-hour dietary recall questionnaire. The findings showed that at age 6-8 months, only about 53 percent were given timely complementary feeding (breast milk and complementary food). The most common types of solid or semi-solid foods that were fed to both breastfeeding and non-breastfeeding children were foods made from grains, fruits, and vegetables rich in vitamin A, and food made from roots. About one-third of breastfeeding children and half of non-breastfeeding children were fed with fruits and vegetables rich in vitamin A. About 10% of breastfeeding children and 20% of non-breastfeeding children consumed meat, fish, poultry, or eggs, about 76% and 87% of breastfeeding and non-breastfeeding children were fed with food made from grains, about 44% and 75% of breastfeeding and non-breastfeeding consumed other milk products and about 22% and 28% of breastfeeding and non-breastfeeding children were fed food made from roots. Overall, about 98% were fed with breast milk, milk, or milk products, 35% with the appropriate number of food groups and 42% with the minimum meal frequency. In total, only about 21% of children ages 6 – 23months were fed appropriately according to all three recommended IYCF practices.[15] The study has a large sample size and therefore the findings are truly representative. The limitation of this study is that infant feeding practices was age-specific and was assessed by mothers' report on recall; which may leave room for recall bias.

A population-based demographic and health survey was conducted in 2017 to assess the infant and young child feeding practices of 764 children ages 6 – 23 months in Belize Republic. A multistage sampling method was applied. Data was collected using a 24-hour dietary recall questionnaire. The findings showed that about 79% of infants' ages 6-8 months were timely introduced to complementary foods, 83% of non-breastfed children were fed according to the recommended milk feeding frequency for non-breastfed children and 50% were breastfed according to the age-appropriate breastfeeding. In total, about 66% of children were fed according to the minimum dietary diversity.[18]

A community-based birth cohort study was conducted in 2018 to assess infant feeding practices and determinant variables for early complementary feeding in the first 8 months of life among 244 infants in Fortaleza, North-East Brazil. A food questionnaire was applied monthly to assess dietary diversity and quality. The findings showed that grains were the most offered foods to children. They were introduced early to 10% of the children in the first month and their use increased over time to 82·4 % in the eighth month. Dietary diversity was met by only 47 % of children at 6 months of age and increased to 69 % at 8 months. Thus, minimum acceptable diet was met by only 47 % of children at 6 months and 69% at 8 months. The limitation of this study is that there was loss due to follow up; it was done over a long time; the birth cohort study was initiated in November 2010 and followed up until February 2017. [19]

A community-based cross-sectional study was carried out in 2018 to assess dietary diversity and its associated factors among 740 children 6–23 months in Sinan Woreda, Northwest Ethiopia. Data on children's dietary diversity of the last 24 h were collected through interview of mothers. The findings showed that the dominant food groups consumed were grains

(99%) followed by legumes (83%). Optimum dietary diversity was observed in only about 13% of the children.[20]

A community-based cross-sectional study was carried out in 2015to identify the determinants of appropriate complementary feeding practice among 546 mother-child pairs ages 6–23 months in rural Damot Sore District, Southern Ethiopia. A multi-stage sampling technique was applied. Data was collected using a structured 24hr dietary diversity questionnaire. The findings showed that about 74% of children were timely introduced to complementary foods. Grains, roots and tubers were the most commonly taken food items by children (88%). Only about 17% were fed according to the minimum dietary diversity criteria, 16% fed according to the minimum acceptable diet and 95% according to the minimum feeding frequency. In total, only about 11% were fed according to the appropriate complementary feeding practice. The limitation of this study was that infant feeding practices was assessed by mothers' report on recall, which may leave room for recall bias.[21]

A population-based demographic and health survey was conducted in 2016 to assess the infant and young child feeding practices of 1365 children ages 6 – 23 months in South Africa. A multistage sampling method was applied. Data was collected using a 24-hour dietary recall questionnaire. The findings showed that at age 6- 8 months, only about 47 percent were given timely complementary feeding (breast milk and complementary food) and only about 23 percent of children were fed with the minimum acceptable diet.[22]

A population-based demographic and health survey was conducted in 2016 to assess the infant and young child feeding practices of 5920 children age 6 – 23months in Uganda. A multistage sampling technique was applied. Data was collected using a 24-hour dietary recall questionnaire. The findings showed that at age 6- 8 months, about 79 percent were given timely

complementary feeding (breast milk and complementary food) and only about 14 percent of children were fed with the minimum acceptable diet.[23]

A community-based longitudinal study was conducted in 2017 to assess the impact of improvements to poultry health and crop production on diets and growth of 503 children under two years of age in Manyoni District, Central Tanzania. Data was collected using six monthly structured questionnaires, four monthly household-level documentation of chicken and egg consumption, and a two-weekly record of children's breastfeeding status. The findings showed that chicken and eggs were infrequently eaten, breastfeeding was almost universal (97%) and of long duration and also there was early initiation of complementary feeding at 74%.[24]

A community-based cross-sectional study was carried out in 2016 to assess the magnitude and factors associated with appropriate complementary feeding among 778 children aged 6–23 months in Northern Ghana. A multistage sampling technique was used to select study participants. Data on children’s dietary pattern was collected through interview of mothers using a structured questionnaire. The findings showed that, of the children aged 6–23 months; 57% met the minimum meal frequency, 35% received minimum dietary diversity (≥4 food groups), and 25 % had received minimum acceptable diet. In total, only 14 % received appropriate complementary feeding.[25]

A population-based multiple indicator cluster survey conducted in 2017 to assess the infant and young child feeding practices of 8,174 children ages 6 – 23 months in Nigeria. A multistage sampling technique was used to select study participants. The findings showed that, about 79% of children ages 6-8 months were timely introduced to complementary foods. Only about 40% were fed with the minimum diverse diet, 42% fed according to the minimum meal frequency and 25% according to the recommended milk feeding frequency for non-breastfed

children. In total, only about 15 percent of children were fed with the minimum acceptable diet, of this proportion, in Edo State, only about 3% of children were fed with the minimum acceptable diet, 55% with the minimum diverse diet and 9% according to the minimum meal frequency.[3]

A community-based cross-sectional study was carried out in 2017 to identify the factors influencing complementary and weaning practices among women in rural communities of Sokoto State, Nigeria. A multistage sampling technique was employed to recruit 296 mothers of children 6-24 months. Data was collected using a pretested 24hr dietary recall questionnaire. The findings showed that, about 54% of the children were timely introduced to complementary foods at 6-9 months. The complementary feeds given were pap/kunu only (55.1%); fortified pap/kunu (25.3%); formula milk (11.8%); adult diet (7.8%). Most of the children 107 (36.1%) were fed complementary feeds twice a day.[26]

A community-based cross-sectional study was conducted in 2017 to assess complementary feeding knowledge, practices, and dietary diversity among mothers of under-five children in Eti-Osa area of Lagos State, Nigeria. A multistage sampling technique was employed to select 355 mothers and infants. Data was collected using a pretested 24hr dietary recall questionnaire. The findings showed that 48% of children were timely introduced to complementary feeding, 16% were fed with the minimum dietary diversity and about 16% were fed with the minimum acceptable diet for children between 6 and 9 months. Overall, appropriate complementary feeding practice was low at 47%.[27]

A community-based cross-sectional survey was conducted in 2016to assess the complementary feeding practices among 330 mother–child pair ages 6–11 months in Akpabuyo Local Government Area in Cross River State (CRS) Nigeria. A multistage sampling technique

was used to select mother-child pairs. Data was collected using a 24hr dietary diversity questionnaire. The findings showed that only about 25% of the mothers started complementary foods at the age of 6 months, the proportion of infants 6–8 months of age who received solid, semi-solid or soft foods was 85%, minimum dietary diversity was 32%, minimum meal frequency rate was 37%, milk feeding frequency for non-breastfed children was 7%. In total, only about 7% of children are fed with the minimum acceptable diet.[28]

A population-based demographic and health survey was conducted in 2013to assess the infant and young child feeding practices of 8,818 children ages 6 – 23 months in Nigeria. A multistage sampling method was applied. Data was collected using a 24-hour dietary recall questionnaire. The findings showed that, about 67% children age 6-8 months were timely introduced to complementary foods. Only about one in five children (breastfed and non-breastfed) received the appropriately diverse diet, only 58 percent of children were fed the recommended number of times with solid or semisolid foods and 79 percent were given breast milk or other milk products. In total, only about 10 percent of children were fed in compliance with the IYCF recommendations of consuming breast milk or other milk products, having the minimum dietary diversity, and having the minimum meal frequency. Of this proportion, in Edo State only about 7% were fed in compliance with all three IYCF recommendations; about 75% consuming breast milk or other milk products, 18% with the minimum dietary diversity and 58% fed according to the recommended meal frequency.[2]

2.2 Nutritional status of under-five children

Nutritional status is one of the indicators of the quality of physical and mental development of a child. It is influenced by the adequacy of food intake both in terms of quality and quantity. There are various methods that could be used in assessing nutritional status but in this context the anthropometric method of assessment will be utilized; it involves taking measurements such as height, weight and skin fold thickness.[29]The measurements are then compared with the median weight or height of a healthy reference population; the comparison is expressed as a percentage of the median or a *z*-sore.[30]The nutritional status of under-fives has been assessed in previous studies using anthropometric methods, thus:

A community-based cross-sectional study was carried out in 2016 to assess the nutritional status of 355 under-five children in urban area of Barpeta District, Assam, India. The anthropometric method of assessment was employed; height and weight measurements were made by standard techniques. The overall prevalence of underweight, stunting and wasting was 19%, 11% and 14%, respectively. About 6%, 8% and 11% of children were found to be severely underweight, stunted and wasted, respectively.[31]

A community-based cross-sectional study was carried out in 2013 to assess prevalence of stunting, wasting, underweight and epidemiological determinants associated with malnutrition among 150 under-fives in an urban slum, Nagpur, India. A multistage sampling technique was used to select the study participants from the study units. The anthropometric method of assessment was employed; height and weight measurements were made by standard techniques. Children were considered as underweight, stunted and wasted if their weight-for-age, height-for-age and weight-for-height Z-scores were below (<) -2.0 SD of the WHO reference standards.

The overall prevalence of underweight, stunting and wasting was 46%, 52% and 21% respectively. The total prevalence of undernutrition was 63.3%.[32]

A population-based demographic and health survey was conducted in 2007 to assess the nutritional status of 46,655 under-five children in India. A multistage sampling technique was used to select the study participants. The anthropometric method of assessment was employed; height and weight measurements were made by standard techniques. Children were considered as underweight, stunting and wasting if their weight-for-age, height-for-age and weight-for-height Z-scores were below (<) -2.0 SD of the WHO reference standards. The overall prevalence of underweight, stunting and wasting was 43%, 48% and 20%, respectively.[15]

A population-based demographic and health survey was conducted in 2017 to assess the nutritional status of 7233 children under-five years of age in Belize Republic. Multistage sampling technique was used to select the study participants. The anthropometric method of assessment was employed; height and weight measurements were made by standard techniques. Children were considered as underweight, stunted and wasted if their weight-for-age, height-for-age and weight-for-height Z-scores were below (<) -2.0 SD of the WHO reference standards. The findings showed that about 5% of children were underweight, 15% were stunted and 2% were wasted.[18]

A population-based demographic and health survey was conducted in 2017 to assess the nutritional status of 4,204 under-five children in South Africa. The anthropometric method of assessment was employed; height and weight measurements were made by standard techniques. Children were considered as underweight, stunting and wasting if their weight-for-age, height-for-age and weight-for-height Z-scores were below (<) -2.0 SD of the WHO reference standards.

The overall prevalence of underweight, stunting and wasting was 6%, 27% and 3% respectively.[22]

A population-based demographic and health survey conducted in 2017 to assess the nutritional status of 5,418 under-five children in Uganda. The anthropometric method of assessment was employed; height and weight measurements were made by standard techniques. Children were considered as underweight, stunting and wasting if their weight-for-age, height-for-age and weight-for-height Z-scores were below (<) -2.0 SD of the WHO reference standards. The overall prevalence of underweight, stunting and wasting was 11%, 29% and 4% respectively. About 2%, 9% and 1% of children were found to be severely underweight, stunted and wasted, respectively.[23]

A community-based cross-sectional study was carried out in 2017 to assess the nutritional status and association of demographic characteristics with malnutrition among 380 children aged 1 day to 24 months in Kwale County, Kenya. A multistage sampling technique was used to select the study participants. Nutrition status was assessed using anthropometric measurements and expressed as z-scores. Children were considered as underweight, stunted and wasted if their weight-for-age, height-for-age and weight-for-height Z-scores were below (<) -2.0 SD of the WHO reference standards. The overall prevalence of stunting, underweight and wasting was 29%, 21% and 19% respectively. About 10%, 13% and 7% of children were found to be severely underweight, stunted and wasted, respectively.[33]

A population-based multiple indicator cluster survey was conducted in 2017 to assess the nutritional status of 28,578 children under-five years of age in Nigeria. The anthropometric method of assessment was employed; height and weight measurements were made by standard techniques. The findings showed that 11% were wasted, 2% were overweight, 32% were under-

weight and 44% were stunted; of this proportion, in the south-south zone, about 19% were stunted, 7% were wasted, 14% were underweight and 1% were overweight; in Edo State, 14% were stunted, 10% were underweight, 7% were wasted and 1% were overweight.[11]

A community-based cross-sectional survey was conducted in 2016to assess the complementary feeding practices among 330 mother–child pair ages 6–11 months in Akpabuyo Local Government Area in Cross River State (CRS), Nigeria. A multistage sampling technique was used to select study participants. Nutritional status was determined using anthropometric measurements. Children were considered as underweight, stunted and wasted if their weight-for-age, height-for-age and weight-for-height scores were below (<) -2.0 SD of the WHO reference standards. The overall prevalence of stunting, underweight, wasting and overweight and obesity was 25%, 33%, 26% and 6%, respectively.[28]

A community-based descriptive cross-sectional survey was conducted in 2014to assess recent illness, feeding practices and father's education as determinants of nutritional status among 374 preschool children aged less than 5 years in Shika village, Zaria, Kaduna State Nigeria. A multistage sampling technique was used to select mother-child pairs from the study units. Nutritional status was determined using anthropometric measurements. Children were considered as underweight, stunted and wasted if their weight-for-age, height-for-age and weight-for-height scores were below (<) -2.0 SD of the WHO reference standards. The overall prevalence of stunting, underweight, wasting and overweight and obesity was 52%, 30%, 25% and 5%, respectively.[34]

A community-based cross-sectional survey was conducted in 2013 to assess food consumption and nutritional status of 355 under-five children in Akure South Local Government of Ondo State. Nutrition status was determined using anthropometric measurements. Children

were considered as underweight, stunted and wasted if their weight-for-age, height-for-age and weight-for-height scores were below (<) -2.0 SD of the WHO reference standards. The overall prevalence of stunting, underweight and wasting was 13%, 9% and 15%, respectively. Few of the children (2.6%) had a MUAC less than 12.5cm while 3.4% had between 12.5-13.5cm (Acute malnutrition) and 94.1% had MUAC above 13.5cm.[35]

A community-based descriptive cross-sectional study was carried out in 2013 to assess the factors influencing nutritional status of 332 children under the age of five in Biye village in Shika district of Giwa Local Government Area of Kaduna State, Nigeria. Nutritional status was determined using anthropometric measurements. Children were considered as underweight, stunted and wasted if their weight-for-age, height-for-age and weight-for-height scores were below (<) -2.0 SD of the WHO reference standards. From anthropometric data obtained, 62.2% were stunted, 12.6%were wasted, and 48.7% were underweight.[36]

A community-based cross-sectional study was carried out in 2012 to assess the effect of maternal literacy on the nutritional status of 300 mother–child pairs of under-fives in Babban-dodo, Zaria, Nigeria. A multistage sampling technique was applied and information on the socio-demographic characteristics of the respondents and the anthropometric measurements (weight, height, mid-upper arm circumference) was collected. Children were considered as underweight, stunted and wasted if their weight-for-age, height-for-age and weight-for-height scores were below (<) -2.0 SD of the WHO reference standards. The findings showed that about 29% were underweight, 7% were wasted, and 31% were stunted.[37]

2.3 Morbidity pattern of under-five children

Acute respiratory infection (ARI), fever, and dehydration caused by severe diarrhea are major causes of childhood mortality in developing countries, and Nigeria is no exception.[2]Also these illnesses and their symptoms are easily recognizable. The morbidity pattern of a population can be quantified in a number of ways; it can be objectively measured (e.g., through clinical tests) or subjectively measured (e.g., through self-reports by individuals).In this context, morbidity pattern is subjectively measured. Morbidity data of under-fives is obtained from mothers and is based on mothers' report of illness. The accuracy of objective measures of morbidity is affected by the reliability of the mother's recall of when the disease episode occurred and a two-week recall period is used. The two-week recall period is thought to be most suitable for ensuring that there will be adequate number of cases to analyze and that recall errors will not be too serious.[38] Previous studies have been carried out to subjectively measure the morbidity pattern of under-fives:

A community-based cross-sectional study was conducted in 2017 to assess malnutrition and morbidity profile of 205 under-five children in a rural area of Bangladesh, India. A purposive sampling technique was used to select mother-child pairs. Data was collected using an interviewer administered two-week morbidity recall questionnaire. The findings showed that about 45% of the children had diarrheal, 32% presented with acute respiratory tract infection and 18% had pneumonia.[39] The sampling technique applied in this study does not allow for all units in the target population to have a chance of being selected so these findings are not generalizable.

A population-based demographic and health survey was conducted in 2007 to assess child health status and morbidity pattern of 88112 under-five children in India. A multistage sampling technique was used to select mother-child pairs .Data was collected using a two-week

morbidity recall questionnaire .The findings showed that about 6% of children presented with symptoms of ARI, 15% had fever and 9% had diarrhea.[15]The limitation of this study is the use of recall for morbidity which is prone to recall bias; lack of clinical examination of the children; use of diagnosis assigned by parents and assessment of morbidity using only three preventable childhood diseases.

A community-based cross-sectional study was conducted in 2008 to assess the health profile of 827 under-fives in rural areas of Aligarh, India. Data was collected using an interviewer administered questionnaire. History of present illness was recorded followed by complete physical examination. The findings showed that about 14% of the children had diarrhea, 30% had ARI and fever 19%. There was also a high prevalence of skin diseases (28%) among the children.[40]The sampling technique used in the study was not mentioned.

A population-based demographic and health survey was conducted in 2017 to assess the child health status of 2537 under-five children in Belize. A multistage sampling technique was used to select mother-child pairs. Data was collected using a two-week morbidity recall questionnaire. The findings showed that about 6% of children presented with diarrhea, 3% had symptoms of ARI and 16% had an episode of fever.[18]

A population-based demographic and health survey was conducted in 2016 to assess the child health status of 1142 children under age five in South Africa. A multistage sampling technique was used to select mother-child pairs. Data was collected using a two-week morbidity recall questionnaire. The findings showed that about 3% presented with symptoms of ARI, 20% had fever, and 10% had diarrhea.[22]

A population-based demographi8c and health survey was conducted in 2016 to assess child health status and morbidity pattern of 9010 children under age five in Uganda. A multistage

sampling technique was used to select mother-child pairs. Data was collected using a two-week morbidity recall questionnaire. The findings showed that about 9 percent presented with symptoms of an ARI, 33 percent had a fever, and 20 percent had diarrhea.[23]

A population-based multiple indicator cluster survey was conducted in 2017 to assess child health status and morbidity pattern of 28,085 under-five children in Nigeria. A multistage sampling technique was used to select mother-child pairs. Data was collected using a two-week morbidity recall questionnaire. The findings showed that about 14 percent of children presented with diarrhea, 3% had symptoms of ARI and 25% had an episode of fever, of this proportion, in the south-south regions 22% had fever, 5% had diarrhea and 1% had ARI. In Edo State, 9% had an episode of fever, 3% had diarrhea and 1% had symptoms of ARI.[11]

A community-based descriptive cross-sectional survey was conducted in 2014 to assess recent illness, feeding practices and father's education as determinants of nutritional status among 374 preschool children aged less than 5 years in Shika village, Zaria, Kaduna State Nigeria. A multistage sampling technique was used to select mother-child pairs from the study units. Data was collected using a four-week morbidity recall questionnaire. The findings showed that prevalence of diarrhea and ARI among all children was 42 and 61%, respectively. The limitation of this study is, using a four-week morbidity recall period, which creates more chances for a high occurrence of recall bias.[34]

A community-based descriptive cross-sectional survey was conducted in 2014 to determine the health problems common among 245 under-five children in a typical urban slum in Enugu State, Nigeria. A cluster sampling technique was used to select 245 children from 140 households and an interviewer-administered two-week recall questionnaire was used to obtain information on morbidity from the mothers of the children. The findings showed that about 40%

had diarrhea, 38% presented with ARI and 25% had fever. The limitation of the study is that most of the questions on the survey instrument were close ended.[41]

2.4 Factors associated with the dietary pattern, nutritional status and morbidity pattern of under-five children.

Nutritional epidemiology is of crucial importance when investigating nutrition-health relationships. It provides direct information of exposure to certain dietary factors as related to the development of pathologies in everyday life. Adequate nutritional status and proper dietary intake pattern helps to improve child health.[42] Studies have been conducted to identify the factors associated with the dietary pattern, nutritional status and morbidity pattern of under-five children:

2.4.1 Factors associated with the dietary pattern of under-five children.

A growing body of evidence has identified age, breastfeeding status, place of residence, household wealth, mothers' level of education and nutritional knowledge as significant factors associated with dietary pattern of under-fives.[3]All these factors identified interact to shape the child's dietary pattern for example, children living in urban areas consume more diverse diets compared to children living in rural areas and this is because of the differences in socio-economic status. Poverty and insufficient income for the family-household result in the lack of the food diversification.[2] Also, well-educated, and nutritionally literate mothers who have control over the purchase of the dietary items would be more qualified and capable of taking care of their children properly and this will be reflected in the dietary pattern of their children and the vice versa for the illiterate mothers. Infants require a high energy intake to meet up with their nutritional demands, but energy intake and macronutrient intake decreases with age.[2, 15] Also, non-breastfeeding children are more likely to consume more solid or semi-solid food than

breastfeeding children.[15] Studies have been carried out to identify factors associated with the dietary pattern of under-fives:

A population-based demographic and health survey was conducted in 2007 to identify factors associated with the dietary pattern of 15,066 children aged 6 – 23 months in India. A multistage sampling technique was employed. Data was collected used an interviewer administered 24hr real dietary diversity questionnaire. The findings showed that the percentage of breastfeeding children receiving solid or semisolid food increased with the age of the child, the largest increase is from 19% at age 4-5 months to 55 percent at 6-8 months. Feeding frequency among breastfeeding and non-breastfeeding children increased with the age of the children from 40% in age 6 – 8 months to 48% and in age 18 months - 23 months. Dietary diversity among breastfeeding and non-breasting feeding children increased with the age of the children from 10% in age 6 – 8 months to 48% and in age 18 months - 23 months. In urban areas, about 24% were fed in compliance with all three IYCF practices while among children residing in rural areas, only about 20% were fed in compliance with all three IYCF practices. In the households with the highest wealth quintile about 29% of the children were fed in compliance with all three IYCF practices while in households with the lowest wealth quintiles, only about 16% were fed in compliance with all three IYCF practices. About 32% of children whose mothers had the highest education were fed in compliance with all three IYCF practices while among those whose mothers had no education, only about 16% were fed in compliance with all three IYCF practices.[15]

A community-based cross-sectional study was conducted in 2017 to estimates factors influencing dietary diversity of the household, children under five years, and women in Tanzania. A multistage sampling technique was employed. An interviewer administered 24hour recall

questionnaire was used to collect data from which dietary diversity score (DDS) was calculated using the FAO-Protocol. Binary analysis was employed using chi-square to test for possible associations. The findings showed that children ($d = 0.4$; $p<0.05$) and women ($d = 0.5$; $p<0.01$) in female headed households have low dietary diversity compared to those in male-headed households. Gender (coef. 0.05; $p<0.10$) and education of the household head (coef. 0.02; $p<0.01$), food preparation and nutrition training (coef. 0.10; $p<0.05$) are important factors influencing dietary diversity of the members of a household.[43]

A community-based cross-sectional study was conducted in 2014 to assess the determinants of the nutritional status among 374 preschool children aged less than 5 years in Shika village, Zaria, Kaduna State, Nigeria. A multistage cluster sampling technique was used to select mother-child pairs. Data was collected using an interviewer administered questionnaire. A two-tailed estimation of significance was used, and the level of significance was set at $p < 0.05$. The findings showed that children whose fathers completed postsecondary education were more likely to consume fish (OR ¼ 1.33, p ¼ 0.002), eggs (OR ¼ 1.36, p ¼ 0.002) and milk (OR ¼ 1.53, $p < 0.001$) compared with those whose fathers did not. A higher father's income was associated with a higher likelihood of eating eggs (OR ¼ 1.28, $p < 0.001$).[34]

A population-based demographic and health survey was conducted in 2013 to identify the factors associated with the dietary pattern of 8,818 children aged 6 - 23 months in Nigeria. A multistage sampling technique was used to select mother child-pairs. Data was collected using an interviewer administered 24hr recall dietary diversity questionnaire. The findings showed that among breastfeeding children, consumption of solid or semisolid food increased from 40% at age 4- 5 months to 87% at age 9 - 11 months, while among non-breast-feeding children, there was an increase from 36% at age 4 -5months to 85% at age 9- 11 months. In urban areas, about 14%

were fed in compliance with all three IYCF practices while among children residing in rural areas, only about 8% were fed in compliance with all three IYCF practices. In the households with the highest wealth quintile about 15% of the children were fed in compliance with all three IYCF practices while in households with the lowest wealth quintiles, only about6% were fed in compliance with all three IYCF practices. About 17% of children whose mothers had the highest education were fed in compliance with all three IYCF practices while among those whose mothers had no education, only about 7% were fed in compliance with all three IYCF practices.[2]

2.4.2 Factors associated with the nutritional status of under-five children.

Malnutrition has a complex etiology related to several factors that alter the nutritional status of a child at varying levels. A conceptual framework on the causes of under-nutrition was developed in 1990 as part of the UNICEF nutrition strategy.[9] This conceptual framework details the numerous pathways leading to under-nutrition. It embraces food, health and care practices. The conceptual framework identified inadequate dietary intake and infection, household food insecurity, inadequate maternal and child care practices, unhealthy environment (water and sanitation) and poor health services, and poverty at the family level as causes of nutritional problems.[9]Also, a growing body of evidence has identified low food intake, level of family income, mother's educational level, birth interval, breast feeding practices and family size as significant factors associated with malnutrition. Studies have been carried out to identify factors associated with nutritional status of under-fives:

A multi-center, cross sectional study was conducted in 2016 to assess the nutritional status and identify associated factors in 100 under-five children at the immunization centers of the 3 allied hospitals of Rawalpindi Medical College in Rawalpindi- Pakistan. Multistage sampling technique, incorporating stratified random sampling of hospitals was used to selected

study participants. Data was collected using an interviewer administered questionnaire and measuring weight and height of each child targeted for the survey. Chi-square test at 5% level of significance was applied. The findings showed that maternal illiteracy (p<0.01) and presence of a family member with special needs (p=0.05) were significantly associated with the children's nutritional status.[44]

A community-based descriptive cross-sectional study was conducted in 2014 to identify factors influencing the nutritional status of 394 school children under five years of age in an urban slum of Hyderabad, India. A multistage sampling technique was used to select study participants. Data was collected using an interviewer administered questionnaire and measuring weight and height of each child targeted for the survey. The findings showed that gender (p =0.023), maternal literacy (p<0.0001), maternal occupation (p<0.00001), per capita income (p<0.00001), maternal dietary knowledge (p<0.001) were found to have highly significant association (P<0.005) with malnutrition among children.[45]

A community-based cross-sectional study was carried out in 2014 to determine the prevalence of malnutrition and associated factors among 844 children age 6-59 months in Lalibela town, Northern Ethiopia. Multistage sampling technique and proportional allocation methods were employed to obtain sample size from each stratum and cluster. Data was collected using pre-tested, adopted structured questionnaire through interviewing mothers or caregivers and measuring weight and height of each child targeted for the survey. Bivariate and multivariate logistic regression analyses were used using SPSS version 16 computer software to identify relevant associations. The findings showed that among the various socio-economic, demographic and child health and care practices characteristics considered, age of the child 11-23 months (AOR= 2.30; (95%CI: 1.28-4.12), Deworming status (AOR=2.19; (95% CI: 1.41-3.39), sex of

the child(AOR= 0.75; (95% CI: 0.57-1.00) and breastfeeding status (AOR= 0.40;(95% CI: 0.20-0.78) remained significantly associated with stunting. Middle wealth quintile of the households (AOR=0.51; (95%CI: 0.28-0.91), age of the child 23-35 months(AOR=2.29; (95%CI: 1.14-4.61), number of children aged 6-59 months in the household (AOR=1.61; (95%CI: 1.08-2.41) and giving honey to the child in the morning (AOR=1.52; (95%CI: 1.03-2.24) were significantly associated with underweight. Children from households who had highest wealth quintile were about 0.46 times less likely to be affected by underweight compared to those children from households who had lowest wealth quintile (AOR=0.46; (95%CI: 0.24-0.89).[46]

A community-based descriptive cross-sectional study was conducted in 2015 to identify factors associated with nutritional status of 214 infants and young children ages 6 – 23 months in Filtu town, Somali Region, Ethiopia. A multistage sampling technique was used to select study participants. Data was collected using an interviewer administered questionnaire and measuring weight and height of each child targeted for the survey. Univariable and multivariable logistic regressions models were used in the statistical analysis. The strength of association was measured by odds ratios with 95 % confidence intervals. The findings of the multivariable logistic regression model showed that breastfeeding was independently associated with reduced odds of wasting (AOR = 0.38(95 % CI: 0.14-0.99)). Diarrhea in the past 15 days (AOR = 2.13 (95 % CI: 1.55-4.69)) was also associated with increased odds for wasting. The independent predictors of reduced odds for stunting were dietary diversity score ≥4 (AOR = 0.45(95 % CI: 0.21-0.95)) and introduction of complementary feeding at 6 months (AOR = 0.25 (95 % CI: 0.09-0.66)). Bottle feeding was associated with increased odds of stunting (AOR = 3.83 (95 % CI: 1.69-8.67)). Breastfeeding was associated with reduced odds of underweight (AOR = 0.24

(95 % CI: 0.1-0.59)), while diarrheal disease in the past 15 days was associated with increased odds of underweight (AOR = 3.54 (95 % CI: 1.17-7.72)).[47]

A cross-sectional study was conducted in 2016 to assess child growth and determinant factors 6480 children aged 6 to 24 months in Burundi. Multistage sampling technique was used to select study participants in the health units. Data was collected using an interviewer administered questionnaire and measuring weight and height of each child targeted for the survey. Proportions of these indicators were compared using chi square to determine association between these indicators and independent variables. Multivariate logistic regression was then performed to ascertain adjusted odds ratio of independent determinants of the 3 child growth indicators. The findings showed a number of factors at various levels were associated with child growth; notable associations were found for household head age, occupation, literacy and formal education. Additionally, relationships were also found for household 19 wealth status, number of children less than 2 years, access to hygienic water source and regular soap usage. Stunting, wasting and underweight were more prevalent in households having more than 1 child less than 2 years, 72.9% compared to 52.4% with 1 child ($p<0.0001$), 12.5% relative to 5.5% ($P<0.0001$) and 50.7% to 25.6% ($p<0.0001$). Lower stunting levels (50.1%) were recorded among households of literate heads compared to those of illiterate heads (57.9%) ($p <0.0001$). A similar trend was seen for underweight; 31.4% compared to 22.8% and wasting; 6.6% to 4.6% ($p < 0.0001$). Prevalence of all the 3 under nutrition indicators significantly decreased with an increase in household wealth status. Stunting decreased from 59.7% in poorest households to 41.7% in richest, underweight from 27.2% to 4.2% and wasting from 5.5% to 0%. Statistics further show that households with access to hygienic water source had lower levels of stunting and underweight; 51.7% and 25.4% compared to 57.6% and 29.7% respectively ($p < 0.0001$).[48]

A community-based cross-sectional study was conducted in 2015 to assess nutritional status and associated factors in 100 children age 5–24 month in the district of Batouri, Republic of Cameroon. Multistage sampling technique was used to select study participants in the study units. Data was collected using an interviewer administered questionnaire and measuring weight and height of each child targeted for the survey. $\chi2$ -test, Fisher's exact test, and Wilcoxon rank sum test were used to determine variables associated with malnutrition. Five factors were found to be statistically significant in their association with the children's malnutrition: mother's age (p=0.006), child's age (p = 0.0078), mother's educational level (p=0.0072), mothers who had family planning information (p =0.006), and the source of tap water (p=0.0297).[49]

A community-based descriptive cross-sectional study was conducted in 2013 to assess food consumption and nutritional status of 355 under-five children in Akure South Local Government, Ondo State, Nigeria. Multistage sampling technique was used to select mother-child pairs in the study units. Data was collected using an interviewer administered questionnaire and measuring weight and height of each child targeted for the survey. The findings showed that mothers' education affected the health status of the children; 81.8% of the mothers with no education did not give colostrum to their children, 16.7% of the mothers exclusively breastfed and majority (60.0%) of those that did not exclusively breastfeed had little or no education. Household size had a negative correlation with the nutritional status of the children (underweight) (r = -0.14; p<0.05).Household income was positively correlated with nutritional status of the infants (Stunting) (r = 0.18; p<0.05). There was a positive correlation between mothers' education and hygienic practice (food preservation) (r = 0.12; p<0.05). Level of mothers education was positively correlated with nutritional status of the children (stunting) (r = 0.23;

$p<0.05$).There was a positive correlation between infants nutritional status (under-weight) and hygienic practices (food preservation) ($r = 0.15$; $p<0.05$).[50]

A community-based descriptive cross-sectional study was conducted in 2010 to assess the influence of family size, household food security status, and childcare practices on the nutritional status of 423under-five children in Ile-Ife, Nigeria. Multistage sampling technique was used to select mother-child pairs in the study units. Data was collected using an interviewer administered questionnaire and measuring weight and height of each child targeted for the survey. The findings showed that food-insecure households were five times more likely than secure households to have wasted children (crude OR=5.707, 95 percent CI=1.31-24.85). Children with less educated mothers were significantly more likely to be stunted ($p < 0.068$). Children who were breastfed for less than six months were 1.6 times more likely than those breastfed longer to be stunted (OR=1.640, 95% CI=0.95-2.85). Children born with low birth weight were more likely than those with normal birth weight to be underweight (OR=2.988, 95% CI=0.98-9.05). Households with food insecurity and less educated mothers were more likely to have malnourished children.[51]

2.4.3 Factors associated with the morbidity pattern of under-five children.

Prevalence, severity, and frequency of morbidity due to infections depend upon infant and young child feeding and caring practices, nutritional status of the child, child's size at birth, and place of residence.[15] For example poor infant and young child feeding and caring practices results in poor health status with an increased susceptibility to infections. Also, children whose birth weight is less than 2.5 kilograms, or children reported to be 'very small' or 'smaller than average' are considered to have a higher-than-average risk of early childhood death and morbidity. Birth weight is an important indicator of a child's vulnerability to the risk of

childhood illness and chances of survival.[15]The population characteristics such as socio-cultural variation, low socio economic status, mother's education poor health care utilization and overall, compromised living condition makes children more susceptible for various diseases for example poor access to safe water and proper sanitation facilitates the spread of infections.[15] Also, type of housing is an important risk factor for ARI among children aged under-5, children living in houses built with raw materials and tin commonly suffer from ARI compared with children who live in houses built with cement/brick. Children living in houses built of cement enjoy better socio-economic status, which in turn ensures better health. Morbidity, clearly, is not a simple problem with a single problem, multiple and interrelated determinants come into play.[52] Studies have been carried out to identify factors associated with the morbidity pattern of under-fives:

A community-based cross-sectional study was conducted in 2016 to assess the prevalence and pattern of morbidity and associated factors among preschool children ages 1 – 3 year in Bhadravatitaluk of Shimoga district, Karnataka India. A cluster sampling technique was used for subject selection. Data was collected using an interviewer administered 2-week morbidity recall questionnaire. A statistical analytical method (chi-square test) was used to test for association between the variables. Morbidity was found to be inversely proportional to the age of the children in the study with the highest prevalence, i.e. 21 (32.8%) in the 12-17 month age group and least, i.e. nil prevalence of morbidity in the 30-36 months age group, and it was found to be statistically significant ($p < 0.05$) ($\chi2=14.597$, $p=0.002$). The prevalence of morbidity was high in children having illiterate fathers, and there was a significant association between the literacy status of fathers and morbidity among their children ($\chi2=6.074$ $p=0.048$).On the contrary, morbidity was more in children from the rural locality, was more in children belonging to below poverty line families, and was more in children belonging to joint/three generation families in

our study. However, there was no significant association between the prevalence of morbidity and any of these factors ($p > 0.05$) ($\chi2$ =1.376 p=0.241). More children with literate mothers were ill in our study compared to children with illiterate mothers. However, it was not statistically significant ($p> 0.05$). Morbidity was found to be inversely proportional to birth order of the child as well as with the number of siblings the child had in the study, but there was no significant association ($p> 0.05$) between them. Furthermore, the study did not find any significant association ($p> 0.05$) between morbidity and primary immunization status of the child.[53]

A community-based cross sectional descriptive study was conducted in 2016 to assess the prevalence and determinants of morbidity among 396 under five children residing in a rural area of Tiruchirappalli district of Tamil Nadu, in India. A cluster sampling technique was used to select the children residing in the study units. Mothers of the under five children were interviewed using a predesigned structured interviewer administered proforma. A statistical analytical method (chi-square test) was used to test for association between the variables. The findings showed that poor ventilation ($\chi2$=2.39 p=0.12), both air and smoke, was significantly associated with the morbidity in present study - about 75% of the children living in houses with poor ventilation were affected. The pediatric population which drank water which was not purified by any method were more prone to episodes of illness ($\chi2$=1.3 p=0.25), about 74% were affected. Mothers with pre-existing diseases during pregnancy were invariably associated with children affected by diseases ($\chi2$=16.2 p=0.00). Greater the age of the mother at the time of childbirth greater was the prevalence of morbidity among the children ($\chi2$=14.1 p=0.001).Children with lower birth weight i.e. less than 2.5kgs were more affected (81.8%) when compared to normal birth weight children. Delayed initiation of supplementary feed

correlated with highest number victims (76%). Another important revelation was that among the 284 affected children only 96 (24.2%) approached health facility for treatment. Children with both underweight and overweight were more prone to develop illness ($\chi 2 = 24.3$ $p=0.001$).[54]

A community-based cross-sectional survey was conducted in 2014 to assess healthcare seeking pattern for childhood ailments among 238 mothers of 304 children (0-5 years) from a coastal area in Trivandrum district, Kerala, India. A multistage sampling technique was used to select study participants. An interviewer administered questionnaire was used to collect data. Statistical analytical methods (odds ratio and confidence interval) were used to test for association. Factors typically associated with health seeking behavior were occupation of the father [OR 2.002; 95% CI 1.103-3.634, $p < 0.05$], regular newspaper reading [OR 3.593; 95% CI 1.404-9.193, $p < 0.01$).[55] The study had a high response rate of 95.2%. The study area covered all groups in the coastal area.

A hospital-based cross-sectional study was conducted in 2012 to identify the factors associated with severe disease from malaria, pneumonia and diarrhea among 293 under-five children in rural Tanzania. Children presenting with symptoms suggestive of the diseases of interest were identified (i.e. fever, cough, difficult or fast breathing, diarrhea and vomiting). These were reviewed and assigned diagnosis as per WHO guidelines by the principal investigator or a trained clinical officer. Children who did not need admission were interviewed in a room located near the outpatient department while caretakers of children who were admitted to the hospital were interviewed later within their respective wards, after the child had received initial treatment. Bivariate analysis was used to examine associations between child’s disease severity status and potential predictors. Multivariate analysis was also used to determine predictors that remained associated with severe disease when adjusted for other factors. The

findings showed a persistent association between severity of disease and caretaker's lack of formal education (OR 6.6; 95% confidence interval (CI) 2.7-15.8) compared to those with post-primary education, middle compared to high socio-economic status (OR 1.9; 95% CI 1.2-3.2), having 4 or more children compared to having one child (OR 2.5; 95% CI 1.4-4.5), having utilized a nearer primary health care (PHC) facility for the same illness compared to having not (OR 5.2; 95% CI 3.0-9.1), and having purchased the first treatment other than paracetamol from local or drug shops compared to when the treatment was obtained from the public hospitals for the first time (OR 3.2; 95% CI 1.9-5.2). The old officially abandoned first line anti-malaria drug sulfadoxin-pyrimethamine (SP) was found to still be in use for the treatment of malaria and was significantly associated with children's' presentation to the hospital with severe malaria (OR 12.5; 95% CI 1.6-108.0).[56]

A population-based demographic and health survey was conducted in 2015 to identify the socio-demographic and environmental determinants of infectious disease morbidity in 2,790 children under-five years in Ghana. The data for this analysis were drawn from the GDHS, conducted in 2008 as part of the MEASURE DHS international program. The Ghana DHS employed a two-stage sampling design. Bivariate analysis was conducted to identify possible associations between socio-demographic and environmental factors, and the outcome variables. Only significant factors ($p < 0.05$) or those that were considered critical (e.g. biological factors) were used in the multivariate analysis. The findings showed that children in the 6-11, 12-23-, and 24-59-months age groups respectively had, 3.48 (95% CI2.23, 5.44), 4.57 (95% CI3.03, 6.90), and 1.93 (95% CI1.30, 2.87) increased odds of getting diarrhea infection compared to those in the youngest age category (0-5). Similarly, children in the 6-11, 12-23, and 24-59-months age brackets were, respectively, were 2.64 (95% CI1.76, 3.97), 2.63 (95% CI1.81, 3.83), and 1.83

(95% CI1.29, 2.59) times more likely to have cough compared to children in 05 months age brackets. Children who were not breastfeeding had higher odds of childhood diarrhea (OR1.33, 95% CI1.03, 1.73) compared to those who were breastfeeding. Compared to children who were living in households without co-wives, children who were living in households with co-wives had 1.74 increased odds of diarrhea (95% CI1.33, 2.27).[57]

A community-based cross-sectional descriptive study was conducted in 2015 to assess social factors that determine morbidity of under-fives in Gimba village, a rural community of Kaduna State, Nigeria. A multistage sampling technique was used to select the study participants in the study units. An interviewer- administered questionnaire was used to collect data from all household heads in the community. Multivariate analysis was done using SPSS (Version 19). The findings showed that factors like paternal education and geographic weaning are social determinants of health of under-fives in the study area. Children of uneducated fathers were more likely to have been ill compared to those of educated fathers (RR = 1.20; 95% C.I = 0.78 – 1.91). Children who were weaned abruptly and transferred to their aunties or grandmothers (geographic weaning) were more likely to have been ill compared to those weaned normally (RR = 1.71; 95% C.I= 0.97 – 2.03). One limitation of the study is the non - reliability of information on child health obtained from a father, instead of a mother. Others include use of recall for morbidity which is prone to recall bias; lack of clinical examination of the children; use of diagnosis assigned by parents and assessment of morbidity using only the five preventable childhood diseases.[58]

A community-based, cross-sectional survey was conducted in 2015 to assess health problems of the 245 under-five children in an urban slum in Enugu State, Nigeria. A cluster sampling technique was used to select the study participants in the study units. An interviewer-

administered questionnaire was used to collect data from all household heads in the community. Chi-square statistics was used to compute for statistical association between variables. The findings showed that there was a statistically significant association between source of water supply, occupation of mothers, family size and reported illness in the children in the past one year with $\chi 2 = 16.7$, $p= 0.005$; $\chi 2 = 17.8$, $p=0.03$; $\chi 2= 23.7$, $p=0.002$.[41]

2.5 Relationship between the morbidity pattern and the nutritional status of under-five children

Children are nutritionally vulnerable segment of the population and also very susceptible to morbidity due to infections. The relationship between infection and nutrition was first mentioned in the 1968 W.H.O monograph on the "Interactions of Nutrition and Infection". The monograph described the relationship between nutrition and infection as being either synergistic or antagonistic; when nutrition aggravates or lowers resistance to infection, the relationship between the two can be seen as synergistic, when nutrition discourages multiplication of the agent than to affect the resistance mechanism of the host, the interaction is antagonistic. Infections have a deleterious effect on the nutritional status of the host through physiologic and anatomic changes. These changes become evident in such systemic reactions as fever, leukocytosis, and stimulation of adrenal cortical activity. Local reactions include diarrhea tissue inflammation and necrosis, increased mucus secretion, fatty liver, and changes in skin and hair.[59] Malnutrition weakens the immune system, putting children at higher risk of more severe, frequent and prolonged bouts of illness, which may further worsen the child's nutritional status at a time of greater nutritional needs. Malnourished children have more severe diarrheal episodes and a child with diarrhea loses weight and can quickly become malnourished.[7] The relationship

between diarrhea and malnutrition is bidirectional: diarrhea leads to malnutrition while malnutrition aggravates the course of diarrhea. This interaction between malnutrition and infection creates a potentially lethal cycle of worsening illness and deteriorating nutritional status. Several studies have been carried out to show the relationship between morbidity and nutritional status:

A case-control study was conducted in 2016 to assess the etiology, risk factors and impact of severe diarrhea among 210 under-fives in Madagascar. A control was recruited for each case enrolled, during home visits. The controls were matched with the cases for age, sex and place of residence. Bivariate and multivariate associations between independent variables and the occurrence of severe diarrhea were investigated by conditional logistic regression analyses. Wasting at enrolment was associated with a higher risk of severe diarrhea (OR = 9; 95% CI: 4.5–17.9); wasting was observed in 43.6% of children with diarrhea but only 8.2% of those without diarrhea. During follow-up visits at about 30 and 60 days after enrolment, five (2.5%) deaths were recorded among the 199 children with severe diarrhea, whereas no deaths had occurred in the controls. All these deaths occurred in children under the age of 18 months with faltering growth. Children with severe diarrhea also had symptoms of respiratory infection.[60]

A community-based descriptive cross-sectional study was conducted in 2010 to determine the prevalence and risk factors of under-nutrition amongst 200 under-five children living in an urban slum of Ludhiana, Punjab, India. Interviewer administered questionnaire was used to collect data. The findings showed that 80 (40.0 %) children had suffered from up to 2 episodes of acute infection, 72 (36.0 %) had 3-4 episodes and 48 (24.0%) had >4 episodes in the past 12 months. All the three indices of under-nutrition were higher in those who suffered more

than 4 episodes of infections in the year; stunting (p value =0.611), wasting (p value = 0.173) and underweight (p value = 0.104), though the differences were statistically not significant.19 (9.5 %) mothers gave history of worm infestation in their children. All the three indices of under-nutrition were higher in those with worm infestation stunting (p value = 0.809), wasting (p value =0.618) and underweight (p value =0.020).[61]

A community-based descriptive cross-sectional study was conducted in 2015 to identify factors associated with nutritional status of 214 infants and young children ages 6 – 23 months in Filtu town, Somali Region, Ethiopia. A multistage sampling technique was used to select study participants. Data was collected using an interviewer administered questionnaire. Univariable and multivariable logistic regressions models were used in the statistical analysis. The strength of association was measured by odds ratios with 95 % confidence intervals. The findings of the multivariable logistic regression model showed that diarrhea in the past 15 days (AOR = 2.13 (95 % CI: 1.55-4.69)) was associated with increased odds for wasting and underweight (AOR = 3.54 (95 % CI: 1.17-7.72)).[47]

A community-based cross-sectional study was conducted in 2009 to assess the magnitude and determinants of stunting in 622 children under-five years of age in West Gojam Zone, Ethiopia. Data was collected using an interviewer administered questionnaire. Both bivariate analysis and multivariate analysis (logistic regression model) were used to identify the determinants of under-five stunting. The findings showed that incidence of diarrhea in two weeks prior to the study showed a significant association with child stunting ($\chi 2$=6.495, p- value 0.003, OR= 2.289). Although the prevalence of stunting was slightly higher among those who had malaria in the two weeks before the survey, the association was not statistically significant ($p>0.05$). [62]

A community-based cross-sectional study was conducted in 2014 to assess the determinants of the nutritional Status among 374 preschool children aged less than 5 years in Shika village, Zaria, Kaduna State, Nigeria. A multistage cluster sampling technique was used to select mother-child pairs. Data was collected using an interviewer administered questionnaire. A two-tailed estimation of significance was used to test for association, and the level of significance was set at $p < 0.05$. The findings showed that recent history of diarrhea was associated with wasting (OR¼2.66, $p<0.001$). Children who had diarrhea in the 4-week period preceding the onset of the study were more likely to be wasted compared to those who did not, after controlling for other acute illnesses like malaria and acute respiratory illness (ARI).[34]

A cross-sectional study was carried out in 2014 to determine the risk factors affecting the prevalence of ARIs among436 under- five children in three hospitals in Enugu State, Nigeria. A structured proforma was used to collect socio-demographic characteristic, anthropometric data, and risk profile history including retroviral statues of the subjects if available. The findings showed that there was an association between undernutrition and pneumonia ($\chi2$= 79.85 p value; 0.01, < 0.05), bronchiolitis ($\chi2$= 2.15, p value; 0.01, < 0.05) and acute upper respiratory tract infections (AURI) ($\chi2$= 86.84, p value; 0.01, < 0.05). Pneumonia was noted in about 75.7% (56/74) of inadequately nourished children compared to 22.6% (82/362) in adequately nourished children.[63]

CHAPTER THREE

MATERIALS AND METHOD

3.1 Study Area

This study was carried out in Benin City, the capital of Edo State in Southern Nigeria. Benin-City is made up of three Local Government Areas (LGAs) namely Egor, Oredo, and Ikpoba -Okha. The three LGAs comprise of 10, 12 and 10 administrative wards, respectively and these wards are headed by a Councilor. [64, 65] Benin-City is an urban area with a high population density and infrastructure of built environment.[66] The 2006 population and housing census put the population of Benin City at one million, eighty-five thousand, six hundred and seventy-six (1,085,676) which was further projected in 2018 using the geometric method of population projection to be one million, four hundred and ninety-four thousand, six hundred and seventy-one (1,494,671) at a growth rate of 2.7% per annum.[67] This projected population for the three Local Government Areas (LGAs) was as follows; Egor: 467,945, Oredo: 515,817 and Ikpoba-Okha: 510,909.Under-five children make up 20% (298,933) of the total population (1,494,671) and the population of under-fives for each of the three LGAs in Benin-City is as follows: Oredo: 103,163, Egor: 93,589 and Ikpoba-Okha: 102,181.[67]

There are 217,135 households in Benin-City as reported by the 2006 population and housing census, which was further projected in 2018 using the geometric method of population projection to be 298,934 at rate of 5 persons per household. The projected number of households for the three local government areas is as follows: Egor 93,589, Oredo 103,163 and Ikpoba-Okha 102,182 households.[67] Of this proportion (298,934), only 52.76% of households had access to an improved toilet facility (water closet), 50% have access to a safe water source (borehole) and 97% of the households have access to electricity.[68] The most commonly used fuel for cooking

was '*Kerosene'* (67%) and household solid waste is commonly disposed via collection by trucks for treatment/landfill disposal.[68]

There are three levels of health care services that are operational in Benin City namely: primary, secondary and tertiary levels of health care. These health care services are either government owned (public) or owned by individual health practitioners (private). In Egor LGA, there are 102 primary health care facilities (5 public and 97 private), two private secondary health care facilities and two public tertiary health care facilities. [69] In Ikpoba-Okha LGA, there are 114 primary health care facilities (10 public and 104 private), 4 secondary health care facilities (1 public and 3 private). [69] In Oredo LGA, there are 167 primary health care facilities (7 public and 160 private), 7 secondary health care facilities (3 public and 4 private) and one tertiary health care facility (public).[69]

There are 811,827 persons (age 6 and above) in Benin-City who are literate as reported by the 2006 national housing and population census. This figure was projected in 2018 using the geometric method of population projection to be 1,117,658.[70] There are nine major occupations in Benin City with a total figure of 337,416 workers as reported by the 2006 population and housing census. Of this proportion, the most predominant occupation is "sales and related works" having a total figure of 119,438 workers; this figure was further projected in 2018 using the geometric method of population projection to be one hundred and sixty-four thousand, four hundred and thirty-five (164,435).[71]

3.2 Study Design

A descriptive cross-sectional survey design was employed in this study with mixed methods of data collection.

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3.3 Scope of Study

The scope of this study was to investigate the relationship between the nutritional status and morbidity pattern of under-five children age 6 – 59 months residing in Benin-City.

3.4 Study Duration

This study was carried out within a period of twenty-one months. Planning and proposal writing was completed within six months from June 2018 to November 2018. Data collection was carried out within two months (December 2018 to January 2019). Data entry and analysis was carried out within five months (February 2019 to June 2019). Chapter four (results) was written within five months (July 2019 to November 2019). Discussion, conclusion and recommendation were written within three months (December 2019 to February 2020).

3.5 Study Population

The study population (de jure population) comprised of mother-child pairs age 6-59 months residing in households within the selected communities in Benin City. Mothers were the respondents, and they were also recruited for the focus group discussions.

3.5.1 Selection Criteria

Inclusion criteria

1. All children age 6–59 months residing within the selected communities in Benin City were included in the study.
2. All mothers of children age 6-59 months residing in study area for at least six months were included in the study.

Exclusion Criteria

1. Children with physical defects that could affect the anthropometric measurements were excluded from the study.

3.5.2 Sample Size Determination

The sample size for the study was determined using the Cochrane formula (1977).[72]

Where $n = (Z^2pq)/d^2$

n=the desired sample size when population is greater than 10,000 (minimum sample size).

z= standard normal deviation set at 1.962 which corresponds to 95% confidence interval. $1.96^2 = 3.8416$

P= the proportion of a variable of interest in the study population. For the purpose of this study p was taken at 31% which was the prevalence of stunting in a similar study conducted in Babban-dodo, Zaria, Nigeria.[37] Therefore p = 31/100 = 0.31

q=1-p (denote children not stunted) = 1 – 0.31= 0.69

d= degree of precision desired which is set at 5% $(0.05)^2 = 0.0025$

$n = (3.8416 \times 0.31 \times 0.69)/0.0025$

$n = 0.82171824/0.0025 = 328.687296 \approx 329$

n = 329.

Minimum calculated sample size for the study = 329

To make adjustment for 10% non-response, the non-response adjustment formula was employed;

nf =n/ (1-nrr)

Where nf= final minimum sample size

n = minimum sample size= 329

nrr = non-response rate= 10% = 0.1

nf = 329/ (1-0.1)

nf = 365.555555 ≈ 366

A multistage sampling technique was employed in selecting the respondents; hence the calculated sample size was multiplied by a design effect of 2. In total, the final minimum sample size (adjusted) for the study was 732 (366 × 2 = 732)

The proportionate allocation method was employed in computing the sample size per LGA. The sampling fraction was determined using the formulae: (Sample Size)/ (Total number of under-five children in Benin-City)

The projected number of under-five children in Benin-City for 2018 was 298,933

The calculated minimum sample size for under-five children in this study was 732.

Thus the sampling fraction was set at (0.002449); 732/298,933=0.002449

In Egor LGA, the projected number of under-five children for 2018 was 93,589

The calculated sample size for Egor LGA was (229); 93,589 × 0.002449 = 229

In Oredo LGA, the projected number of under-five children for 2018 was 103,163

The calculated sample size for Oredo LGA was (253); 103,163 × 0.002449 = 253

In Ikpoba-Okha LGA, the projected number of under-five children for 2018 was 102,181.

The calculated sample size for Ikpoba-Okha LGA was (250): 102,181 × 0.002449 = 250

Thus, In total; 229 +253 + 250 = 732

3.6 Sampling Technique

Eligible respondents were selected using a multistage sampling technique comprising four stages.

Stage 1 (Selection of wards): Benin-City has a total of 32 wards; Egor (10), Oredo (12) and Ikpoba-Okha (10). Ten wards were selected using simple random sampling technique (SRS) by balloting. The selected wards were Uselu , Uwelu, Evbogida, Evabreke, Iwehen, Ikpema, Ibiwe, Ogbe , Ugbekun and Aduwawa

Stage 2 (Selection of communities): In each of the ten selected wards, one community per ward was selected using the simple random sampling technique by balloting, which totaled a selection of ten communities.

Stage 3 (Selection of houses): The total number of houses in each community was enumerated. A bottle was spun at 360 degrees to get a starting point.

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Stage 4 (Selection of households): In each selected house, one household per house was selected using simple random sampling method.

Stage 5 (Selection of under-five children): In each selected household, all eligible under-five children residing in the household were selected.

3.7 DATA COLLECTION

3.7.1 Quantitative data collection

A structured interviewer-administered questionnaire with open and closed ended questions was employed for the quantitative data collection. Anthropometric measurements were also taken for physical assessment. The questionnaire consisted of four sections namely:

Section 1 This section comprised of questions on demographic and socio-economic characteristics of the mother-child pair. Also, it consisted of questions on water, sanitation and hygiene practices (WASH). The questions in this section were adapted from the 2013 Nigerian Demographic Health Survey.[2]

Section 2 This section comprised of questions on the dietary pattern of the under-five children. The questions on the dietary pattern captured some core IYCF indices namely; timely initiation of breastfeeding after birth, exclusive breastfeeding, breastfeeding frequency (children less than 24 months), age at introduction of complementary food, feeding frequency , dietary diversity and continued breastfeeding. The questions in this section were adapted from the WHO Guide for

assessing infant and young child feeding practices' and the Baseline Nutrition and Food Security Survey Questionnaire.[73, 74]

Section 3 This section consisted of questions on physical assessment (anthropometric indices). Anthropometric tools were used for the physical assessment, namely, the bathroom weighing scale, measuring tape and MUAC tape were used. Physical assessment (Anthropometric measurement) was done according to United Nations manual for assessing the nutritional status of young children in household surveys.[75] The procedure for physical assessment according to the United Nations Manual is described below:

A. Weight measurement:

i. For children less than 12 months: The bathroom weighing scale was placed on a flat level surface. The weight reading was readjusted to zero using the knob at the back of the scale. The child was dressed in light clothing. The mother was asked to remove her shoes and stand in the middle on the scale's surface with her feet slightly apart and her weight was recorded to the nearest 100g. She was asked to remain on the scale even after her weight had appeared until the child was handed to her, when she was settled with the child on the scale, their weight was recorded to the nearest 100g. To obtain the exact weight of the child, the recorded weight of the mother alone on the scale was subtracted from the recorded weight of the mother and child on the scale.

ii. For children above 12 months: The bathroom weighing scale was placed on a flat level surface. The weight reading was readjusted to zero using the knob at the back of the scale. The child was undressed to light clothing and asked to stand in the middle on the scale's surface with feet slightly apart and the child's weight was recorded to the nearest 0.1kg.

B. Height Measurement:

i. Children less than 24 months: For children less than 24months recumbent length measurements were taken. A measuring tape was used to measure the length. It was ensured that the child was not wearing any shoes or head covering. The mother was asked to seat and carry the child horizontally across her lap. A measuring tape was placed from the top of the child's head to the bottom of one of their heels and the measurement was recorded to the nearest 0.1cm.

ii. Children above 24 months: It was ensured that the child was not wearing any shoes or head covering. The child was asked to stand upright against a wall. It was ensured that the child's heels and knees were firmly pressed against the wall, then the child was asked to stand still and the top of the child's head was marked against the wall using a chalk or pen. The Measuring tape was placed against the wall from the point indicating top of head to the feet of the child and the measurement was recorded to the nearest 0.1cm.

C. Mid-upper arm circumference: This measurement was taken in centimeters for children between ages 12 -59 months using a measuring tape. First, the midpoint of the child's left upper arm was determined. On the child's left arm, the tip of the child's shoulder was located and the arm was bent at the elbow to make a right angle. The MUAC tape was placed at zero on the tip of the shoulder and the tape pulled straight down past the tip of the elbow. The number at the tip of the elbow was read to the nearest centimeter and divided by two to get the mid-point estimate. Secondly, the child's left arm was straightened and the MUAC tape was wrapped around the mid-point. I ensured that the tape had the proper tension on the child's arm and i read measurement to the nearest 0.1cm.[75]

Section 4: This section consisted of questions on child health status and practices namely, immunization history, history of illness and type of treatment given, deworming history, history

of intake of vitamin A supplement and Iron supplement. The questions in this section were adapted from the 2013 Nigerian Demographic Health Survey.[2]

3.7.2 Qualitative data collection

A total of six focus group discussions were carried out in this study; two FDG sessions per LGA. The respondents were purposively selected. Each focus group session consisted of 6- 8 respondent, this was to ensure an interesting and sustained conversation. To ensure homogeneity, young mothers (< 30 years of age) and older mothers (≥ 30years of age) of under-five children were selected to participate in the focus group sessions. All six groups had a mixture of both young and old mothers. Notes and audio recorders were used to take record of the responses during the session. Each session was conducted by the researcher and one research assistant; the researcher moderated the session using the focus group discussion guide while the research assistant took notes and handled the audio recorder. The focus group discussions were done to throw more light on the knowledge, attitude and practices of mothers on infant and young child feeding and child health.

Focus group discussion guide:

The guide was designed to address the objective 4 of this study which was to identify factors affecting dietary pattern, nutritional status and morbidity pattern of under-fives in Benin-City. Opening and probing questions were asked, so as to stimulate interest in the group process, and to elicit the participants' initial perceptions about the general theme. The general topical themes for the discussions were: knowledge and practices of mothers on Infant and young child feeding, child health and treatment of childhood illnesses.

The sitting arrangement at each session was done in a way that allowed for easy eye contact and hearing between the principal facilitator (researcher) and the participants. The

participants were encouraged to talk freely and spontaneously. Each discussion lasted for about 50- 60 minutes to avoid fatigue. The notes and recordings were transcribed within 24hours using thematic analysis to identify the various themes discussed.

3.7.3 Pre-testing of research tools

A pretest was conducted to determine the effectiveness of the research tools. The tools were pretested on the field using 10% of the sample size in a similar population from a different location. The tools were administered to respondents in Ovia-North East Local Government Area which is located on the outskirts of Benin-City and This LGA has similar socio-economic characteristics as the three LGAs in Benin City.

3.7.4 Research Assistants

Ten Community Health Extension Workers were recruited and trained for three days on the study objectives, and how to correctly administer the study tools and collect uniform information.

3.8 DATA MANAGEMENT

3.8.1 Scoring

Socio-economic status (SES) Status: Information about birth order , child age, and gender were considered as basic characteristics of the participants. Several other co-variables were taken into account namely; maternal educational level (categorized into four levels: ”No education or informal”, “Primary education”, “Secondary and higher education”), skill level, religion and marital status. Wealth quintiles were computed to serve as a proxy to measure socioeconomic status. Wealth Quintile was computed according to Filmer and Pritchett’s Principal Component Analysis of household assets. A wealth index score was generated based on ownership of certain household assets and household characteristics. Variables included in the Principal Component

Analysis were; ownership of present residence, use of electricity in residential apartment, type of toilet, type of cooking fuel, source of drinking water and refusal disposal method. All variables were categorical and ranked by ascending order (from worst to best). The selection criterion for inclusion of individual variables into the final factor was that factor loadings (defined as the correlation between the variable and the factor) had a value > 0.5. The first principal component of the PCA (ownership of present residence) was employed as the wealth index since it explained the largest proportion of the variations in the population. The index was used to divide the study population into five wealth quintiles that reflected the relative socioeconomic status of the study participants (poorest, poorer, middle, richer and richest). The first quintile (Q1) was the poorest and the fifth quintile (Q5) the richest.

Hygienic environmental conditions of the household was measured through a composite score of water, sanitation, and hygiene -WASH- practices according to the Cambodian socio-economic survey, referred to as the National Child Sensitive composite score-CSES. The indicator covered source and treatment of household water, type of toilet and strategy of disposal of child feces; each one of afore mentioned was equally weighted based on a maximum value of 1 and points were offered for improved conditions.

Infant and Young Child feeding : On a similar note, diet was considered using "Appropriate Daily Feeding practices" (ADF) as described by the National Nutrition Guidelines. Twenty-four-hour recall information was used for the construction of related indicators, namely, type of breastfeeding, frequency of feedings (breast milk and complementary foods), and quantity of food consumed.[76] Feeding practices were considered for the following age groups: (I) 6 – 23.99 months and (II) 6 –59 months. Appropriateness of feeding practices was measured through a

binary value of appropriate (0) or not appropriate (1) . Optimal feeding practices was defined for two groups: breast-feeding and non-breastfeeding children.[77]

Breast-feeding received a score of "1" for infants 6–23.99 months of age who were currently breastfeeding and a score of '0'' for all children age 6- 23.99 not currently breastfeeding . The use of baby bottles was considered an inappropriate practice for the two child groups. Avoidance of baby bottles was scored '1'' (good practice) while the use of baby bottles received a score of '0''.

A food group score was computed based on dietary diversity; (food group consumption per week). The food groups were grains and tubers; legumes; dietary products; flesh foods; eggs; vitamin rich foods and other fruits and vegetables. There are currently no specific recommendations regarding the optimal number of foods or food groups a child should consume each day, but there is some consensus that higher dietary diversity is desirable because it can help meet daily requirements for a variety of nutrients. In the absence of a specific recommendation, an arbitrary scoring, similar for all age groups, was used: none (meaning no semisolid or solid foods) was given a score of "0", 1–3 food groups received a score of "1" and

4 food groups or more received a score of "2." An aggregate score was computed from all the food groups. A final aggregate score of 0 to 2 was grouped as low Dietary Diversity; 3 to 4 as middle Dietary Diversity and 5-7 was grouped as high Dietary Diversity.

A feeding frequency score was computed based on the optimal feeding frequency for breast-feeding and non-breastfeeding children in a 24-hour period. A child who was fed between 1 to 3 times in a 24-hour period was scored 1 point while a child fed 4 or more times was scored 2 points. For a non-breastfeeding child, a feeding frequency of less than 4 times in a 24-hour

period was grouped as inadequate feeding frequency while a frequency of 4 or more times was termed adequate feeding frequency. For a breastfeeding child, a feeding frequency of less than 2 times in a 24-hour period was grouped as inadequate feeding frequency while a frequency of 3 or more times was termed adequate feeding frequency.

A child feeding index was a computed from the summation of the scores from these two indexes described above; dietary diversity and feeding frequency. The index scores ranged from 0 to 12 for the two child groups; breast fed and non-breastfed. Within each child group, the child feeding index scores was grouped into terciles: low, average and high.

Occupation:

An index was created to categorize occupation into quintiles according to a modified International Standard Classification of Occupations, volume 8 (ILO-ISCO-08), i.e. Unemployed and Students, Skill level 1, Skill level 2, Skill level 3 and Skill level 4.[78] Occupation at skill level 1 typically involved the performance of simple and routine physical or manual tasks. They involve tasks such as cleaning; digging; lifting and carrying materials by hand; sorting or assembling goods by hand (sometimes in the context of mechanized operations); operating non-motorized vehicles; and picking fruits and vegetables. Basic skills in literacy and numeracy as well as completion of primary education or the first stage of basic education may be required. Occupations classified here included office cleaners, freight handlers, garden laborers and kitchen assistants.[79]

Occupations at skill level 2 typically involved the performance of tasks such as operating machinery and electronic equipment; driving vehicles; maintenance and repair of electrical and mechanical equipment; and manipulation, ordering and storage of information. This skill level mostly requires relatively advanced literacy and numeracy skills and good interpersonal

communication skills with a high level manual dexterity. It requires completion of second stage of secondary education. Occupations classified here included butchers; bus drivers, secretaries, account clerks, sewing machinists, dressmakers, shop sales assistants, police officers, hair dressers, building electricians and motor vehicle mechanics.

Occupations at skill level 3 typically involved the performance of complex technical and practical tasks that required an extensive body of factual, technical and procedural knowledge in a specialized field. Occupation in this skill level requires a high level of literacy and numeracy and well-developed interpersonal communication skills. The skill level requires completion of a study at higher educational institution for a period of 1 – 3 years. Occupations classified here included shop managers, medical laboratory technicians, legal secretaries, commercial sales representatives, diagnostic medical radiographers, computer support technicians and broadcasting and recording technicians.[79]

Occupation at skill level 4 typically involved the performance of tasks that required complex problem solving, decision making and creativity based on an extensive body of theoretical and factual knowledge in a specialized field. Occupation in this skill level requires extended levels of literacy and numeracy, sometimes at a very high level and excellent interpersonal communication skills. The skill level requires completion of a study at higher educational institution for a period of 3 – 6 years. Occupations classified at skill level 4 included sales and marketing managers, civil engineers, secondary school teachers, medical practitioners, musicians, operating theatre nurses and computer system analysts.[79]

Nutritional Status Index: Children who were less than two standard deviation below the reference median (they had a z-score of less than minus two) were considered to be undernourished and this was classified as being stunted, wasted or underweight. Children with

measurements below 3 SD (a z- score of less than minus three) were considered to be severely undernourished.[78] Children with height for age measurement that fell between the reference median and plus two standard deviation were considered to be normal (a z score lesser than or equal to plus two), those that had measurements that fell below minus two standard deviations from the median height for age of the reference population were classified to be stunted and children that had measurements that fell below minus three standard deviations from the median height for age were classified as severely stunted. Children with Weight for age measurement that fell between the reference median and plus two standard deviation were considered to be normal (a z score lesser than or equal to plus two), those that had measurements that fell below minus two standard deviations from the median weight for height of the reference population were classified to be underweight and children that had measurements that fell below minus three standard deviations from the median weight for height were classified as severely underweight.

Children with Weight for Height measurement that fell between the reference median and plus two standard deviation were considered to be normal (a z score lesser than or equal to plus two), those that had measurements that fell below minus two standard deviations from the median weight for height of the reference population were classified to be wasted and children that had measurements that fell below minus three standard deviations from the median weight for height were classified as severely wasted. Children with BMI for age measurement that were two standard deviation above the reference median were considered overweight.[80] For the Mid-upper arm circumference, children with measurements less than 12.5cm were considered 'under-nourished'', 'borderline'' for children who had measurements between 12.5cm and 13.5cm and 'normal'' for children who had measurements greater than 13.5cm.[78]

3.8.2 Quantitative Data Analysis

Data was analyzed using IBM Statistical Package for Social Sciences (SPSS) version 20.0 software. Univariate analysis was carried out to assess the distribution of variables. Categorical data such as age group, sex, education and marital status were presented as frequencies and proportions while continuous data like age of mother ad under-five children that was normal in distribution were presented as means and standard deviation. Skewed data such as duration of breast-feeding were presented as median and range. Bivariate analysis using Chi-squared test of association was done to test for statistical association between socio-demographic characteristics of both mother and under-five children and main outcome variables such as Infant and Child Feeding Index, nutritional status and morbidity status. Chi-squared test was also done to determine associations between socio-economic characteristics and main outcome variables such as Infant and Child Feeding Index, nutritional status and morbidity status. The Fisher's exact test was used in instances where the total expected cell counts less than five is more than 20% of the cells.

Binary logistic regression was modelled to identify predictors of Infant and Child Feeding Index. Binary logistic regression was also used to identify significant predictors of nutritional status and morbidity status of under-five children. The level of significance was set at $p < 0.05$.

In the bivariate and binary logistic regression analysis certain variables such as Infant and Young Child Feeding all the anthropometric measures (such as Height-for-Age, Weight-for-Age, Weight-for-Height, BMI-for-Age and Mid Upper Arm Circumference) were merged for the purpose of analysis. The anthropometric measures were grouped as normal and abnormal based on their final measurements.

The results were presented using statements, frequency distribution tables and charts in relation to the specific objectives of the study.

3.8.3 Qualitative Data Analysis

Information from focus group discussion was analyzed in themes and prose in relation to the objectives of the study.

3.8.4 ETHICAL CONSIDERATION

1. Ethical clearance was obtained from the Ethics and Research Committee of the University of Benin Teaching Hospital, Benin-City.
2. Permission was sought from the Chairmen of the LGAs and the community heads.
3. Written informed consent was obtained from respondents. (Signatures for the educated mothers and thumbprint for the non-educated ones).
4. Children with any form of malnutrition or who are sick were referred to the nearest health facility for further management.
5. Health education sessions on the appropriate dietary pattern and IYCF practices were also given after the interviews had been conducted.

3.9 LIMITATION OF STUDY

1. Recall bias may occur regarding birth weight, dietary recall, morbidities, treatments and immunization history. To limit this, relevant validating questions were asked.

Breach in communication may occur, to minimize this CHEWS well versed in the local language and Pidgin English were used as research assistants

CHAPTER FOUR

RESULTS

A total of 771 mother-child pairs' age 6-59 months residing within the survey area were recruited for this study.

SECTION A: Demographic and Socio-Economic Characteristics of Respondents

SECTION B: Dietary Pattern of Under-Five Children in Benin-City Edo State

SECTION C: Factors Affecting Infant and Child Feeding Index of Under-Fives in Benin-City

SECTION D: Nutritional Status of Mother-Child Pair in Benin-City, Edo State

SECTION E: Factors Associated with the Nutritional Status of Under-Five Children in Benin-City

SECTION F: Morbidity Pattern of Under-Five Children in Benin-City Edo State

SECTION G Factors Affecting the Morbidity Pattern of Under-Five Children

SECTION H: Association between Nutritional Status and Morbidity Pattern of Under-Five Children in Benin-City Edo State

SECTION A: DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS

Table 1: Maternal demographic characteristics

Variable	Frequency (n=771)	Percent
Age group (years)		
15- 24	57	7.4
25- 34	467	60.2
35- 44	222	28.8
≥ 45	28	3.6
Mean±sd age (Years)	**32.5±6.3**	

Marital Status		
Married	762	98.8
Not married	9	1.2
Family type		
Monogamous	715	92.7
Polygamous	56	7.3
Religion		
Christian	648	84.0
Muslim	123	16.0
Level of Education		
No formal	50	6.5
Primary	150	19.5
Secondary	468	60.7
Tertiary	103	13.4
Skill Level		
Skill level 0	41	5.3
Skill level 1	1	0.1
Skill level 2	680	88.2
Skill level 3	15	2.0
Skill level 4	34	4.4

Four hundred and sixty-seven (60.2%) respondents were between the ages 25 to 34 years while 28 (3.6%) were between age 45 years and above. The mean age (SD) of respondents was 32.5 (6.3) years.

Seven hundred and sixty-two (98.8%) respondents were married while only 9 (1.2%) respondents were single. Majority, 92.7% respondents had monogamous family type while 7.3% of respondents were polygamous. Six hundred and forty-eight respondents (84%) were Christians while 123 (16%) were Muslims.

Fifty (6.5%) had no formal education; while 468 (60.7%) respondents had attained secondary level of education, 150 (19.5%) had attained primary level of education and 103 (13.4%) tertiary level of education. Six hundred and eighty (88.2%) respondents belonged to Skill level two while

15 (2.0%) belonged to skill level three. Five hundred and thirty-one (68.9%) respondents' spouses' belonged to skill level two while 453 (58.8%) had attained secondary level of education.

Table 2: Socio-economic characteristics of Households

Variable	Frequency (n=771)	Percent
Number of persons' in household		
1-6	600	77.8
>6	171	22.2
Average monthly household income (₦)		
0 - 18,000	89	11.5
18,001- 36,000	263	34.1

36,001 - 54,000	187	24.3
54,001 - 72,000	107	13.9
>72,000	29	3.7
No response**	96	12.5
Wealth Quintile		
Poorest	132	17.1
Poorer	133	17.3
Middle	126	16.3
Richer	156	20.2
Richest	103	13.4
Missing*	121	15.7

*Information provided not adequate to compute wealth quintile scores **Respondents refused to disclose information on income.

Six hundred (77.8%) respondents had households with 1 to 6 persons while 171 (22.2%) respondents had more than 6 persons in their households. The median (range) number of persons in respondents' households was 5.0 (1 - 14) while the median (range) of number of children under-five in respondents' household was 2.0 (1 - 6). Two hundred and sixty-three (34.1%) respondents had a monthly income of between ₦ 18,001 - ₦ 36,000 while twenty-nine (3.8%) respondents earned above ₦ 72,000. One hundred and three (13.4%) belonged to richest quintile while 132 (17.1%) belonged to poorest.

Table 3: Demographic characteristics of Focus Group Discussion participants

Variable	Frequency (n =36)	Percent
Age group (years)		
24 - 29	16	44.4
30 - 34	19	52.8
35 and above	1	2.8

Religion		
Christian	33	91.7
Muslim	3	8.3

Six focus group discussion sessions were carried out in six of the selected communities. Thirty-six mothers in total participated in the discussion, thirty-three were Christians and three were Muslims. They had an age range of 24 to 36 years.

Table 4: Demographic characteristics of under-five children

Variable	Frequency	Percent
Age (months) (n=771)		
6-11	173	22.4
12-23	159	20.6
24-35	157	20.4
36-47	146	18.9
48-59	136	17.6

Mean ±SD age (in months)	**27.3±15.9**	
Birth order of index child (n=771)		
1-3	509	66.0
4-6	135	17.5
7 and above	13	1.7
No response	114	14.8
Commenced formal education (n=771)		
Yes	327	42.4
No	444	57.6
Class (n=327)		
Pre-school	60	18.3
Nursery	252	77.1
Primary	15	1.9

One hundred and seventy-three (22.4%) under-fives were between age group 6 to 11 months while 136 (17.6%) were between 48 to 59 months of age. The mean (SD) age of under-fives was 27.3 (15.9) months. Five hundred and nine (66.0%) under-fives were of birth order 1 to 3 while 135 (17.5%) were of birth order 4 to 6. Three hundred and twenty-seven (42.4%) respondents have commenced formal education; of these number, two hundred and fifty-two (77.1%) are in nursery class.

Table 5: Household Sanitation Facilities

Variable	Frequency **(n=771)**	Percent
Type of toilet		
Water closet	494	64.1
Pit latrine	211	27.4
VIP toilet	38	4.9
No response	28	3.6

Number of families' who use toilet		
1	367	47.6
2 -10	282	36.6
≥10	68	8.8
No response	54	7.0

Four hundred and ninety-four respondents (64.1%) use water system toilet while 38 (4.9) use ventilated improved latrine. Three hundred and sixty-seven (47.6%) respondents do not share toilet facility with other households while 68 (8.8%) share toilet facilities with more than ten households.

Table 6: Households Method of Refuse Disposal

Variable	Frequency **(n=771)**	Percent
Use of waste managers'	365	47.3
Burning	195	25.3
Open dumping	116	15.0

No response	95	12.3

Three hundred and sixty-five (47.3%) respondents' make use of waste managers while 116 (15.0%) practice open dumping.

Table 7: Households Main Source of Drinking Water and Treatment Practices

Variable	Frequency	Percent
Main source of drinking water (n=771)		
Piped borne	584	75.7
Sachet	178	23.1

Bottle	7	0.9
Well	2	0.3
Purification of drinking water (n=771)		
Yes	37	4.8
No	588	76.3
No response	146	18.9
Method of purification used (n=37)		
Boiling	18	48.6
Use of chlorine	10	27.0
Left to stand/settle	3	8.1
Water filtration	1	2.7
No response	5	13.5

Five hundred and eighty-four respondents (75.7%) have access to pipe borne water while 2 (0.3%) drink water from the well. Only about 37 (4.8%) purify their water before drinking, of this proportion, 18 (48.6%) respondents boil their water before drinking while only 1 (2.7%) filter their water before drinking.

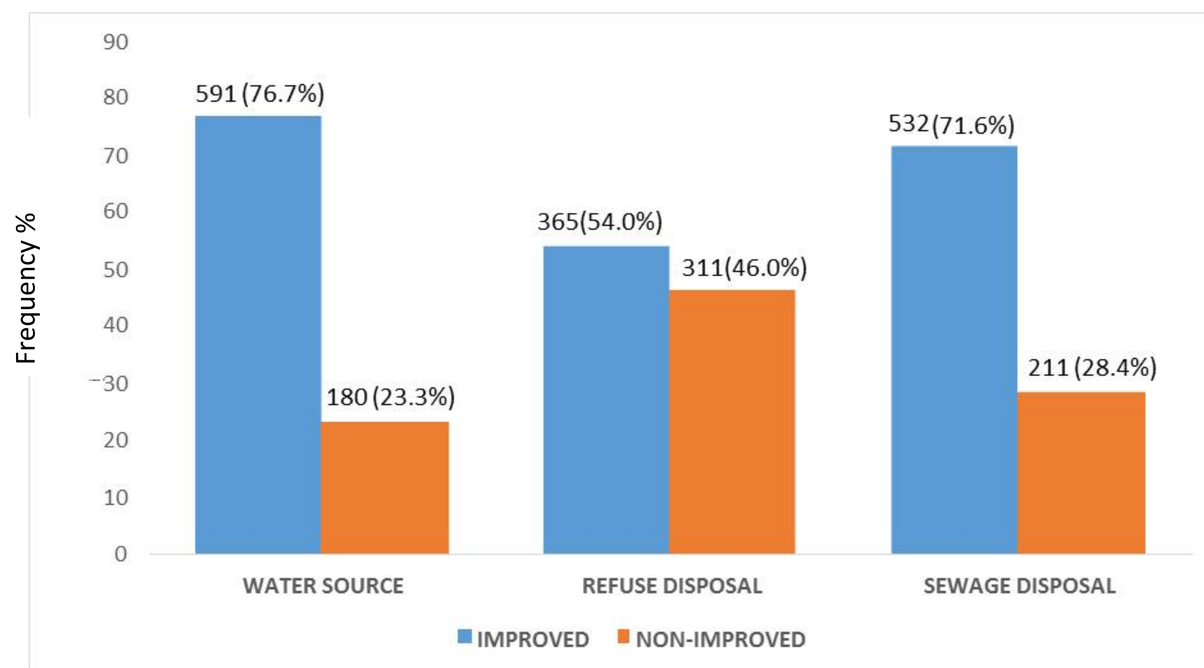

Figure 1: Water and sanitation practices of respondent

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Five hundred and ninety-one (76.7%) respondents' obtained water from improved water sources compared to 180 (23.3%) who used non-improved water sources. Above half, three hundred and sixty-five (54.0%) respondents used improved methods of waste disposal compared to 311 (46.0%) who used non-improved waste disposal methods. Five hundred and thirty-two (71.6%) respondents employed improved sewage disposal methods compared to 211 (28.4%) who used non-improved sewage disposal practices.

Table 8: Household Source of Vegetables, Fruits and Animal Produce

Variable	Frequency (n=771)	Percent
Source of vegetable		
Household produce	140	18.2
Purchased	631	81.8
Source of fruits		
Household produce	65	8.4
Purchased	706	91.6
Source of Animal produce		
Household produce	39	5.1
Purchased	732	94.9

Six hundred and thirty-one (81.8%) respondents reported purchasing their vegetables while one hundred and forty (18.2%) reported that household produce was the source of their vegetable. Seven hundred and six (91.6%) respondents had purchased their fruit, while 65 (8.4%) reported that household produce was the source of their fruit source. Seven hundred and thirty-two (94.9%) respondents reported purchasing their source of animal produce while thirty-nine (5.1%) were household produced.

SECTION B: DIETARY PATTERN OF UNDER-FIVE CHILDREN IN BENIN-CITY EDO STATE

Table 9: Breast-feeding patterns of under-five children

Variable	Frequency	Percent
Ever been breastfed (n=771)		
Yes	752	97.5
No	19	2.5
Initiation of breastfeeding at birth (n=752)		
Within one hour after birth	356	47.3
More than one hour after birth	396	52.7
History of exclusive breast-feeding(months) (n=752)		
Yes	488	64.9
No	264	35.1
Duration of exclusive breast-feeding (months) (n=488)		
<6	128	26.2

6	226	46.3
>6	121	24.8
No response*	13	2.7
Median (range) duration of exclusive breast feeding	6.0 (1- 6)	
Age of introduction of complementary foods (months) (n = 771)		
< 6	247	32.0
6	215	27.9
>6	181	23.5
No response*	128	16.6
Median (range) age of introduction to complementary feeds	6.0 (1- 6)	
Currently breast-feeding (Children below 24 months) (n = 332)		
Yes	187	56.3
No	145	43.7

Table 9 Continued: Breast-feeding pattern of under-five children

Variable	Frequency	Percent
Breast feeding frequency (n=187)		
Very often	99	53.0
On demand	78	41.7
Two to three times daily	10	5.3
Reasons for stopping breastfeeding (Children below 24months) (n=145)		
Feeling the child was of age	46	31.7
Mother commenced work	11	7.5
Child refusing breast milk	14	9.7
Another pregnancy	7	4.8

Illness of mother	5	3.5
Child was not gaining weight	7	4.8
Mother got tired	5	3.5
Child refused to eat	2	1.4
Illness of child	1	0.7
No response*	47	32.4
Duration of breast feeding (months) (n=356) *		
< 24	332	93.3
24	14	3.9
>24	10	2.8
Median duration of breastfeeding (range)	14.0 (2-36)	
Use of cup and spoon (n=771)		
Yes	553	71.7
No	218	28.3

***sample not complete due to no responses**

Seven hundred and fifty-two (97.5%) children under-five years of age have ever been breastfed, of this proportion, 356 (47.3%) were breastfed within an hour after birth. Four hundred and eighty-eight (64.9%) were exclusively breastfed. The median (range) duration of exclusive breast-feeding of under-fives was 6.0 months (1 - 6). Two hundred and fifteen (27.9%) under-five children were timely introduced to complementary foods at 6 months while 247 (32.0%) were introduced early to complementary foods. The median (range) age of introduction to complementary feeds was 6.0 (1 - 6) months. One hundred and eighty-seven (56.3%) under-fives aged 6 – 23 months were currently being breast-fed while 145 (43.7%) were not. Ninety-nine (53.0%) of children aged 6 – 23 months who were currently breastfeeding were breast-fed very often while 10 (5.3%) were breastfed only two to three times daily.

The major reasons respondents' reported for stopped breast-feeding included feeling the child was of age, reported by 46 (31.7%) mothers; mother commenced work, 11 (7.5%); child refusing breast milk, 14 (9.7%); another pregnancy, 7 (4.8%); illness of mother, 5 (3.5%) and because child was not gaining weight, 7 (4.8%); Mother got tired, 5 (3.5%); Child refused to eat, 2 (1.4%) and illness of mother, 1 (0.7).The median (range) age of stopping breastfeeding was 14.0 (2 - 36) months. Five hundred and fifty-three (71.7%) were fed using cup and spoon.

Table 10: Dietary pattern of breastfed and non-breastfed under-five children

Variable	Frequency	
	Breastfed (n = 193) n (%)	Non-Breastfed (n = 598) n (%)
Food Group		
Grains, tubers and roots	146 (26.9)	396 (73.1)
Legumes	46 (20.2)	182 (79.8)
Dairy products	120 (32.8)	246 (67.2)
Flesh foods	46 (16.9)	226 (83.1)
Eggs	37 (22.3)	129 (77.7)
Vitamin A rich fruits and vegetables	41 (25.5)	120 (74.5)
Other fruits and vegetables	12 (24.5)	37 (75.5)

Multiple responses

One hundred and forty-six (26.9%) breast-fed under-fives were fed with grains, roots and tubers in the 24hours preceding the survey compared to three hundred and ninety-six (73.1%) non-breastfed under-fives who fed from same food group. Forty-six (20.2) breastfed under-fives were fed with legumes in the 24 hours preceding the survey compared to 182 (79.8%) non-breastfed under-fives who fed from same food group. One hundred and twenty (32.8) breastfed under-fives were fed with dairy products in the 24 hours preceding the survey compared to two hundred and forty-six (67.2%) non-breast fed under-fives who were fed with dairy products . Forty-six (16.9%) breastfed under-fives fed from flesh foods (meat, fish and poultry) in the 24 hours preceding the survey compared to two hundred and twenty-six (83.1%) non-breast fed under-fives. Thirty-seven (22.3%) breastfed under-fives compared to one hundred and twenty-nine (77.7%) non-breast fed under-fives. Forty-one (25.5%) breast fed under-fives fed from vitamin A rich fruits and vegetables compared to one hundred and twenty (74.5%) non-breast fed under-fives. Twelve (24.5%) breast fed under-fives fed from other fruits and vegetables compared to thirty-seven (75.5%) non-breast fed under-fives.

Table 11: Components' of child feeding index among breast-fed and non-breast-fed under-five children

Variable	Breastfed (n = 193) n (%)	Non-Breast fed (n = 578) n (%)
Dietary Diversity		
Low diversity	134 (41.4)	190 (58.6)
Medium diversity	41 (12.3)	293 (87.7)
High diversity	18 (15.9)	95 (84.1)
Food frequency (preceding 24 hours)		
Inadequate food frequency	155 (22.5)	534 (77.5)
Adequate food frequency	38 (46.3)	44 (53.7)
Food Group score (preceding 24		

hours)		
1.0	119 (54.8)	98 (45.2)
2.0	43 (13.8)	269 (86.2)
3.0	12 (10.8)	99 (89.2)
4.0	6 (14.6)	35 (85.4)
5.0	12 (14.0)	74 (86.0)
6.0	1 (25.0)	3 (75.0)
Median (range) food group score	**1.0 (0-6)**	**2.0 (0-6)**
Use of cup and spoon		
Yes	94 (17.0)	459 (83.0)
No	99 (45.4)	119 (54.6)
Child feeding index		
Low	85 (42.5)	115 (57.5)
Average	58 (18.6)	254 (81.4)
High	50 (19.3)	209 (80.7)

*Responses were not adequate to compute a score

Eighteen (15.9%) breast-fed under-fives had high diversity child feeding index scores compared to ninety-five (84.1%) non-breastfed under-fives. Less than one-fifth, 46.3%, of breast-fed under-fives' had adequate food frequency compared to 44 (53.7%) non-breastfed under-fives'. Twelve (14.0%) breast-fed under-fives' had a food group score of 5.0 compared to 74 (86.0%) of non-breastfed under-fives'. The median (range) food group score of breast-fed under-fives' was 1.0 (0 - 6) compared with 2.0 (0 - 6) for non-breastfed under-fives'. Ninety-four (17.0%) of breast-fed under-fives' made use of cup and spoon compared to four hundred and fifty-nine (83.0%) non-breastfed under-fives'. Fifty (19.3%) breast-fed under-fives' had a high Child Feeding Index compared to 209 (80.7%) non-breastfed under-fives'.

SECTION C: FACTORS AFFECTING INFANT AND CHILD FEEDING INDEX OF UNDER-FIVES IN BENIN-CITY

Table 12: Maternal demographic characteristics and child feeding index

Variable	Child Feeding index		
	Low (n = 200) n (%)	Average (n = 312) n (%)	High (n = 259) n (%)
Age group (years)			
15- 24	17 (29.8)	24 (42.1)	16 (28.1)
25- 34	114 (24.6)	190 (40.9)	160 (34.5)
35- 44	66 (29.7)	84 (37.8)	72 (32.4)
45 and above	3 (10.7)	14 (50.0)	11 (39.3)
$\chi^2 = 6.458$	p = 0.374		
Marital status			
Not married	4 (44.4)	2 (22.2)	3 (33.3)
Married	196 (25.7)	310 (40.7)	256 (33.6)
Fisher's = 1.976	p = 0.365		
level of education			

No formal	23 (46.0)	15 (30.0)	12 (24.0)
Primary	56 (37.3)	52 (34.7)	42 (28.0)
Secondary	96 (20.5)	210 (44.9)	162 (34.6)
Tertiary	25 (24.3)	35 (34.0)	43 (41.7)
$\chi2 = 31.554$	$p<0.0001$		
Skill level			
Skill level 0	6 (15.4)	19 (48.7)	14 (35.9)
Skill level 1	0 (0.0)	0 (0.0)	1 (100.0)
Skill level 2	177 (26.0)	277 (40.7)	226 (33.2)
Skill level 3	4 (26.7)	4 (26.7)	7 (46.6)
Skill level 4	11 (32.4)	12 (35.2)	11 (32.4)
Fisher's = 6.658	p= 0.568		
Spouse's skill level			
Skill level 0	0 (0.0)	2 (100.0)	0 (0.0)
Skill level 1	29 (26.4)	38 (34.5)	43 (39.1)
Skill level 2	144 (27.1)	217 (40.9)	170 (32.0)
Skill level 3	14 (19.7)	26 (36.6)	31 (43.7)
Skill level 4	13 (22.8)	29 (50.9)	15 (26.3)
$\chi^2 = 11.694$	p= 0.165		
Spouse's level of education			
No formal	10 (47.6)	7 (33.3)	4 (19.1)
Primary	53 (42.1)	39 (31.0)	34 (27.0)
Secondary	95 (21.0)	203 (44.8)	155 (34.2)
Tertiary	42 (24.0)	63 (36.8)	66 (38.6)
$\chi2 = 30.908$	$p<0.0001$		

Eleven (39.3%) respondents aged 45 years and above had high child feeding index compared to 16 (28.1%) aged 15 to 24 years. The association between age and feeding index was not statistically significant (p = 0.374).

Married respondents were more likely to have under-fives with high feeding index (33.6%) compared to not married respondents (33.3%). The association between marital status and feeding index was not statistically significant (p = 0.365).

Child feeding index tends to increase with an increase in mothers level of education .Forty-three (41.7%) respondents who had tertiary level of education had high child feeding index compared to 42 (28.0%) respondent of primary level of education. The association between level of education and feeding index was statistically significant (p < 0.0001). Two hundred and twenty-six (33.2%) respondents who belong in skill level 2 had under-fives with a high feeding index

compared to 7 (46.6%) with skill level 3. The association between skill level and feeding index was not statistically significant ($p = 0.568$).

One hundred and seventy (32.0%) respondents' spouses who belong to skill level 2 had high child feeding index compared to 15 (26.3%) with skill level 4. The association between skill level of spouse and feeding index was not statistically significant ($p = 0.165$). One hundred and fifty-five (32.4%) fathers who had tertiary level of education were more likely to have under-fives with high feeding index compared to 34 (27.0%) fathers with primary level of education. The association between father's education and child feeding index was statistically significant ($p < 0.0001$).

Table 12 Continued: Maternal demographic characteristics and child feeding index

Variable	Child Feeding index		
	Low (n = 200) n (%)	Average (n = 312) n (%)	High (n = 259) n (%)
Wealth Quintile *			
Poorest	27 (20.5)	65 (49.2)	40 (30.3)
Poorer	36 (27.1)	50 (37.6)	47 (35.3)
Middle	34 (27.0)	57 (45.2)	35 (27.8)
Richer	45 (28.8)	60 (38.5)	51 (32.7)
Richest	30 (29.1)	38 (36.9)	35 (34.0)
$\chi2 = 7.567$	$p = 0.477$		
Average monthly household income (₦) *			
18,001- 36,000	74 (28.1)	101 (38.4)	88 (33.5)
36,001- 54,000	46 (24.6)	80 (42.8)	61 (32.6)

54,001- 72,000	24 (22.4)	48 (44.9)	35 (32.7)
72,001 and above	7 (24.1)	12 (41.4)	10 (34.5)
$\chi^2 = 4.627$	p = 0.797		
Number of persons' in household			
1-6	163 (27.2)	233 (38.8)	204 (34.0)
7 and above	37 (21.6)	79 (46.2)	55 (32.2)
$\chi^2 = 3.486$	p = 0.175		

*** *Missing data due to incomplete information**

Ten (34.5%) respondents who earned more than ₦ 72,001 had high child feeding index compared to 61 (32.6%) respondents with a monthly income of N 36,001 - N 54,000. The association between household income and feeding index was not statistically significant (p = 0.797).

Forty (30.3%) respondents who were poorest on the wealth quintile had a high child feeding index compared to 51 (32.7%) respondents who were on the richer quintile. The association between wealth quintile and child feeding index was not statistically significant (p = 0.797).

Two hundred and four (34.0%) respondents' with 1 to 6 persons in household had a high child feeding index compared to 55 (32.2%) respondents' who had 7 or more persons in household. The association between persons in household and child feeding index was not statistically significant (p = 0.175).

Table 13: Demographic characteristics of under-five children and child feeding index

Variable	Child feeding Index		
	Low (n = 200) n (%)	Average (n= 312) n (%)	High (n= 259) n (%)
Age (month)			
6 - 11	84 (48.6)	55 (31.8)	34 (19.7)
12 - 59	116 (19.4)	257 (43.0)	225 (37.6)
$\chi^2 = 61.024$	p <0.0001		
Sex			
Male	96 (25.5)	141 (37.5)	139 (37.0)
Female	104 (26.3)	171 (43.3)	120 (30.4)
$\chi^2 = 4.133$	p= 0.127		

No of under-fives in household			
1 - 3	197 (26.9)	288 (39.4)	246 (33.7)
4 - 6	3 (7.5)	24 (60.0)	13 (32.5)
$\chi^2 = 3.486$	p = 0.175		
Birth order of index child			
1-3	125 (24.6)	207 (40.7)	177 (34.8)
4-6	36 (26.7)	57 (42.2)	42 (31.1)
7 and above	5 (38.5)	4 (30.8)	4 (30.8)
No response	34 (29.8)	44 (38.6)	36 (31.6)
$\chi^2 = 2.015$	p = 0.747		

Two hundred and twenty-five (37.6%) respondents aged 12 to 59 months of age had high child feeding index compared to 34 (19.7%) aged 6 to <11 months. The association between ages of under-fives' and feeding index was statistically significant ($p < 0.0001$).

One hundred and thirty-nine (37.0%) male under-fives' had the high child feeding index compared to 120 (30.4%) female under-fives'. The association between sex of under-fives' and child feeding index was not statistically significant ($p = 0.127$).

Two hundred and forty-six (33.7%) respondents with 1 to 3 under-fives' in household had a high child feeding index compared to 13 (32.5%) respondents with 4 to 6 under-fives' in household. The association between under-fives' and feeding index was statistically significant ($p < 0.0001$).

One hundred and seventy-seven (34.8%) under-fives' who belonged to birth order 1 to 3 had a high child feeding index compared to 4 (30.8%) under-fives' with a birth order 7 and above. The association between birth order and feeding index was not statistically significant ($p = 0.747$)

Table 14: Predictors of child feeding index of under-five children

Variables	B (regression coefficient)	p value	Odds ratio	95% C.I.	
				Lower	Upper
Mother' age (years)	-0.013	0.432	0.987	0.955	1.020
Mother's marital status					
Single*			1		
Married	-0.005	0.994	0.995	0.228	4.333
Divorced/widowed/separated	1.750	0.248	5.755	0.295	112.290
Mother's level of education					
No formal*			1		
Primary	0.876	0.165	2.401	0.697	8.266
Secondary	1.987	0.005	7.297	1.829	29.115
Tertiary	2.642	0.001	14.035	2.837	69.425

Father's level of education					
No formal education*			1		
Primary	-1.395	0.077	0.248	0.053	1.161
Secondary	-1.200	0.162	0.301	0.056	1.618
Tertiary	-1.699	0.061	0.183	0.031	1.078
Number of persons in the household	0.074	0.344	1.076	0.924	1.254
Number of under-five children in household	0.286	0.035	1.331	1.021	1.735
Average monthly household income ((₦)					
<18,000*			1		
18,001 - 36,000	-0.039	0.902	0.961	0.514	1.799
36,001 - 54,000	-0.956	0.005	0.384	0.197	0.749
54,001 - 72,000	-1.025	0.003	0.359	0.184	0.702
72,001 and above	-0.830	0.032	0.436	0.204	0.933
Child's age (months)	0.024	0.001	1.024	1.011	1.037
Sex of child					
Male*			1		
Female	-0.317	0.118	0.728	0.490	1.083

Table 14 Continued : Predictors of child feeding index of under-five children

Variables	B (regression coefficient)	p value	Odds ratio	95% C.I.	
				Lower	Upper
Birth Order	-0.013	0.432	0.987	0.955	1.020
1 - 3*			1		
4 – 6	-0.257	0.378	0.774	0.438	1.368
7 and above	-1.509	0.076	0.221	0.042	1.174
Wealth Quintile					
Poorest*			1		
Poorer	0.046	0.881	1.047	0.570	1.924
Middle	-0.768	0.019	0.464	0.244	0.882
Richer	-0.786	0.016	0.456	0.240	0.865
Richest	-0.541	0.144	0.582	0.281	1.204
Years lived in the community	-0.007	0.639	0.993	0.964	1.023

*Reference category R^2 (coefficient of determination) = 16.9% to 22.6%

With one-year increase in age of mothers, under-five's were less likely to have high child feeding index with an odds' of 0.987. The association between age and having good child feeding index was not statistically significant (p = 0.432) (95%CI = 0.955 - 1.020).

Married mothers compared to singles were less likely to have under-fives' with high child feeding index with an odds' of 0.995. This was not statistically significant (p = 0.994) (95% CI = 0.228 - 4.333).

Respondents with tertiary level of education compared to those with no formal education were more likely to have under-fives' with high child feeding index with an odds' of 14.035. This was however statistically significant (p = 0.001) (95% CI = 2.837 - 69.425).

Respondent's spouse with tertiary level of education compared with those with no formal education were less likely to have under-fives' with high child feeding index with an odds' of 0.183. This was however not statistically significant (p = 0.061) (95%CI = 0.031 - 1.078).

With an increase in the number of persons in the household, respondents were more likely to have under-fives' with high child feeding index with an odds' of 1.076. This was however not statistically significant (p = 0.344) (95%CI = 0.924 - 1.254).

With an increase in the number of under-fives' in the household, respondents were less likely to have under-fives' with high child feeding index with an odds' of 1.331. This was statistically significant (p = 0.035) (95%CI = 1.021 - 1.735).

Respondents with household income of ₦ 54,001 - 72,000 compared to those with an income less than ₦ 18,000 were less likely to have under-fives' with high child feeding index with an odds' of 0.359. This was statistically significant (p = 0.003) (95%CI = 0.184 - 0.702).

With one-year increase in age, under-fives' were more likely to have high child feeding index with an odds' of 1.024. The association between age and having good child feeding index was statistically significant (p = 0.001) (95%CI = 1.011 - 1.037).

Female under-fives' compared to males were less likely to have high child feeding index with an odds' of 0.728. This was however not statistically significant (p = 0.118) (95%CI = 0.490 - 1.083).

Under-five's children with a birth order of 4 to 6 compared to those with a birth order 1 to 3 were less likely to have high child feeding index with an odds' of 0.774. This was however not statistically significant (p = 0.378) (95%CI = 0.438 - 1.368).

Respondents in rich wealth quintile compared to those in the poorest were less likely to have under-fives' with high child feeding index with an odds' of 0.456. This was statistically significant (p = 0.016) (95%CI = 0.240 - 0.865).

With a year increase in duration lived in community, respondents less likely to have under-fives' with high child feeding index with an odds' of 0.993. This was however not statistically significant (p = 0.639) (95%CI = 0.964 - 1.023).

QUALITATIVE DATA ON FACTORS AFFECTING DIETARY PATTERN OF UNDER-FIVES IN BENIN-CITY

Focus group sessions were conducted to investigate the factors affecting infant and young child feeding of under-fives in Benin-City. The sessions were held across six selected wards in the study area. The finding revealed that all participants had good knowledge of Exclusive breast feeding and a reoccurring reason given for not practicing exclusive breast feeding was being a working mother. The most predominant food most mothers used to wean their child was *Akamu.* Most mothers fed their child on demand and randomly. Most mothers fed their child with a spoon and preferred cooking their child's food together with the general family food.

Most mothers stated that breast-milk was the first food given to a child immediately after birth. Also, they fondly referred to exclusive breastfeeding as '*Baby Friendly*".

''Baby friendly na breast milk for 6 months, you go start am from the first day you born your pikin.. I do my own for 6 months..i no add water.. baby friendly good, na im dey make your pikin strong''… **30 year old Mother from Ikpema**

However, two mothers stated that breast milk and water from Saudi Arabia was the first food to be given to a child after birth;

'*for me … as i born my pikin na only breast I give am and water wey dey come from Saudi Arabia…That baby friendly i no do am oo, ..* i dey give my pikin breast and food .. e dey chop, e dey drink water too………' **…- 28 year old Mother from Obakhareye**

*'The first food wey you suppose give your pikin nah breast milk and water from Saudi Arabia………….'***-*26 year old Mother from Obakhareye***

Some participants did not practice *Baby friendly* for six months. The recurring reasons they gave for not practicing *baby friendly* for six months was being a working mother and getting tired of practicing it.

'Baby friendly na when u dey give your pikin only breast milk for 6 months, you go start am from the first day you born your pikin.. I do my own for only 3months sha.. after that 3months i begin add water .. i do am like that because i dey work and i no get time''… ***30 year old Mother from Evabreke***

'*Baby friendly na breast milk without water … i do my own for three months.. i just tire so i stop kon dey add water …for me challenge no dey sha''* **… 30 year old Mother from Aduwawa**

Few participants who did not practice it at all gave the reason that after birth their breasts couldn't produce milk immediately so they had to introduce baby food to soothe the crying baby.

'*from when i born my pikin my breast no quick rush … so e dey cry too much ,, na im my people help me buy baby food i begin give am..''* **30 year old mother from Ikpema**

The month at which mothers stopped exclusive breastfeeding was immediately followed up by complementary feeding except for mothers who already started complementary feeding from birth. The most reoccurring food mothers used to wean their child was *AKAMU*. The reasons

they gave for choosing *AKAMU* was its easiness to prepare and that it was the normal food used for weaning a child.

'Just like i talk before ...as e reach 3months i stop baby friendly begin give am akamu .. i dey add peakmilk to my akamu.. i choose Akamu because na so dem dey do am *and plus say akamu easy to prepare… my pikin like am too'' - **28year old mother from Ikpema***

Me i been do baby friendly so after the 6months i begin give my pikin Akamu ...sometimes i dey grind crayfish put for beans give my pikin ...though na the akamu e dey chop pass.. - 26 year old mother from Aduwawa

All participants stated that they fed their children randomly and on demand. The most reoccurring number of times a child was fed in a day was thrice. However there were a few outlier cases of feeding five times a day.

*'Ah my pikin dey chop ooo .well well.. i dey feed am reach five times a day… because na for night e dey chop pass oo.. e no dey gree person sleep.. e dey hard before e no gree chop .. execpt say e dey sick'… **26 year old mother from Ikpema***

Most participants stated that they fed their child with a spoon. They also stated that their children had good appetite and ate willingly except on cases when they were sick. Most mothers stated that they preferred cooking the child's food together with the general family food so that the child to gets accustomed to the family feeding.

''yes oo same thing with my pikin na ony when e dey sick wey e dey reject food.. normal normal e dey chop…like three times a day… I dey cook my pikin food with general food make e master am''..... **34 year old mother from Ugbekun**

However, few mothers preferred cooking the food separate from family diet.. All mothers agreed that there was no challenge faced while practicing complementary feeding.

''na spoon i dey take feed am.. if na garri i dey use hand mould the ball small small give am.. i dey cook my pikin food separate because i dey like make e don well well....'' **32 year old mother from Ikpema**

''……….i dey cook my pikin food separate ooo.. because of pepper… and make i fit know the quantity e dey chop… **'' 30 year old mother from Evabreke**

SECTION D: NUTRITIONAL STATUS OF MOTHER-CHILD PAIR IN BENIN-CITY, EDO STATE

Table 15: Anthropometric characteristics of under-five children

Variable	Frequency	Percent
Height-for-Age (n=691)*		
Normal	395	57.2
Stunted	77	11.1
Severely stunted	219	31.7
Weight-for-Age (n=711)*		
Normal	693	89.9
Underweight	38	4.9
Severely underweight	40	5.2

Weight-for-Height (n=666)*		
Normal	313	47.0
Wasted	33	4.9
Severely wasted	29	4.4
Overweight	71	10.7
Obese	220	33.0
BMI-for-Age (n=691)*		
Normal	307	44.4
Wasted	31	4.5
Severely wasted	32	4.6
Overweight	78	11.3
Obese	243	35.2
Mid Upper Arm Circumference (n=598)		
Normal	457	76.4
Borderline	26	4.4
Undernourished	115	19.2

***Missing data due to incomplete information**

Three hundred and ninety-five (57.2%) under-five respondents' had normal height for age while 219 (31.7%) were severely stunted. Six hundred and ninety-three (89.9%) under-five respondents' had normal weight for age while 40 (5.2%) respondents' were severely underweight. Three hundred and thirteen (47.0%) under-five respondents' had normal weight for height while 220 (33.0%) were obese.

Three hundred and seven (44.4%) under-five respondents' had normal BMI for age while 243 (35.2%) respondents' were obese. Four hundred and fifty-seven (76.4%) under-five respondents' had normal mid upper arm circumference while 115 (19.2%) were undernourished.

Table 16: Maternal anthropometric characteristics

Variable	Frequency (n=771)	Percent
BMI		
Normal	49	6.4
Underweight	260	33.7
Overweight	242	31.4
Obese	220	28.5

Forty-nine (6.4%) mothers' had normal BMI for age while 220 (28.5%) respondents' were obese.

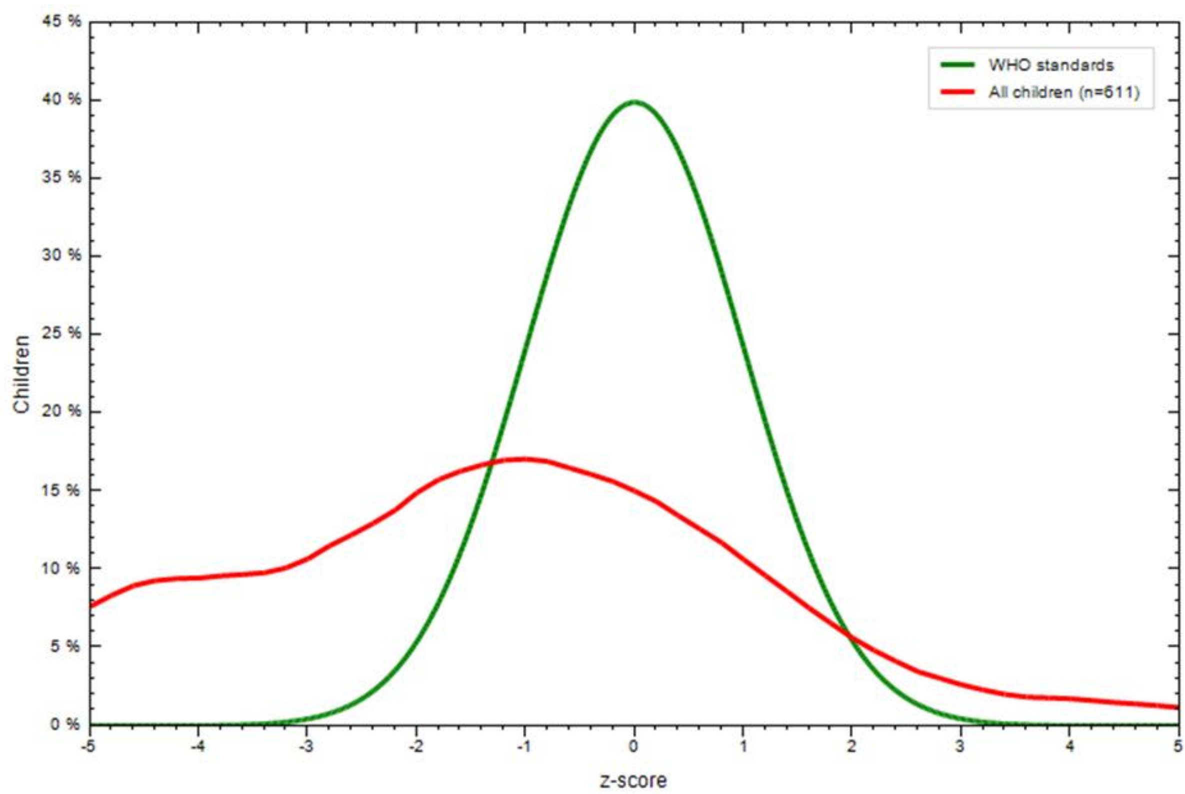

Figure 2: Distribution of Z-Score for Height for Age of under-five respondents compared with WHO standard

Three hundred and ninety-five (51.2%) of children had normal height for age, 77 (10.0%) were stunted (z-score <-2SD) and 219 (28.4%) were severely stunted.

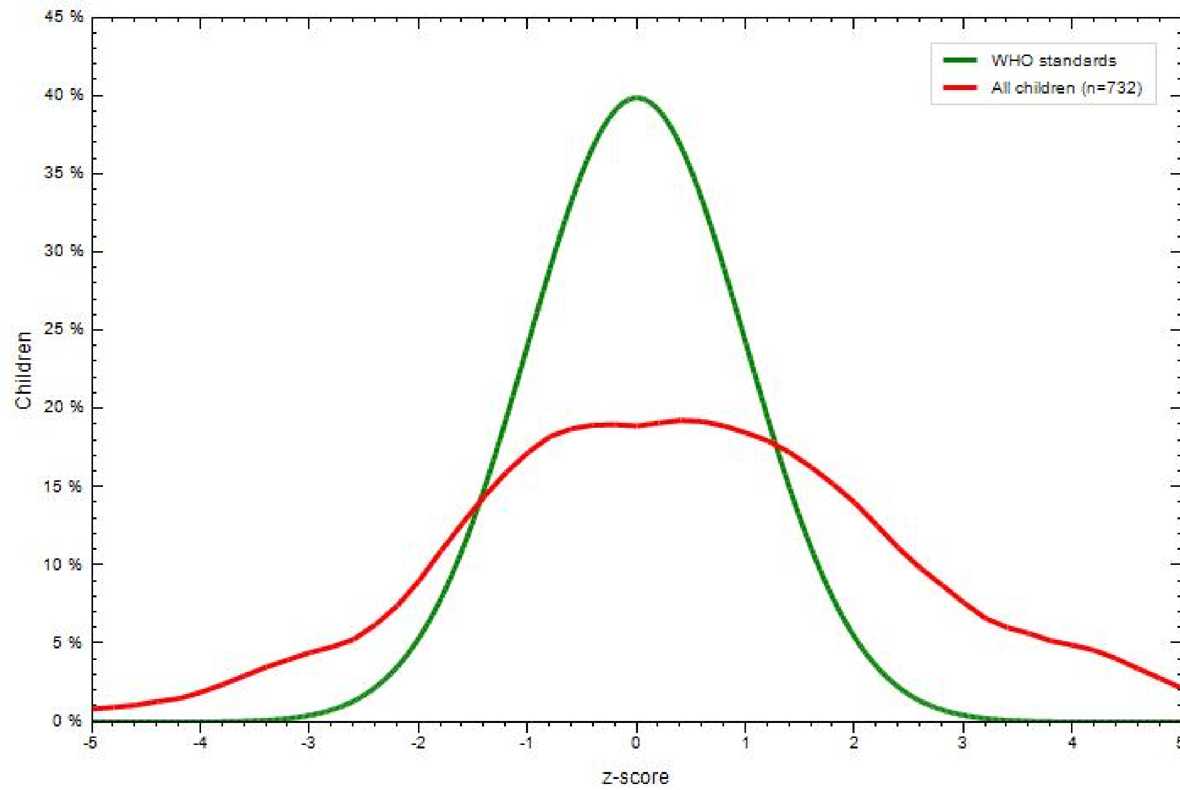

Figure 3: Distribution of Z-Score for Weight for Age of under-five respondents compared with WHO standard

Six hundred and ninety-three (89.9%) of children had normal weight for age, 38 (4.9%) were underweight (z-score <-2SD) and 40 (5.2%) were severely underweight.

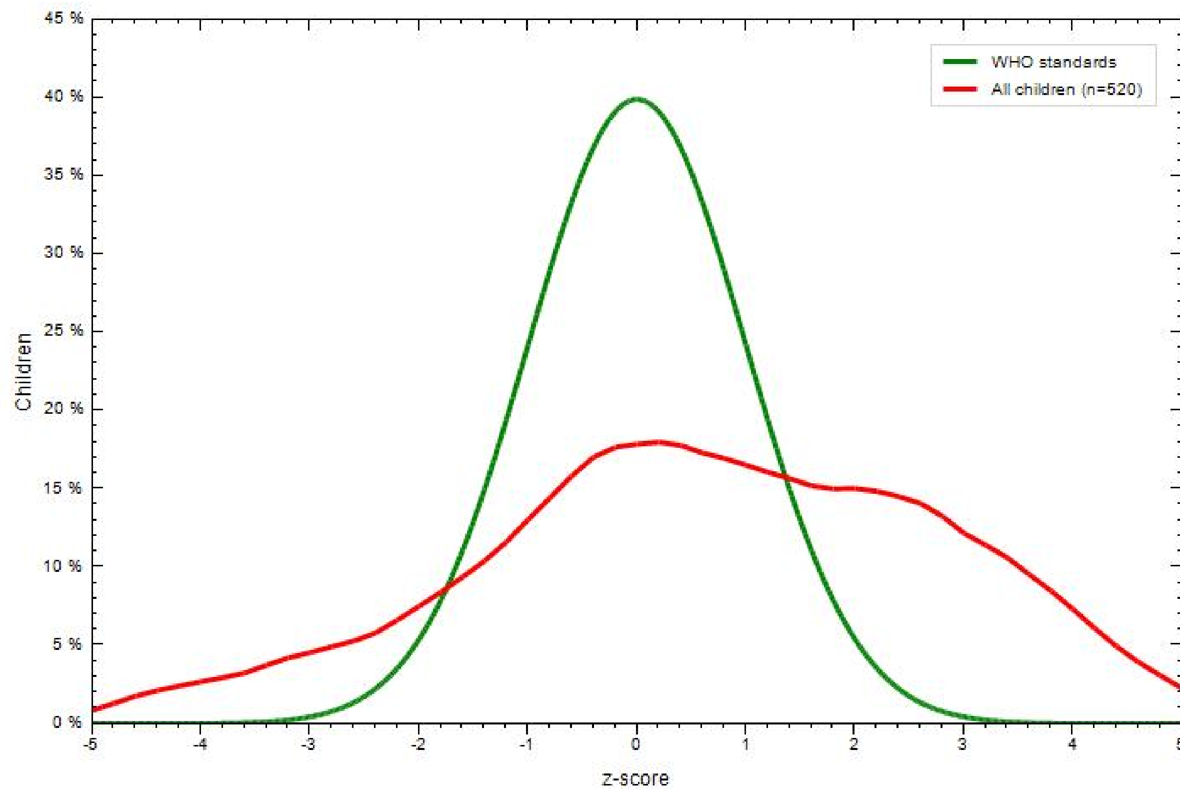

Figure 4: Distribution of Z-Score for Weight for Height of under-five respondents compared with WHO standard

Three hundred and thirteen (40.6%) of children had normal weight for height, 33 (4.3%) were wasted (z-score <-2SD) and 71 (9.2%) were overweight.

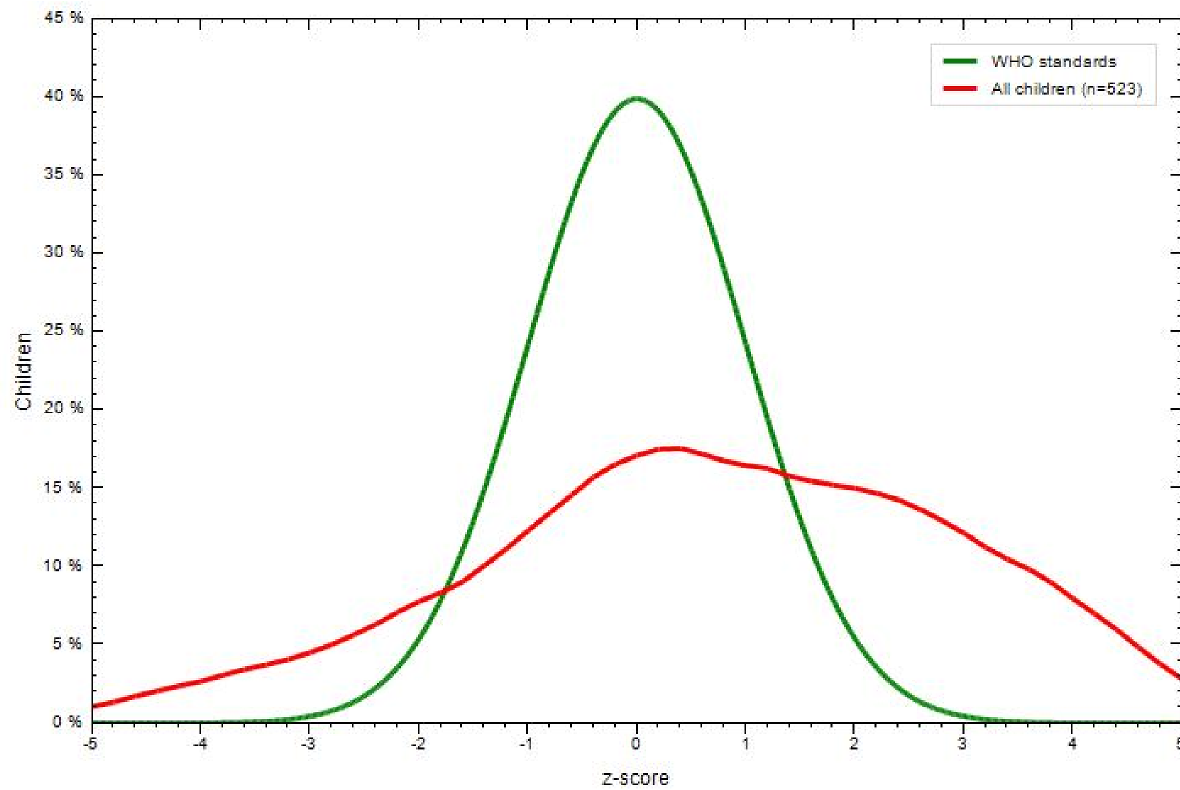

Figure 5: Distribution of Z-Score for BMI for Age of under-five respondents compared with WHO standard

Three hundred and seven (39.8%) of children had normal BMI for age, 31 (4.0%) were wasted (z-score <-2SD) and 78 (10.1%) were overweight.

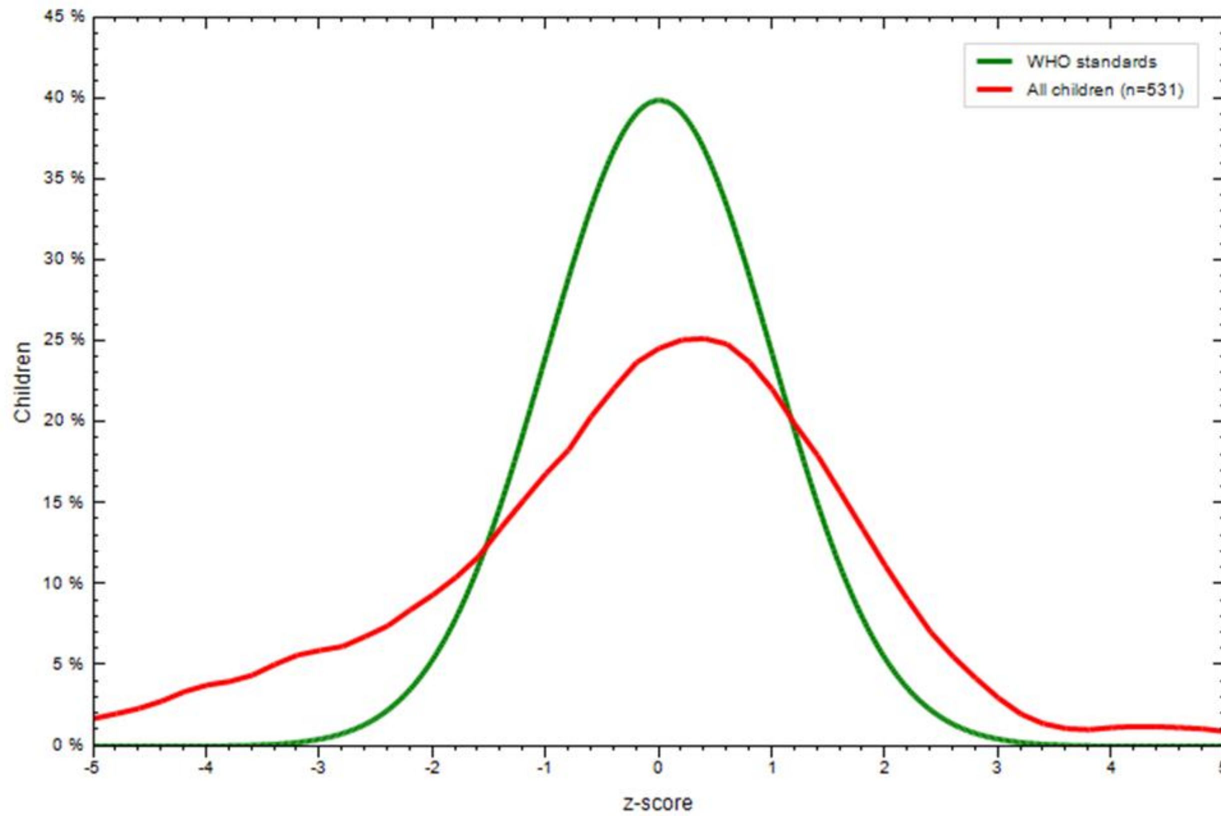

Figure 6: Distribution of Z-Score of Mid upper arm circumference for under-five respondents compared with WHO standard

Four hundred and fifty-seven (76.4%) of children were normal, 26 (4.3%) had borderline features of being undernourished and 115 (19.2%) were undernourished.

SECTION E: FACTORS ASSOCIATED WITH THE NUTRITIONAL STATUS OF UNDER-FIVE CHILDREN IN BENIN-CITY

Table 17: Maternal demographic characteristics and Height for Age of under-five children

Variable	Height for Age (HFA) Normal (n = 395) n (%)	Height for Age (HFA) Abnormal (n = 296) n (%)	Test Statistics	p-value
Age group (years)				
15 -24	31 (60.8)	20 (39.2)	$\chi2 = 2.408$	0 .472
25 - 34	245 (58.2)	176 (41.8)		
35 - 44	109 (55.6)	87 (44.4)		
≥ 45	10 (43.5)	13 (56.5)		
Marital status				
Single	6 (66.7)	3 (33.3)	Fisher's =2.955	0.239
Married	388 (57.3)	289 (42.7)		
Divorced/Widowed/Separated	1 (20.0)	4 (80.0)		
Level of education				
No formal	27 (57.4)	20 (42.6)	$\chi^2 = 1.482$	0.690
Primary	82 (60.3)	54 (39.7)		
Secondary	238 (57.2)	178 (42.8)		
Tertiary	48 (52.2)	44 (47.8)		
Skill level				
Skill level 0	16 (42.1)	22 (57.9)	$\chi^2 = 9.472$	0.024
Skill level 1	0 (0.0)	0 (0.0)		
Skill level 2	353 (58.4)	251 (41.6)		
Skill level 3	11 (78.6)	3 (21.4)		
Skill level 4	14 (42.4)	19 (57.6)		
Spouse's skill level				
Skill level 0	0 (0.0)	2 (100.0)	Fisher's = 7.697	0.084
Skill level 1	54 (54.0)	46 (46.0)		
Skill level 2	280 (59.8)	188 (40.2)		
Skill level 3	37 (55.2)	30 (44.8)		
Skill level 4	24 (44.4)	30 (55.6)		
Number of persons' in				

household				
1- 6	314 (58.1)	226 (41.9)	$\chi^2 = 0.978$	0.353
7 and above	81 (53.6)	70 (46.4)		

Table 17 Continued: Maternal demographic characteristics and Height for Age of under-five children

Variable	Height for Age (HFA)		Test Statistics	p-value
	Normal (n = 395) n (%)	Abnormal (n = 296) n (%)		
BMI				
Normal	136 (57.6)	100 (42.4)	$\chi^2 = 7.840$	0.049
Underweight	13 (35.1)	24 (64.9)		
Overweight	129 (58.9)	90 (41.1)		
Obese	117 (58.8)	82 (41.2)		
Number of under-fives' in household				
1-3	276 (41.9)	382 (58.1)	$\chi^2 = 4.469$	0.046
4-6	20 (60.6)	13 (39.4)		
Average household income (₦)				
< 18,000	46 (60.5)	30 (39.5)	$\chi^2 = 2.870$	0. 583
18,001 - 36,000	133 (55.6)	106 (44.4)		
36,001 - 54,000	87 (53.0)	77 (47.0)		
54,001 - 72,000	62 (46.6)	71 (53.4)		
>72,000	16 (57.1)	12 (42.9)		

Thirty-one (60.8%) respondents aged 15 to 24 years of age had under-fives' with normal Height for Age compared to 10 (43.5%) aged 45 years and above. The association between age and Height for Age of under-fives' was not statistically significant (p = 0.492).

Three hundred and eighty-eight (57.3%) respondents' who were married had under-fives' with normal Height for Age compared to six (66.7%) who were single. The association between marital status and Height for Age of under-fives' was not statistically significant (p = 0.239).

Eighty-two (60.3%) respondents with primary level of education had under-fives' with normal Height for Age compared to 42 (52.2%) with tertiary level of education. The association between level of education and Height for Age of under-fives' was not statistically significant (p = 0.690).

Three hundred and fifty-three (58.4%) respondents who belong to Skill Level 2 had under-fives' with normal Height for Age compared to 11 (78.6%) who belonged to Skill Level 3. The association between Skill Level and Height for Age of under-fives' was statistically significant (p = 0.024).

Two hundred and eighty (59.8%) respondents spouse who belong to skill level 2 had under-fives' with normal Height for Age compared to 24 (44.4%) who belonged to Skill Level 4. The association between Skill Level of spouse and Height for Age of under-fives' was not statistically significant (p = 0.084).

Three hundred and fourteen (58.1%) respondents' with 1 to 6 persons in household had under-fives' with normal Height for age compared to 81 (53.6%) respondents' who had 7 or more persons in a household. The association between number of persons in household and Height for Age for under-fives' was not statistically significant (p = 0.353).

Two hundred and seventy-six (41.9%) respondents' with 1 to 3 under-fives' in household had under-fives' with normal Height for Age compared to 20 (60.6%) respondent's 4to 6 under-fives' in household. The association between number of under-fives' in households and Height for Age was not statistically significant (p = 0.046).

One hundred and thirty-three (55.6%) respondents with a monthly income of ₦ 18,001 - ₦ 36,000 compared to 16 (57.1%) respondents who earned more than ₦ 72,000. The association between average household income and Height for Age was not statistically significant (p = 0.583).

Table 18: Socio-demographic characteristics and Height for Age of under-five children

Variable	Height for Age (HFA) Normal (n = 395) n (%)	Height for Age (HFA) Abnormal (n = 296) n (%)	Test Statistics	p-value
Age of under-five (months)				
6-11	116 (70.3)	49 (29.7)	$\chi^2 = 18.612$	<0.001
12-23	74 (50.7)	72 (49.3)		
24-35	80 (59.7)	54 (40.3)		
36-47	64 (50.0)	64 (50.0)		
48-59	61 (51.6)	57 (48.3)		
Sex of under-five				
Male	197 (57.9)	143 (42.1)	$\chi^2 = 0.165$	0.701
Female	198 (56.4)	153 (43.6)		
Birth order of under-five				
1 - 3	249 (53.7)	215 (46.3)	$\chi^2 = 9.536$	0.008
4 - 6	75 (65.2)	40 (34.8)		
7 and above	3 (25.0)	9 (75.0)		
Child feeding index				
High	177 (60.4)	116 (39.6)	$\chi^2 = 2.189$	0.141
Low	218 (54.8)	180 (45.2)		
Wealth Quintile				
Poorest	55 (48.7)	58 (51.3)	$\chi^2 = 4.412$	0.360
Poorer	69 (57.5)	51 (42.5)		
Middle	69 (61.1)	44 (38.9)		
Richer	84 (59.2)	58 (40.8)		
Richest	55 (59.1)	38 (40.9)		
Missing*	63 (57.3)	47 (42.7)		

One hundred and sixteen (70.3%) of under-five respondents aged 6 to 11 months of age had normal Height for Age compared to 60 (51.6%) aged 48 to 59 months. The association between age and Height for Age of under-fives' was statistically significant ($p < 0.0001$).

One hundred and ninety-eight (56.4%) female under-fives' had normal Height for Age compared to 107 (49.8%) under-five males. The association between sex and Height for Age for under-fives' was not statistically significant ($p = 0.701$).

Two hundred and forty-nine (53.7%) under-fives' who belonged to birth order 1 to 3 had normal Height for Age compared to 3 (25.0%) under-fives' who belonged to birth order 7 and above. The association between birth order and Height for Age of under-fives' was statistically significant ($p = 0.008$).

Two hundred and eighteen (54.8%) respondents with low child feeding index had normal Height for Age compared to 177 (60.4%) under-fives' with high child feeding index. The association between child feeding index and Height for Age was not statistically significant ($p = 0.141$).
Eighty-four (59.2%) respondents who were richer on the wealth quintile had under-fives with normal Height for Age compared to sixty-nine (57.5%) who were poorer on the wealth quintile. The association between wealth quintile and Height for Age of under-fives' was not statistically significant ($p = 0.360$).

Table 19: Predictors of Height for Age of under-five children

Variables	B (regression coefficient)	p value	Odds ratio	95% C.I.	
				Lower	Upper
Mother's Age (years)	-0.007	0.666	0.993	0.961	1.026
Mothers marital status					
Single*			1		
Married	1.878	0.252	6.539	0.263	162.725
Divorced/Widowed/Separated	1.284	0.354	3.612	0.239	54.572
Mother's level of education					
No formal*			1		
Primary	-0.539	0.398	0.583	0.167	2.037
Secondary	-0.898	0.209	0.407	0.100	1.654
Tertiary	-0.943	0.267	0.389	0.074	2.061
Mother's Skill level					
Skill level 0*			1		
Skill level 2	0.090	0.888	1.094	0.312	3.832
Skill level 3	0.615	0.202	1.849	0.720	4.750
Skill level 4	1.326	0.154	3.765	0.608	23.311
Father's level of education					
No formal education*			1		
Primary	0.818	0.301	2.266	0.480	10.694
Secondary	1.189	0.169	3.284	0.603	17.891
Tertiary	1.157	0.205	3.179	0.531	19.020
Number of persons' in household	-0.093	0.228	0.912	0.784	1.060
Number of under-fives' residing in household	-0.052	0.683	0.949	0.738	1.220
Average monthly household income					
<18,000*			1		
18,001 - 36,000	-0.244	0.437	0.783	0.422	1.452
36,001 - 54,000	0.003	0.994	1.003	0.515	1.952
54,001 - 72,000	0.709	0.094	2.031	0.887	4.653
>72,000	-0.086	0.897	0.918	0.252	3.338
Childs' Age (months)	-0.005	0.411	0.995	0.982	1.008
Sex of child					
Male*			1		
Female	-0.172	0.395	0.842	0.566	1.251

Birth Order					
1 - 3*			1		
4 – 6	0.754	0.015	2.125	1.156	3.904
7 and above	-1.168	0.207	0.311	0.051	1.911

Table 19 Continued: Predictors of Height for Age of under-five children

Variable	B (regression coefficient)	p value	Odds ratio	95% C.I.	
				Lower	Upper
Wealth Quintile					
Poorest*			1		
Poorer	0.127	0.688	1.135	0.610	2.112
Middle	0.042	0.902	1.043	0.532	2.047
Richer	0.116	0.737	1.123	0.571	2.208
Richest	0.117	0.769	1.124	0.515	2.452
Child feeding index					
Low*			1		
High	-0.480	0.028	0.619	0.403	0.949
Years lived in community	-0.020	0.175	0.980	0.952	1.009

***Reference category R^2 (coefficient of determination) = 8.7% to 11.6%**

With one-year increase in age of mothers, under-five's were less likely to have normal Height for Age with an odds' of 0.993. This was however not statistically significant (p = 0.666) (95%CI = 0.961 - 1.026).

Married mothers compared to singles were more likely to have under-fives' with normal Height for Age with an odds' of 6.539. This was however not statistically significant (p = 0.252) (95%CI = 0.263 - 162.725).

Respondents with tertiary level of education compared to those with no formal education were less likely to have under-fives' normal Height for Age with an odd' of 0.389. This was however not statistically significant (p = 0.267) (95%CI = 0.074 - 2.061).

Respondents who belonged to Skills Level 4 compared with those in Skill Level 0 were more likely to under-fives' with normal Height for Age with an odds' of 3.765. This was however not statistically significant (p = 0.154) (95%CI = 0.608 - 23.311).

Respondents' spouses' with tertiary education compared with those with no formal education were more likely to have under-fives with normal Height for Age with an odds' of 3.179. This was however not statistically significant (p = 0.205) (95%CI = 0.531 - 19.020).

For an increase in the number of persons in the household, under-fives were less likely to have normal Height for Age with an odds' of 0.912. This was however not statistically significant (p = 0.228) (95%CI = 0.784 - 1.060).

For an increase in the number of under-fives' in households, the children were less likely to have normal Height for Age with an odds' of 0.949. This was however not statistically significant (p = 0.683) (95%CI = 0.738 - 1.220).

Respondents earning a monthly income of ₦ 54,001 - 72,000 compared to those earning less than ₦ 18,000 were more likely to have an under-five with normal Height for Age with an odds' of 2.031. This was however not statistically significant (p = 0.094) (95%CI = 0.887 - 4.653).

With one-year increase in age, under-fives' were less likely to have normal Height for Age with an odds' of 0.995. This was however not statistically significant (p = 0.411) (95%CI = 0.982 - 1.008).

Female under-fives' compared to males were less likely to have normal Height for Age with an odd of 0.842. This was however not statistically significant (p = 0.395) (95%CI = 0.566 - 1.251).

Under-fives' in birth order 4 to 6 compared to those in birth order 1 to 3 were more likely to have normal Height for Age with an odds' of 2.125. This was statistically significant (p = 0.015) (95%CI = 1.156 - 3.904).

Respondents' in the richest wealth quintile compared to those in poorest quintile were more likely to have under-fives' with normal Height for Age with an odds' of 1.124. This was however not statistically insignificant (p = 0.769) (95%CI = 0.515 - 2.452).

Under-fives' with high child feeding index compared to those with low feeding index were less likely to have normal Height for Age with an odds of 0.619. This was statistically significant (p = 0.028) (95%CI = 0.403 - 0.949).

For an increase in the duration lived in the community by respondents, under-fives' were less likely to have normal Height for Age with an odds' of 0.980. This was however not statistically significant (p = 0.175) (95%CI = 0.952 - 1.009).

Table 20: Maternal demographic characteristics and Weight for Age of under-five children

Variable	Weight for Age (WFA)		Test Statistics	p-value
	Normal (n = 691) n (%)	Abnormal (n= 80) n (%)		
Age group (years)				
15- 24	51 (89.5)	6 (10.5)	$\chi^2 = 0.660$	0.888
25 – 34	419 (90.3)	45 (9.7)		
35 – 44	196 (88.3)	26 (11.7)		
≥ 45	25 (89.3)	3 (10.7)		
Marital status				
Single	9 (100.0)	0 (0.0)	Fisher's = 0.345	0.771
Married	677 (89.4)	80 (10.6)		
Divorced/Widowed/Separated	5 (100.0)	0 (0.0)		
Level of education				
No formal	46 (92.0)	4 (8.0)	$\chi^2 = 2.029$	0.564
Primary	131 (87.3)	19 (12.7)		
Secondary	425 (90.8)	43 (9.2)		
Tertiary	91 (88.3)	12 (11.7)		
BMI				
Normal	235 (90.4)	25 (9.6)	$\chi^2 = 5.896$	0.117
Underweight	39 (79.6)	10 (20.4)		
Overweight	220 (90.9)	22 (9.1)		
Obese	197 (89.5)	23 (10.5)		
Skill Level *				
Skill level 0	37 (94.9)	2 (5.1)	Fisher's = 3.039	0.536
Skill level 1	1 (100.0)	0 (0.0)		
Skill level 2	611 (89.9)	69 (10.1)		
Skill level 3	13 (86.7)	2 (13.3)		
Skill level 4	29 (85.3)	5 (14.7)		
Spouse's Skill level				
Skill level 0	2 (100.0)	0 (0.0)	Fisher's = 1.013	0.905

Skill level 1	98 (89.1)	12 (10.9)		
Skill level 2	478 (90.0)	53 (10.0)		
Skill level 3	65 (91.5)	6 (8.5)		
Skill level 4	50 (87.7)	7 (12.3)		
Number of persons' in household				
1-6	539 (89.8)	61 (10.2)	χ^2 = 0.128	0.776
7 and above	152 (88.9)	19 (11.1)		

Table 20 Continued: Maternal demographic characteristics and Weight for Age of under-five children

Variable	Weight for Age (WFA)		Test Statistics	p-value
	Normal (n = 691) n (%)	Abnormal (n = 80) n (%)		
Number of under-fives' in household *				
1-3	654 (89.5)	77 (10.5)	Fisher's = 0.375	0.614
4-6	37 (92.5)	3 (7.5)		
Average monthly household income (₦) *				
<18,000	82 (92.1)	7 (7.9)	χ^2 = 2.717	0.675
18,001 - 36,000	235 (89.4)	28 (10.6)		
36,001 - 54,000	164 (87.7)	23 (12.3)		
54,001 - 72,000	99 (92.5)	8 (7.5)		
>72,000	27 (93.1)	2 (6.9)		

Four hundred and nineteen (90.3%) respondents aged 25 to 34 years had under-fives with normal Weight for Age compared to 196 (88.3%) respondents aged 35 to 44 years. The association between age and Weight for Age of under-fives' was not statistically significant (p = 0.888).

Six hundred and seventy-seven (89.4%) respondents' who were married had under-fives' with normal Weight for Age compared to 9 (100%) respondents who were single. The association between marital status and Weight for Age of under-fives' was not statistically significant (p = 0.771).

One hundred and thirty-one (87.3%) respondents with primary level of education had under-fives with normal Weight for Age compared to 91 (88.3%) respondent with tertiary level of education. The association between level of education and Weight for Age of under-fives' was not statistically significant (p = 0.564).

Six hundred and eleven (89.9%) respondents who belonged to Skill Level 2 had under-fives' with normal Weight for Age compared to 13 (86.7%) who belonged to Skill Level 3. The association between Skill Level and Weight for Age of under-fives' was not statistically significant (p = 0.536).

Four hundred and seventy-eight (90.0%) respondents spouses' who belong in skill level 2 had under-fives' with normal Weight for Age compared to 50 (87.7%) respondents spouses' who belonged to Skill Level 4. The association between Skill Level of respondent's spouses' and Weight for Age of under-fives' was not statistically significant (p = 0.905).

Five hundred and thirty-nine (89.8%) respondents' with 1 to 6 persons in household had under-fives' with normal Weight for Age compared to 152 (88.9%) respondents' who had 7 or more persons in a household. The association between number of persons in household and Weight for Age of under-fives' was not statistically significant (p = 0.776).

Seventy-seven (10.5%) respondents' with 1 to 3 under-fives' in household had under-fives' with normal Weight for Age compared to 3 (7.5%) respondent's with 4 to 6 under-fives' in household. The association between number of under-fives' in household and Weight for Age was not statistically significant (p = 0.614).

Two hundred and thirty-five (89.4%) respondents with a monthly income of ₦ 18,001 - ₦ 36,000 had under-fives' with normal Weight for Age compared to 27 (93.1%) respondents who earned more than ₦ 72,000. The association between average household income and Weighty for Age of under-fives' was not statistically insignificant (p = 0.675).

Table 21: Socio-demographic characteristics and Weight for Age of under-five children

Variable	Weight for Age (WFA) Normal (n= 693) n (%)	Weight for Age (WFA) Abnormal (n = 78) n (%)	Test Statistics	P value
Age of under-five (months)				
6-11	162 (93.6)	11 (6.4)	$\chi^2 = 5.553$	0.213
12-23	139 (87.4)	20 (12.6)		
24-35	144 (91.7)	13 (8.3)		
36-47	129 (88.4)	17 (11.6)		
48-59	119 (87.5)	17 (12.5)		
Sex				
Male	340 (90.4)	36 (9.6)	$\chi^2 = 0.237$	0.635
Female	353 (89.4)	42 (10.6)		
Birth order of under-five*				
1 - 3	455 (89.6)	53 (10.4)	$\chi^2 = 1.031$	0.466
4 - 6	124 (91.9)	11 (8.1)		
7 and above	11 (84.6)	2 (15.4)		
Child feeding index				
High	404 (91.0)	40 (9.0)	$\chi^2 = 1.413$	0.277
Low	289 (88.4)	38 (11.6)		
Wealth Quintile				
Poorest	121 (91.7)	11 (8.3)	$\chi^2 = 2.946$	0.589
Poorer	115 (86.5)	18 (13.5)		
Middle	112 (88.9)	14 (11.1)		
Richer	141 (90.4)	15 (9.6)		
Richest	95 (92.2)	8 (7.8)		

One hundred and sixty-two (93.6%) of under-five respondents aged 6 to 11 months of age had normal Weight for Age compared to 119 (87.5%) aged 48 to 59 months. The association between age and Weight for Age of under-fives' was not statistically significant (p = 0.213).

Three hundred and fifty-three (89.4%) female under-fives' had normal Weight for Age compared to 340 (90.4%) under-fives' who were male. The association between sex and Weight for Age was not statistically significant (p = 0.635).

Four hundred and fifty-five (89.6%) under-fives' who belonged to birth order 1 to 3 had normal weight for age compared to 11 (84.6%) under-fives' who belonged to birth order 7 and above. The association between birth order and Weight for Age of under-fives' was not statistically significant (p = 0.466).

Four hundred and four (91.0%) under-fives' with high child feeding index had normal Weight for Age compared to 289 (88.4%) under-fives with low child feeding index had normal Weight for Age. The association between child feeding index and Weight for Age of under-fives' was not statistically significant (p = 0.277).

One hundred and forty-one (90.4%) respondents who were richer on the wealth quintile had under-fives with normal Weight for Age compared to 115 (86.5%) were poorer on the wealth quintile. The association between wealth quintile and Weight for Age of under-fives' was not statistically significant (p = 0.589).

Table 22: Predictors of Weight for Age of under-five children

Variables	B (regression coefficient)	p value	Odds ratio	95% C.I.	
				Lower	Upper
Mothers' Age (years)	0.022	0.434	1.022	0.968	1.079
Mother's marital status					
Not married*			1		
Married	0.930	0.292	2.533	0.450	14.266
Mother's level of education					
No formal/Primary *			1		
Secondary/ Tertiary	0.171	0.748	1.186	0.419	3.361
Father's level of education					
No formal/Primary *			1		
Secondary/ Tertiary	-0.112	0.844	0 .894	0.291	2.746
Number of persons in household	-0.091	0.436	0.913	0.726	1.148
Number of under-five residing in household	-0.041	0.827	0.960	0.667	1.382
Average monthly household income (₦)					
<18,000*			1		
18,001 - 36,000	-1.077	0.096	0.341	0.096	1.212
36,001 - 54,000	-1.608	0.014	0.200	0.056	0.719
54,001 - 72,000	-1.063	0.169	0.346	0.076	1.572
>72,000	-0.723	0.560	0.485	0.043	5.530
Childs' Age	-0.008	0.447	0.992	0.972	1.012
Sex of Child					
Male*			1		
Female	-0.214	0.489	0.807	0.440	1.481
Birth Order					
1 - 3*			1		

4 – 6	0.239	0.605	1.270	0.513	3.144
7 and above	0.489	0.697	1.630	0.139	19.098

Table 22 Continued: Predictors of Weight for Age of under-five children

Variables	B (regression coefficient)	p value	Odds ratio	95% C.I.	
				Lower	Upper
Wealth Quintile					
Poorest*			1		
Poorer	-0.691	0.126	0.501	0.207	1.215
Middle	-0.067	0.901	0.936	0.326	2.681
Richer	-0.360	0.476	0.698	0.259	1.878
Richest	0.417	0.531	1.517	0.412	5.589
IYC group					
Low*			1		
High	0.247	0.461	1.281	0.664	2.471
Years lived in community	-0.025	0.237	0.975	0.935	1.017

***Reference category** **R^2 (coefficient of determination) = 3.8% to 8.0%**

With one-year increase in age of mothers, under-fives' were more likely to have normal Weight for Age with an odds' of 1.022. This association was not statistically significant (p = 0.434) (95%CI = 0.968 - 1.079).

Married mothers compared to not married mothers were more likely to have under-fives' with normal Weight for Age with an odds' of 2.533. This was however not statistically significant (p = 0.292) (95%CI = 0.450 - 14.266).

Respondents with tertiary level of education compared with those with no formal education were more likely to have under-fives' with normal Weight for Age with an odds' of 1.186. This was however not statistically significant (p = 0.748) (95%CI = 0.419 - 3.361).

Respondents' spouses' with tertiary level of education compared with spouses' with no formal education were less likely to have under-fives' with normal Weight for Age with an odds' of 0.894. This was however not statistically significant (p = 0.844) (95%CI = 0.291 - 2.746).

With an increase in number of persons' in the household, under-fives' were less likely to have normal Weight for Age with an odds' of 0.913. This was however not statistically significant (p = 0.436) (95%CI = 0.726 - 1.148).

With an increase in the number of under-fives' children in the household, under-fives' were less likely to have normal Weight for Age with an odds' of 0.960. This was however not statistically significant (p = 0.827) (95%CI = 0.667 - 1.382).

Respondents' who earned between ₦ 36,001 - 54,000 compared to those who earned less than ₦ 18,000 were less likely to have under-fives' with normal Weight for Age with an odd of 0.200. This was statistically significant (p = 0.014) (95%CI = 0.056 - 0.719).

With one-year increase in age, under-fives' were less likely to have normal Weight for Age with an odds' of 0.992. This association was not statistically significant (p = 0.447) (95%CI = 0.972 - 1.012).

Female under-fives' compared to males were less likely to have normal Weight for Age with an odds' of 0.807. This was however not statistically significant (p = 0.489) (95%CI = 0.440 - 1.481).

Under-fives' belonging to birth order 4 - 6 compared to those belonging to birth order 1 to 3 were more likely to have normal Weight for Age with an odds' of 1.270. This was however not statistically significant (p = 0.605) (95%CI = 0.513 - 3.144).

Respondents in the richest wealth quintile compared to those in the poorest quintile were more likely to have normal Weight for Age with an odds' of 1.517. This was however not statistically significant (p = 0.531) (95%CI = 0.412 - 5.589).

Under-fives' with high feeding index compared with those with low feeding index, were more likely to have normal Weight for Age with an odd of 1.281. This was however statistically insignificant (p = 0.461) (95%CI = 0.664 - 2.471).

With an increase in the duration lived in the community by respondents, under-fives' were less likely to normal Weight for Age with an odd of 0.975. This was however not statistically significant (p = 0.237) (95%CI = 0.935 - 1.017).

Table 23: Maternal demographic characteristics and Weight for Height of under-five children

Variable	Weight for Height: Normal (n = 313) n (%)	Weight for Height: Abnormal (n = 359) n (%)	Test Statistics	p value
Age group (years)				
15- 24	27 (52.9)	24 (47.1)	$\chi^2 = 3.235$	0.357
25- 34	181 (44.7)	224 (55.3)		
35 - 44	97 (51.1)	93 (48.9)		
≥ 45	8 (40.0)	18 (60.0)		
Marital status				
Single	5 (55.6)	4 (44.4)	Fisher's = 0.869	0.715
Married	306 (46.8)	348 (53.2)		
Divorced/Widowed/Separated	2 (66.7)	1 (33.3)		
Level of education				
No formal	23 (56.1)	18 (43.9)	$\chi^2 = 1.565$	0.671
Primary	60 (45.1)	73 (54.9)		
Secondary	188 (46.8)	214 (53.2)		
Tertiary	42 (46.7)	48 (53.3)		
BMI				
Normal	106 (46.1)	124 (53.9)	$\chi^2 = 5.813$	0.121
Underweight	11 (31.4)	24 (68.6)		
Overweight	97 (45.8)	115 (54.2)		
Obese	99 (52.4)	90 (47.6)		
Skill level				
Skill level 0	12 (33.3)	24 (66.7)	$\chi^2 = 3.550$	0.319
Skill level 1	0 (0.0)	0 (0.0)		
Skill level 2	278 (47.8)	304 (52.2)		
Skill level 3	8 (57.1)	6 (42.9)		
Skill level 4	14 (43.8)	18 (56.2)		
Spouses' skill level				
Skill level 0	1 (50.0)	1 (50.0)	Fisher's = 2.042	0.777
Skill level 1	43 (43.4)	56 (56.6)		
Skill level 2	216 (48.4)	230 (51.6)		

Skill level 3	32 (47.8)	35 (52.2)
Skill level 4	21 (40.4)	31 (59.6)

Table 23 Continued: Maternal demographic characteristics and Weight for Height of under-five children

Variable	Weight for Height		Test Statistics	p-value
	Normal (n = 313) n (%)	Abnormal (n = 359) n (%)		
Spouses' level of education				
No formal education	8 (44.4)	10 (55.6)	$\chi^2 = 0.116$	0.990
Primary	51 (47.7)	56 (52.3)		
Secondary	181 (46.6)	207 (53.4)		
Tertiary	73 (47.7)	80 (52.3)		
Number of persons' in the house				
1-6	241 (46.2)	281 (53.8)	$\chi^2 = 0.665$	0.451
7 and above	72 (50.0)	72 (50.0)		
Number of under-fives' in the household				
1 - 3	330 (52.1)	304 (47.9)	$\chi^2 = 4.806$	0.030
4 - 6	23 (71.9)	9 (28.1)		
Average monthly household income (₦)				
<18,000	37 (49.3)	38 (50.7)	$\chi^2 = 10.090$	0.040
18,001 - 36,000	103 (45.0)	126 (55.0)		
36,001 - 54,000	64 (40.0)	96 (60.0)		
54,001 - 72,000	56 (57.7)	41 (42.3)		
>72,000	8 (68.0)	17 (32.0)		

Eight (40.0%) respondents aged 45 years and above had under-fives' with normal Weight for Height compared to 27 (52.9%) respondents' aged 15 to 24 years. The association between age and Weight for Height of under-fives' was not statistically significant (p = 0.357).

Three hundred and six (46.8%) married respondents' had under-fives' with normal Weight for Height compared to 2 (66.7%) who were Divorced. The association between marital status and Weight for Height of under-fives' was not statistically significant ($p = 0.715$).

Sixty (45.1%) respondents with primary level of education had under-fives' with normal Weight for Height compared to 42 (46.7%) respondent with tertiary level of education. The association between level of education and Weight for Height of under-fives' was not statistically significant ($p = 0.671$).

Two hundred and seventy-eight (47.8%) respondents who belonged to Skill Level 2 had under-fives' with normal Weight for Height compared to 8 (57.1%) who belonged to Skill Level 3. The association between Skill Level and Weight for Height of under-fives' was not statistically significant ($p = 0.319$).

Two hundred and sixteen (48.4%) respondents' spouses' who belong in Skill Level 2 had under-fives' with normal Weight for Height compared to 21 (40.4%) spouses who belonged to Skill Level 4. The association between Skill Level of spouses and Weight for Height of under-fives' was not statistically significant ($p = 0.777$).

Fifty-one (47.7%) respondents' spouses' with primary level of education had under-fives' with normal Weight for Height compared to 73 (47.7%) respondents' spouses' with tertiary level of education. The association between spouses' level of education and Weight for Height of under-fives' was not statistically significant ($p = 0.990$).

Two hundred and forty-one (46.2%) respondents' with 1 to 6 persons in household had under-fives' with normal Weight for Height compared to 72 (50.0%) respondent in household with more than 7 persons. The association between number of persons in household and Weight for Height of under-fives' was not statistically significant ($p = 0.451$).

Three hundred and thirty (52.1%) respondents' with 1 to 3 under-fives' in household had under-fives' with normal Weight for Height compared to 23 (71.9%) respondent's with 4 to 6 under-fives' in household. The association between under-fives' in household and Weight for Height of under-fives' was statistically significant ($p = 0.030$).

One hundred and three (45.0%) respondents with a monthly income of ₦ 18,001 - ₦ 36,000 had under-fives' with normal Weight and Height of under-fives' compared to 8 (68.0%) respondents' who earned above ₦ 72,000. The association between average household income and Weight for Height of under-fives' was statistically significant (p = 0.040).

Table 24: Socio-demographic characteristics and Weight for Height of under-five children

Variable	Weight for Height		Test Statistics	p-value
	Normal (n = 313) n (%)	Abnormal (n = 353) n (%)		
Age of under-five (months)				
6-11	89 (55.3)	72 (44.7)	$\chi^2 = 9.231$	0.056
12-23	70 (50.0)	70 (50.0)		
24-35	58 (45.0)	71 (55.0)		
36-47	50 (40.3)	74 (59.7)		
48-59	45 (40.5)	66 (59.5)		
Sex				
Male	164 (49.9)	165 (50.1)	$\chi^2 = 2.122$	0.162
Female	149 (44.2)	188 (55.8)		
Birth Order of under-five				
1 - 3	197 (43.9)	252 (56.1)	$\chi^2 = 8.697$	0.013
4 - 6	65 (59.1)	45 (40.9)		
7 and above	4 (36.4)	7 (63.6)		
Child feeding index				
Low	143 (51.1)	137 (48.9)	$\chi^2 = 3.220$	0.084
High	170 (44.0)	216 (56.0)		
Wealth Quintile				
Poorest	42 (37.5)	70 (62.5)	$\chi^2 = 4.605$	0.330
Poorer	54 (47.0)	61 (53.0)		
Middle	55 (50.9)	53 (49.1)		
Richer	64 (46.7)	73 (53.3)		
Richest	38 (42.7)	51 (57.3)		

Eighty-nine (55.3%) under-fives' aged 6 to 11 months of age had normal Weight for Height compared to 45 (40.5%) aged 48 to 59 months. The association between age and Weight for Height of under-fives' was not statistically significant (p = 0.056).

One hundred and sixty-four (49.9%) male under-fives' had normal Weight for Height compared to 149 (44.2%) female under-fives'. The association between sex and Weight for Height of under-fives' was not statistically significant (p = 0.162).

One hundred and ninety-seven (43.9%) under-fives' who belonged to birth order 1 to 3 had normal Weight for Height compared to 4 (36.4%) under-fives' who belonged to birth order 7 and above. The association between birth order and Weight for Height of under-fives' was statistically significant (p = 0.013).

One hundred and seventy (44.0%) under-fives' with high child feeding index had normal Weight for Height compared to 143 (51.1%) under-fives' with low child feeding index. The association between child feeding index and Weight for Height of under-fives' was not statistically significant (p = 0.084).

Sixty-four (46.7%) respondents who were richer on the wealth quintile had under-fives with normal Weight for Height compared to 54 (47.0%) who were poorer on the wealth quintile. The association between wealth quintile and Weight for Height of under-fives' was not statistically significant (p = 0.330).

Table 25: Predictors of Weight for Height of under-five children

Variables	B (regression coefficient)	p value	Odds ratio	95% C.I.	
				Lower	Upper
Mothers' Age (years)	0.009	0.620	1.009	0.974	1.044
Mother's marital status					
Not married*			1		
Married	-0.907	0.277	0.404	0.079	2.074
Mother's level of education					
No formal*			1		
Primary	-1.288	0.051	0.276	0.076	1.005
Secondary	-1.433	0.050	0.239	0.057	0.999
Tertiary	-1.496	0.076	0.224	0.043	1.168
Father's level of education					
No formal education*			1		
Primary	1.111	0.178	3.039	0.603	15.320
Secondary	1.452	0.104	4.270	0.742	24.566
Tertiary	1.539	0.101	4.661	0.741	29.317
Number of persons' in household	0.105	0.177	1.111	0.954	1.295
Number of under-fives' residing in household	0.026	0.843	1.026	0.793	1.328
Average monthly household income					
<18,000*			1		
18,001 - 36,000	-0.410	0.196	0.664	0.356	1.236
36,001 - 54,000	-0.341	0.318	0.711	0.364	1.388
54,001 - 72,000	0.203	0.619	1.225	0.551	2.723
>72,000	-0.500	0.469	0.606	0.157	2.347
Child's Age (months)	-0.011	0.092	0.989	0.975	1.002
Sex of Child					
Male*			1		
Female	-0.242	0.239	0.785	0.526	1.174

Birth Order					
1 - 3*			1		
4 – 6	0.323	0.292	1.382	0.757	2.521
7 and above	-1.616	0.086	0.199	0.031	1.256

Table 25 Continued: Predictors of Weight for Height of under-five children

Variables				**95% C.I.**	
	B (regression coefficient)	**p value**	**Odds ratio**	**Lower**	**Upper**
Wealth Quintile					
Poorest*			1		
Poorer	0.700	0.034	2.015	1.055	3.846
Middle	0.775	0.028	2.172	1.085	4.344
Richer	0.685	0.055	1.985	0.986	3.993
Richest	0.341	0.396	1.407	0.640	3.093
Child feeding index					
Low*			1		
High	-0.308	0.162	0.735	0.477	1.132
Years lived in community	0.024	0.123	1.024	0.994	1.056

***Reference category** R^2 (coefficient of determination) = **8.6% to 11.6%**

With one-year increase in age of mothers, under-fives' were more likely to have normal Weight for Height with an odds' of 1.009. This association was not statistically significant (p = 0.620) (95%CI = 0.974 - 1.044).

Married mothers compared to singles were less likely to have under-fives' with normal Weight for Height with an odds' of 0.404. This was however not statistically significant (p = 0.277) (95%CI = 0.079 - 2.074).

Respondents with tertiary level of education compared with those with no formal education were less likely to have under-fives' with normal Weight for Height with odds' of 0.224. This was however not statistically significant (p = 0.076) (95%CI = 0.043 - 1.168).

Respondents' spouses' with tertiary level of education compared with those with no formal education were more likely to have under-fives' with normal Weight for Height with an odds' of 4.661. This was however not statistically significant (p = 0.101) (95%CI = 0.741 - 29.317).

With an increase in the number of persons in the respondents' household, under-fives' were more likely to have normal Weight for Height with an odds' of 1.111. This was however not statistically significant (p = 0.177) (95%CI = 0.954 - 1.295).

With an increase in the number of under-fives' children in the household, under-fives' were more likely to have normal Weight for Height with an odds' of 1.026. This was however not statistically significant (p = 0.843) (95%CI = 0.793 - 1.328).

Respondents who earned a monthly income of ₦54,001 - 72,000 compared to those earning less than ₦ 18,000, had under-fives' with normal Weight for Height with an odds' of 1.225. This was however not statistically significant (p = 0.619) (95%CI = 0.551 - 2.723).

With one-year increase in age of child, under-fives' were less likely to have normal Weight for Height with an odds' of 0.989. The association was not statistically significant (p = 0.092) (95%CI = 0.975 - 1.002).

Female under-fives' compared to males were less likely to have normal Weight for Height with an odds' of 0.785. This was however not statistically significant (p = 0.239) (95%CI = 0.526 - 1.174).

Under-fives' belonging to a birth order of 4 to 6 compared to those belonging to a birth order of 1 to 3, were more likely to have normal Weight for Height with an odds' of 1.382. This was however not statistically significant (p = 0.292) (95%CI = 0.757 - 2.521).

Respondents' in the middle wealth quintile compared to those in the poorest quintile were more likely to have under-fives' with normal Weight for Height with an odds' of 2.172. This was statistically significant (p = 0.028) (95%CI = 1.085 - 4.344).

Under-fives' with high feeding index compared with those with low feeding index were less likely to have normal Weight for Height with an odds' of 0.735. This was however not statistically significant (p = 0.162) (95%CI = 0.477 - 1.132).

With an increase in the duration lived in the community by respondents, under-fives' were more likely to normal Weight for Height with an odds' of 1.024. This was however not statistically significant (p = 0.123) (95%CI = 0.994 - 1.056).

Table 26: Maternal demographic characteristics and BMI for Age of under-five children

Variable	BMI for Age		Test Statistics	p-value
	Normal (n = 307) n (%)	Abnormal (n = 384) n (%)		
Age group (years)				
15 – 24	26 (51.0)	25 (49.0)	$\chi^2 = 2.855$	0.414
25 – 34	177 (42.0)	244 (58.0)		
35 – 44	94 (48.0)	102 (52.0)		
≥ 45	10 (43.5)	13 (56.5)		
Marital status				
Single	5 (55.6)	4 (44.4)	Fisher's = 0.624	0.837
Married	300 (44.3)	377 (55.7)		
Divorced/Widowed/Separated	2 (40.0)	3 (60.0)		
Level of education				
No formal	22 (46.8)	25 (53.2)	$\chi^2 = 0.546$	0.907
Primary	62 (54.4)	74 (45.6)		
Secondary	185 (44.5)	231 (55.5)		
Tertiary	38 (41.3)	54 (58.7)		
BMI				
Normal	103 (43.6)	133 (56.4)	$\chi^2 = 2.552$	0.466
Underweight	14 (37.8)	23 (62.2)		
Overweight	93 (42.5)	127 (57.5)		
Obese	97 (48.7)	102 (51.3)		
Skill Level				
Skill level 0	11 (28.9)	27 (71.1)	$\chi^2 = 4.500$	0.206
Skill level 1	0 (0.0)	0 (0.0)		
Skill level 2	275 (45.5)	329 (54.5)		
Skill level 3	7 (50.0)	7 (50.0)		
Skill level 4	13 (39.4)	20 (60.6)		
Spouses' skill level				
Skill level 0	1 (50.0)	1 (50.0)	Fisher's = 4.115	0.379
Skill level 1	39 (39.0)	61 (61.0)		

Skill level 2	217 (46.4)	251 (53.6)
Skill level 3	31 (46.3)	36 (53.7)
Skill level 4	19 (35.2)	35 (64.8)

Table 26 Continued: Maternal demographic characteristics and BMI for Age of under-five children

Variable	BMI for Age		Test Statistics	p-value
	Normal (n = 307) n (%)	Abnormal (n = 384) n (%)		
Spouses' level of education				
No formal education	7 (35.0)	13 (65.0)	$\chi^2 = 0.903$	0.839
Primary	52 (46.4)	60 (53.6)		
Secondary	178 (44.4)	223 (55.6)		
Tertiary	70 (44.3)	88 (55.7)		
Number of persons' in the house				
1-6	235 (43.5)	305 (56.5)	$\chi^2 = 0.829$	0.405
7 and above	72 (47.7)	79 (52.3)		
Number of under-fives' in the household				
1 - 3	361(54.9)	297 (45.1)	$\chi^2 = 2.801$	0.108
4 - 6	23 (69.7)	10 (30.3)		
Average monthly household income (₦)				
<18,000	33 (43.4)	43 (56.6)	$\chi^2 = 6.529$	0.167
18,001 - 36,000	104 (43.5)	135 (56.5)		
36,001 - 54,000	66 (40.2)	98 (59.8)		
54,001 - 72,000	52 (52.5)	47 (47.5)		
>72,000	8 (28.6)	20 (71.4)		

One hundred and seventy-seven (42.0%) respondents aged 25 to 34 years of age had under-fives' with normal BMI for age compared to 26 (51.0%) respondents' aged 15 to 24 years. The association between age and BMI for age of under-fives' was not statistically significant (p = 0.414).

Three hundred (44.3%) married respondents' had under-fives' with normal BMI for age compared to 5 (55.6%) single respondents. The association between marital status and BMI for age of under-fives' was not statistically significant (p = 0.837).

Sixty-two (54.4%) respondents with primary level of education had under-fives' with normal BMI for age compared to 38 (41.3%) respondent with tertiary level of education. The association between level of education and BMI for age of under-fives' was not statistically significant (p = 0.907).

Two hundred and seventy-five (45.5%) respondents who belonged to Skill Level 2 had under-fives' with normal BMI for age compared to 7 (50.0%) respondents who belonged to Skill Level 3. The association between Skill Level and BMI for age of under-fives' was not statistically significant (p = 0.206).

Two hundred and seventeen (46.4%) respondents spouses' who belonged to Skill Level 2 had under-fives' with normal BMI for age compared to 19 (35.2%) spouses' who belonged to Skill Level 4. The association between skill level of spouse and BMI for age of under-fives' was not statistically significant (p = 0.379).

Fifty-two (46.4%) respondents' spouses' with primary level of education had under-fives' with normal BMI for age compared to 70 (44.3%) spouses' with tertiary level of education. The association between spouses' level of education and BMI for age of under-fives' was not statistically significant (p = 0.839).

Two hundred and thirty-five (43.5%) respondents' with 1 to 6 under-fives' in household had under-fives' normal BMI for age compared to 72 (47.7%) respondent who belonged to household with 7 or more members. The association between number of persons in a household and BMI for age of under-fives' was not statistically significant (p = 0.405).

Three hundred and sixty-one (54.9%) respondents' age 1 to 3 under-fives' in household had a majority range compared to twenty-three (69.7%) respondent's with 4 to 6 under-fives' in household. The association between under-fives' in household and BMI for age was not statistically significant (p = 0.167).

One hundred and four (43.5%) respondents with a monthly income of ₦ 18,001 - ₦ 36,000 had under-fives' with normal BMI for age compared to 8 (28.6%) respondents' who earned above ₦ 72,000. The association between average household income and BMI for age of under-fives' was not statistically significant (p = 0.167).

Table 27: Socio-demographic characteristics and BMI for Age of under-five children

Variable	BMI for Age		Test Statistics	p-value
	Normal (n = 307) n (%)	Abnormal (n = 385) n (%)		
Age of under-five (months)				
6-11	89 (53.9)	76 (46.1)	$\chi^2 = 8.773$	0.069
12-23	64 (43.8)	82 (56.2)		
24-35	56 (41.8)	78 (58.2)		
36-47	52 (40.3)	77 (59.7)		
48-59	46 (39.3)	71 (60.7)		
Sex				
Male	163 (47.9)	177 (52.1)	$\chi^2 = 3.345$	0.078
Female	144 (41.0)	207 (59.0)		
Birth Order of under-five*				
1 - 3	194 (41.8)	270 (58.2)	$\chi^2 = 9.689$	0.007
4 - 6	66 (57.4)	49 (42.6)		
7 and above	4 (33.3)	8 (66.7)		
Child feeding index				
High	166 (41.7)	232 (58.3)	$\chi^2 = 2.812$	0.104
Low	141 (48.1)	152 (51.9)		
Wealth Quintile*				
Poorest	38 (33.6)	75 (66.4)	$\chi^2 = 5.328$	0.251
Poorer	54 (45.0)	66 (55.0)		
Middle	53 (46.9)	60 (53.1)		
Richer	64 (45.1)	78 (54.9)		
Richest	38 (40.9)	55 (59.1)		

Eighty-nine (53.9%) of under-fives aged 6 to 11 months of age had normal BMI for age compared to 46 (39.3%) aged 48 to 59 months. The association between age and BMI for age of under-fives was not statistically significant (p = 0.069).

One hundred and sixty-three (47.9%) male under-fives' had normal BMI for age compared to 144 (41.0%) female under-fives'. The association between sex and BMI for age of under-fives' was not statistically significant (p = 0.078).

One hundred and ninety-four (41.8%) under-fives' who belonged to birth order 1 to 3 had normal BMI for age compared to 4 (33.3%) under-fives' who belonged to birth order 7 and above. The association between birth order and BMI for age of under-fives' was statistically significant (p = 0.007).

One hundred and sixty-six (41.7%) under-fives' with high child feeding index had normal BMI for age compared to 141 (48.1%) with low child feeding index. The association between child feeding index and BMI for age of under-fives' was not statistically significant (p = 0.104).
Sixty-four (45.1%) respondents who were richer on the wealth quintile had under-fives with normal BMI for age compared to 54 (45.0%) who were poorer on the wealth quintile. The association between wealth quintile and BMI for age of under-fives' was not statistically significant (p = 0.251).

Table 28: Predictors of BMI for Age of under-five children

Variables	B (regression coefficient)	p value	Odds ratio	95% C.I.	
				Lower	Upper
Mother's age (years)	0.006	0.729	1.006	0.973	1.040
Mother's marital status					
Not married*			1		
Married	-1.182	0.162	0.307	0.058	1.608
Mother's level of education					
No formal*			1		
Primary	-1.074	0.083	0.342	0.102	1.149
Secondary	-1.342	0.049	0.261	0.069	0.994
Tertiary	-1.365	0.087	0.255	0.054	1.217
Father's level of education					
No formal education*			1		
Primary	1.163	0.142	3.200	0.677	15.126
Secondary	1.300	0.126	3.669	0.694	19.409
Tertiary	1.334	0.138	3.795	0.652	22.099
Number of persons in household	0.126	0.105	1.135	0.974	1.322
Number of under-five residing in household	0.071	0.585	1.074	0.832	1.384
Average monthly household income (₦)					
<18,000*			1		
18,001 - 36,000	-0.242	0.439	0.785	0.425	1.450
36,001 - 54,000	-0.147	0.665	0.864	0.445	1.676
54,001 - 72,000	0.323	0.423	1.381	0.626	3.047
>72,000	-0.585	0.383	0.557	0.150	2.075
Child's age (months)	-0.013	0.059	0.987	0.974	1.000

Sex of Child					
Male*			1		
Female	-0.199	0.326	0.820	0.551	1.219
Birth Order					
1 - 3*			1		
4 - 6	0.318	0.292	1.375	0.761	2.485
7 and above	-1.820	0.047	0.162	0.027	0.977

Table 28 Continued: Predictors of BMI for Age of under-five children

Variables	**B (regression coefficient)**	**p value**	**Odds ratio**	**95% C.I.**	
				Lower	**Upper**
Wealth Quintile					
Poorest*			1		
Poorer	0.826	0.012	2.284	1.203	4.336
Middle	0.877	0.013	2.405	1.202	4.812
Richer	0.952	0.007	2.591	1.292	5.194
Richest	0.597	0.137	1.817	0.827	3.990
IYC group					
Low*			1		
High	-0.267	0.221	0.766	0.500	1.174
Years lived in community	0.022	0.140	1.023	0.993	1.053

***Reference category** **R^2 (coefficient of determination) = 8.9% to 12.0%**

With one-year increase in age of mothers, under-fives' were more likely to have normal BMI for age with an odds' of 1.006. This association was not statistically significant (p = 0.729) (95%CI = 0.973 - 1.040).

Married mothers compared to not married mothers were less likely to have under-fives' with normal BMI for age with an odds' of 0.307. This was however not statistically significant (p = 0.162) (95%CI = 0.058 - 1.608).

Respondents with tertiary level of education compared to those with no formal education were less likely to have under-fives' with normal BMI for age with odds' of 0.255. This was however not statistically significant (p = 0.087) (95%CI = 0.054 - 1.217).

Respondents' spouses' with tertiary level of education compared to spouses with no formal education were more likely to have under-fives' with normal BMI for age with an odds' of 3.795. This was however not statistically significant (p = 0.138) (95%CI = 0.652 - 22.099).

With an increase in number of persons in the households, under-fives' were more likely to have normal BMI for age with an odds' of 1.135. This was however not statistically significant (p = 0.105) (95%CI = 0.974 - 1.322).

With an increase in the number of under-fives' in the household, under-fives' were more likely to have normal BMI for age with an odds' of 1.074. This was however not statistically significant (p = 0.585) (95%CI = 0.832 - 1.384).

Respondents' who earned a monthly income of more than ₦ 72,000 compared to those who earned less than ₦ 18,000 were less likely to have under-fives' with a normal BMI for age with an odds' of 0.557. This was however not statistically significant (p = 0.383) (95%CI = 0.150 - 2.075).

With one-year increase in age of child, under-fives' were less likely to have normal BMI for age with an odds' of 0.987. This association was not statistically significant (p = 0.059) (95%CI = 0.974 - 1.000).

Female under-fives' compared to males were less likely to have normal BMI for age with an odds' of 0.820. This was however not statistically significant (p = 0.326) (95%CI = 0.551 - 1.219).

Under-fives' belonging to birth order 7 and above compared to under-fives' in birth order 1 to 3 were less likely to have normal BMI for age with an odds' of 0.162. This was statistically significant (p = 0.047) (95%CI = 0.027 - 0.977).

Respondents in the richer wealth quintile compared to poorest wealth quintile were more likely to have under-fives' with normal BMI for age with an odds' of 2.591. This was however statistically significant (p = 0.007) (95%CI = 1.292 - 5.194).

Under-fives' with high feeding index compared to those with low feeding index were more likely to have normal BMI for age with an odds' of 0.766. This was however not statistically significant (p = 0.221) (95%CI = 0.500 - 1.174).

With an increase in the duration lived in the community by respondents, under-fives' were more likely to normal BMI for age with an odd of 1.023. This was however not statistically significant (p = 0.140) (95%CI = 0.993 - 1.053).

Table 29: Maternal socio-demographic characteristics and MUAC of under-five children

Variable	MUAC for Age		Test Statistics	p-value
	Normal (n = 457) n (%)	Abnormal (n = 141) n (%)		
Age group(years)				
15- 24	27 (73.0)	10 (27.0)	Fisher's = 0.161	0. 568
25 – 34	272 (77.1)	81 (22.9)		
35 – 44	145 (78.0)	41 (22.0)		
≥ 45	13 (59.1)	9 (40.9)		
Marital status				
Single	5 (83.3)	1 (16.7)	Fisher's = 1.067	0.735
Married	447 (76.1)	140 (23.9)		
Divorced/Widowed/Separated	5 (100.0)	0 (0.0)		
Level of education				
No formal	34 (82.9)	7 (17.1)	$\chi^2 = 36.628$	<0.0001
Primary	9 (8.3)	100 (91.7)		
Secondary	252 (68.3)	117 (31,7)		
Tertiary	71 (89.9)	8 (10.1)		
Skill level				
Skill level 0	21 (63.6)	12 (36.4)	Fisher's = 4.436	0.346
Skill level 1	1 (100.0)	0 (0.0)		
Skill level 2	408 (77.4)	119 (22.6)		
Skill level 3	8 (72.7)	3 (27.3)		
Skill level 4	17 (70.8)	7 (29.2)		
BMI				
Normal	202 (77.7)	58 (22.3)	$\chi^2 = 6.859$	0.077
Underweight	30 (61.2)	19 (38.8)		
Overweight	181 (74.8)	61 (25.2)		
Obese	157 (71.4)	63 (28.6)		
Spouse's level of education				
No formal education	13 (76.5)	4 (23.5)	$\chi^2 = 18.178$	<0.0001

Primary	89 (89.9)	10 (10.1)		
Secondary	249 (70.7)	103 (29.3)		
Tertiary	106 (81.5)	24 (18.5)		
Spouse's skill level				
Skill level 0	2 (100.0)	0 (0.0)	Fisher's = 16.198	0.003
Skill level 1	69 (90.8)	7 (9.2)		
Skill level 2	305 (72.8)	114 (21.8)		
Skill level 3	47 (87.0)	7 (13.0)		
Skill level 4	34 (72.3)	13 (27.7)		

Table 29 Continued: Maternal demographic characteristics and MUAC of under-five children

Variable	MUAC for Age		Test Statistics	p-value
	Normal (n = 457) n (%)	Abnormal (n = 141) n (%)		
Number of persons in household				
1-6	355 (76.2)	111 (23.8)	$\chi^2 = 0.068$	0.794
7 and above	102 (77.3)	30 (22.7)		
Number of under-fives' in household				
1-3	446 (79.4)	116 (20.6)	$\chi^2 = 44.721$	<0.0001
4-6	11 (30.6)	25 (69.4)		
Average monthly household income (₦)				
0- 18,000	67 (90.5)	7 (9.5)	$\chi^2 = 49.016$	<0.0001
18,001 - 36,000	171(81.4)	39 (18.6)		
36,001 - 54,000	94 (68.1)	44 (31.9)		
54,001 - 72,000	36 (46.8)	41 (53.2)		
>72,000	10 (62.5)	6 (37.5)		

One hundred and forty-five (78.0%) respondents aged 35 to 44 years of age had under-fives with normal MUAC for age compared to 13 (59.1%) respondents aged 45 years and above. The association between age and MUAC for age of under-fives' was not statistically significant (p = 0.568).

Four hundred and forty-seven (76.1%) respondents' who were married had under-fives' with normal MUAC for age compared to 5 (83.3%) who were single. The association between marital status and MUAC for age of under-fives' was not statistically significant (p = 0.735).

Seventy-one (89.9%) respondents with tertiary level of education had under-fives' with normal MUAC for age compared to 9 (8.3%) respondent with tertiary level of education. The association between level of education and MUAC for age of under-fives' was statistically significant ($p < 0.0001$).

Four hundred and eight (77.4%) respondents who belonged to Skill Level 2 had under-fives' with normal MUAC for age compared to 8 (72.7%) respondents who belonged to Skill Level 3. The association between Skill Level and MUAC for age of under-fives' was not statistically significant ($p = 0.346$).

One hundred and six (81.5%) respondents' spouses' with tertiary level of education had under-fives' with normal MUAC for age compared to 89 (89.9%) respondents' spouses' with primary level of education. The association between spouses' level of education and MUAC for age of under-fives' was statistically significant ($p < 0.0001$).

Three hundred and five (72.8%) respondents spouse who belonged to Skill Level 2 had under-fives' with normal MUAC for age compared to 34 (72.3%) who belonged to Skill Level 4. The association between skill level of spouses' and MUAC for age of under-fives' was statistically significant ($p = 0.003$).

Three hundred and fifty-five (76.2%) respondents' with 1 to 6 persons in household had under-fives' with normal MUAC for age compared to 102 (77.3%) respondents' who had 7 or more persons in a household. The association between number of persons in household and MUAC for age of under-fives was not statistically significant ($p = 0.794$).

Four hundred and forty-six (79.4%) respondents' with 1 to 3 under-fives' in household had under-fives' with normal MUAC for age compared to 25 (69.4%) respondent's with 4 to 6 under-fives' in household. The association between number of under-fives' in household and MUAC for age was statistically significant ($p <0.0001$).

One hundred and seventy-one (81.4%) respondents with a monthly income of ₦ 18,001 - ₦ 36,000 had under-fives' with normal MUAC for age compared to 10 (62.5%) respondents' who earned more than ₦ 72,000. The association between average household income and MUAC for age of under-fives was statistically significant ($p < 0.0001$).

Table 30: Socio-demographic characteristics and MUAC of under-five children

Variable	MUAC for Age		Test Statistics	p-value
	Normal (n = 457) n (%)	Abnormal (n = 141) n (%)		
Age of under-five (months)				
12-23	114 (71.7)	45 (28.3)	$\chi^2 = 5.311$	0.150
24-35	116 (73.9)	41 (26.1)		
36-47	116 (79.5)	30 (20.5)		
48-59	111 (81.6)	25 (18.4)		
Sex *				
Male	233 (59.1)	61 (40.9)	$\chi^2 = 2.571$	0.109
Female	224 (73.7)	80 (26.3)		
Birth order of under-five *				
1 - 3	295 (72.8)	110 (27.2)	$\chi^2 = 5.004$	0.082
4 - 6	75 (78.1)	21 (21.9)		
7 and above	11 (100)	0 (0.0)		
Child feeding index				
Low	185(86.4)	29(13.6)	$\chi^2 = 18.595$	<0.0001
High	272(70.8)	112(29.2)		
Wealth Quintile *				
Poorest	74 (62.7)	44 (37.3)	$\chi^2 = 18.300$	<0.0001
Poorer	75 (78.1)	30 (21.9)		
Middle	79 (79.8)	20 (20.2)		
Richer	92 (78.6)	25 (21.4)		
Richest	59 (88.1)	8 (11.9)		

One hundred and fourteen (71.7%) of under-five respondents aged 6 to 11 months of age had normal MUAC for age compared to 111 (81.6%) aged 48 to 59 months. The association between age and MUAC for age of under-fives' was not statistically significant (p = 0.150).

Two hundred and thirty three (59.1%) male under-fives' had normal MUAC for age compared to 224 (73.7%) female under-fives'. The association between sex and MUAC for age of under-fives' was not statistically significant ($p = 0.109$).

Two hundred and ninety five (72.8%) under-fives' who belonged to birth order 1 to 3 had normal MUAC for age compared to 11 (100%) under-fives' who belonged to birth order 7 and above. The association between birth order and MUAC for age of under-fives' was not statistically significant ($p = 0.082$).

Two hundred and seventy-two (70.8%) under-fives with high child feeding index had normal MUAC for age compared to 185(86.4%) with low child feeding index had normal MUAC for age. The association between child feeding index and MUAC for age was statistically significant ($p < 0.0001$).

Ninety two (78.6%) respondents who were richer on the wealth quintile had under-fives with normal MUAC for age compared to 59 (88.1%) who were richest on the wealth quintile. The association between wealth quintile and MUAC for age of under-fives' was statistically significant ($p < 0.0001$).

Table 31: Predictors of MUAC of under-five children

Variables	B (regression coefficient)	p value	Odds ratio	95% C.I.	
				Lower	Upper
Mothers' Age (years)	-0.020	0.320	0.980	0.942	1.020
Mother's marital status					
Not married*			1		
Married	1.218	0.173	3.380	0.586	19.506
Mother's level of education					
No formal*			1		
Primary	1.793	0.011	6.007	1.512	23.866
Secondary	0.329	0.664	1.390	0.314	6.142
Tertiary	1.388	0.129	4.006	0.666	24.078
Father's level of education					
No formal education*			1		
Primary	-0.583	0.486	0.558	0.108	2.876
Secondary	-0.970	0.302	0.379	0.060	2.391
Tertiary	-0.275	0.783	0.759	0.107	5.407
Number of persons in household	0.056	0.550	1.058	0.880	1.271
Number of under-five residing in household	-0.569	0.000	0.566	0.426	0.753
Average household income (₦)					
<18,000*			1		
18,001 - 36,000	-0.194	0.615	0.824	0.386	1.757
36,001 - 54,000	-0.686	0.084	0.504	0.231	1.096
54,001 - 72,000	-1.922	0.0001	0.146	0.058	0.371
>72,000	-2.661	0.0001	0.070	0.016	0.305
Child age (months)	0.035	0.0001	1.036	1.019	1.053
Sex of Child					
Male*			1		
Female	-0.386	0.095	0.680	0.432	1.069

Birth Order					
1 - 3*			1		
4 - 6	0.377	0.274	1.458	0.742	2.863
7 and above	0.254	0.799	1.289	0.183	9.062

Table 31 Continued: Predictors of MUAC of under-five children

Variables	B (regression coefficient)	p value	Odds ratio	95% C.I.	
				Lower	Upper
Wealth Quintile					
Poorest*			1		
Poorer	0.312	0.355	1.366	0.706	2.643
Middle	0.584	0.127	1.793	0.847	3.795
Richer	1.282	0.001	3.604	1.689	7.689
Richest	1.477	0.002	4.381	1.723	11.138
Child feeding index					
Low*			1		
High	-0.292	0.251	0.747	0.454	1.229
Years lived in the community	0.027	0.130	1.027	0.992	1.063

*** Reference category R^2 (coefficient of determination) = 25.1% to 35.4%**

With one-year increase in age of mothers, under-fives' were less likely to have normal MUAC for age with an odds' of 0.980. This was not statistically significant (p = 0.320) (95%CI = 0.942 - 1.020).

Married mothers compared to not married mothers were more likely to have under-fives' with normal MUAC for age with an odds' of 3.380. This was however not statistically significant (p = 0.173) (95%CI = 0.586 - 19.506).

Respondents with tertiary level of education compared to those with no formal education were more likely to have under-fives' with normal MUAC for age with odds' of 4.006. This was however not statistically significant (p = 0.129) (95%CI = 0.666 - 24.078).

Respondents' spouses' with tertiary level of education compared to those with no formal education were less likely to under-fives with normal MUAC for age with an odds' of 0.759. This was however not statistically significant (p = 0.783) (95%CI = 0.107 - 5.407).

With an increase in the number of persons in the households, under-fives' were more likely to have normal MUAC for age with an odds' of 1.058. This was however not statistically significant (p = 0.550) (95%CI = 0.880 - 1.271).

With an increase in the number of under-fives,' in the household, children were less likely to have normal MUAC for age with an odds' of 0.566. This was statistically significant (p = 0.0001) (95%CI = 0.426 - 0.753).

Respondents' who earned an income of ₦ 54,001 - 72,000 compared to those who earned less than ₦ 18,000 were less likely to have under-fives' with normal MUAC for age with an odds' of 0.146. This was statistically significant (p = 0.0001) (95%CI = 0.058 - 0.371).

With one-year increase in age, under-fives' were more likely to have normal MUAC for age with an odds' of 1.036. This association was statistically significant (p = 0.0001) (95%CI = 1.019 - 1.053).

Female under-fives' compared to males were less likely to have normal MUAC for age with an odds' of 0.680. This was however not statistically significant (p = 0.095) (95%CI = 0.432 - 1.069).

Under-fives' in birth order 4 to 6 compared to those in 1 to 3 were more likely to have normal MUAC for age with an odd of 0.274. This was however not statistically significant (p = 0.274) (95%CI = 0.742 - 2.863).

Respondents in richer wealth quintile compared to those in the poorest quintile were more likely to have under-fives' with normal MUAC for age with an odds' of 3.604. This was statistically significant (p = 0.001) (95%CI = 1.689 - 7.689).

Under-fives' with high feeding index compared to those with low index were less likely to have good child MUAC for age with an odds' of 0.747. This was however not statistically significant (p = 0.251) (95%CI = 0.454 - 1.229).

With an increase in the duration lived in the community by respondents, under-fives' were more likely to have normal MUAC for age with an odds' of 1.027. This was however not statistically significant (p = 0.130) (95%CI = 0.992 - 1.063).

SECTION F: HISTORY OF ILLNESS OF UNDER-FIVE CHILDREN IN BENIN-CITY EDO STATE

Table 32: Physical characteristics of under-five children

Variable	Frequency (n=771)	Percent
Oedema		
Yes	0	0.0
No	771	100.0
Sunken eyes		
Yes	16	2.1
No	755	97.9
Protruding stomach		
Yes	19	2.5
No	752	97.5
Dehydrated Skin		
Yes	38	4.9
No	733	95.1
Emaciated ribs		
Yes	12	1.6
No	752	98.4
Thin brownish hair		
Yes	23	3.0
No	741	97.0

No under-five child had oedema; 16 (2.1%) had sunken eyes while 19 (2.5%) had protruding stomach. Dehydration was seen in 38 (4.9%) of under-fives' while 12 (1.6%) and 23 (3.0%) had emaciated ribs and thin brownish hair respectively.

Table 33: History of illness in the preceding two weeks among under-five children

Variable	Frequency	Percent
Reported illness in the past 2 week (n=771)		
Yes	264	34.2
No	507	65.8
History of Fever (n=771)		
Yes	119	15.4
No	652	84.6
Received treatment for Fever (n=119)		
Yes	63	52.9
No	56	47.1
Type of treatment received (n=63)		
Antibiotic	2	3.2
Anti-malarial	18	28.6
Antipyretic	41	65.0
Hospital/clinic	2	3.2
History of ARI (n=771)		
Yes	112	14.5
No	659	85.5
Received treatment for ARI (n=112)		
Yes	41	36.6
No	71	63.4
Type of Treatment (n =41)		
Antibiotic	2	4.9
Paracetamol	8	19.5
Cough/catarrh/vitamin syrup	31	75.6
History of diarrhoea (n = 771)		
Yes	39	5.1
No	732	94.9
Was there blood in child's stool (n = 39)		
Yes	4	10.3
No	35	89.7
Treatment of acute watery diarrhoea (n=39)		
Antibiotics	23	59.0
Oral Rehydration Salt	13	33.3
Water plain	2	5.1
Zinc supplement	1	2.6
History of worm in stool (n = 771)		
Yes	79	10.2
No	692	89.8

Previous history of fever was reported among 119 (15.4%) by their mothers; past history of ARI was reported among 112 (14.5%) under-fives'; diarrhoea by 39 (5.1%); blood in the stool among 4 (0.5%) and past history of worm in stool was reported among 79 (10.2%) under-fives'. Two hundred and sixty-four (34.2%) of under-fives' had a history of illness or symptoms in the two preceding weeks before the survey. Treatment for acute watery diarrhoea reported by respondents' included use of antibiotics (n=23) and use of ORS (n=13).

Treatment for ARI among under-fives' by respondents included antibiotic, 2(4.9%); paracetamol, 8 (19.5%) and cough/catarrh and vitamin syrup reported by thirty one (75.6%) respondents'.

Treatment for fever among under-fives' reported by respondents included use of antibiotic, 2 (3.2%); anti-malaria, 18 (28.6%) and use of antipyretics like paracetamol 41 (65.0%) while 2 (3.2%) respondents' reported taking the child to a hospital/clinic.

Table 34: Child health Practices of mothers

Variable	Frequency (n = 771)	Percent
History of deworming in past 6 months		
Yes	520	67.4
No	251	32.6
History of vitamin supplementation in past 6 months		
Yes	529	68.6
No	242	31.4
History of iron supplementation in past one week		
Yes	217	31.9
No	464	68.1

Five hundred and twenty (67.4%) respondents' reported deworming their under-five children in the past 6 months; 529 (68.6%) had given their under-fives' vitamin supplementation and 217 (31.9%) respondents reported giving their under-five children iron supplementation in the past 6 months.

Table 35: Immunization history of under-five children

Variable	Frequency (n=771)	Percent
Ever been immunized		
Yes	728	94.4
No	43	5.6
Vaccine Coverage		
BCG	744	99.9
Polio	689	94.1
DPT/Pentavalent	703	94.7
Yellow fever	662	91.1
Measles	669	91.5
Immunization status		
Fully immunization for age	638	82.7
Partially immunization	90	11.7
Not immunized	43	5.6

The majority, seven hundred and twenty-eight (94.4%) of respondents' under-fives' had ever received immunization. BCG vaccination was completed by 744 (99.9%) of under-fives', Polio Was completed by 689 (94.1%); Pentavalent vaccine, 703 (94.7%) complete; Yellow fever, 662 (91.1%) and Measles vaccination was completed by 669 (91.5%) of under-fives'. In Summary, six hundred and thirty-eight (82.7%) under-five children had completed immunization for age while ninety (11.7%) of under-fives' had not completed immunization.

SECTION G: FACTORS AFFECTING THE MORBIDITY PATTERN OF UNDER-FIVE CHILDREN

Table 36: Maternal demographic characteristics and history of illness of under-five children

Variable	History of illness: Yes (n = 264) n (%)	History of illness: No (n = 507) n (%)	Test statistics	p-value
Age group (years)				
15 - 24	25 (43.9)	32 (56.1)	$\chi^2 = 2.557$	0.465
25 - 34	156 (33.6)	308 (66.4)		
35 - 44	74 (33.3)	148 (66.7)		
45 and above	9 (32.1)	19 (67.9)		
Marital status				
Single	0 (0.0)	9 (1.8)	Fisher's = 5.292	0.059
Married	262 (34.6)	495 (65.4)		
Divorced/Widowed/Separated	2 (40.0)	3 (60.0)		
Level of education				
No formal	24 (48.0)	26 (52.0)	$\chi^2 = 12.847$	0.005
Primary	64 (43.7)	86 (56.3)		
Secondary	140 (29.9)	328 (70.1)		
Tertiary	36 (35.0)	67 (65.0)		
Skill level				
Skill level 0	11 (28.2)	28 (71.8)	Fisher's = 3.544	0.466
Skill level 1	0 (0.0)	1 (100.0)		
Skill level 2	231 (34.0)	449(66.0)		
Skill level 3	8 (53.3)	7 (46.7)		
Skill level 4	12 (35.3)	22 (64.7)		
Spouse's skill level				
Skill level 0	0 (0.0)	2 (100.0)	Fisher's = 1.285	0.892
Skill level 1	41 (37.3)	69 (62.7)		
Skill level 2	181 (34.1)	350 (65.9)		
Skill level 3	24 (33.8)	47 (66.2)		
Skill level 4	18 (31.6)	39 (68.4)		
Spouse's level of education				
No formal	7 (33.3)	14 (66.7)	Fisher's = 34.106	<0.0001
Primary	71 (56.3)	55 (43.7)		
Secondary	129 (28.5)	324 (71.5)		
Tertiary	57 (33.3)	114 (66.7)		

Table 36 Continued: Maternal demographic characteristics and history of illness of under-five children

Variable	History of illness (n = 771)		Test statistics	p-value
	Yes (n = 264) n (%)	No (n = 507) n (%)		
Number of persons' in the house				
1 - 3	35 (36.8)	60 (63.2)	$\chi^2 = 0.326$	0.861
4 - 6	171 (33.8)	334 (66.2)		
>7	58 (33.9)	113 (66.1)		
Number of under-fives' in the household				
1 - 3	260 (35.6)	471 (64.4)	$\chi^2 = 11.010$	<0.0001
4 – 6	4 (10.0)	36 (90.0)		
Average monthly household income (₦)				
0- 18,000	41 (46.1)	48 (53.9)	$\chi^2 = 13.594$	0.010
18,001 - 36,000	92 (35.0)	171 (65.0)		
36,001 - 54,000	52 (27.8)	135 (72.2)		
54,001 - 72,000	27 (25.2)	80 (74.8)		
>72,000	7 (24.1)	22 (75.9)		

Seventy-four (33.3%) respondents aged 35 to 44 years of age compared to 25 (43.9%) aged 15 to 24 years had under-fives' with a previous illness. The association between age and morbidity status of under-fives' was not statistically significant (p = 0.414).

Two hundred and sixty-two (34.6%) respondents' who were married compared to 2 (40.0%) who were Divorced/Widowed had under-fives' with a previous illness. The association between marital status and morbidity status of under-fives' was not statistically significant (p = 0.059).

Sixty-four (43.7%) respondents who had primary level of education compared to 36 (35.0%) with tertiary level of education. The association between level of education and morbidity status of under-fives' was statistically significant (p = 0.005).

Two hundred and thirty-one (34.0%) belonging to skill level 2 compared to 8 (53.3%) in skill level 3 had under-fives' with a previous illness. The association between skill level and morbidity status of under-fives' was not statistically significant ($p = 0.466$).

One hundred and eighty-one (34.1%) respondents spouses' belonging to skill level 2 compared to 18 (31.6%) in skill level 4 had under-fives' with a previous illness. The association between skill level of spouse and morbidity status of under-fives' was not statistically significant ($p = 0.892$).

Seventy-one (56.3%) respondents' spouses' with had primary level of education compared to 57 (33.3%) spouses' with tertiary level of education had under-fives with a previous illness. The association between spouses' level of education and morbidity status of under-fives' was statistically significant ($p < 0.0001$).

One hundred and seventy-one (33.8%) respondents with 4 to 6 members in the household compared to 58 (33.9%) in households with more than 7 persons had an under-five with a previous illness. The association between number of persons in household and morbidity status of under-fives' was not statistically significant ($p = 0.861$).

Two hundred and sixty (35.6%) respondents' with 1 to 3 under-fives' in the household compared to 4 (10.0%) in households with 4 to 6 under-fives' had an under-five with a previous illness. The association between number of under-fives' in household and morbidity status was statistically significant ($p < 0.0001$).

Ninety-two (35.0%) respondents with a monthly income between ₦18,001 - 36,000 compared to 7 (24.1%) respondents' who earned above ₦72,000 had under-fives' with a previous illness. The association between monthly household income and morbidity status of under-fives' was statistically significant ($p = 0.010$).

Table 37: Socio-demographic characteristics and history of illness of under-five children

Variable	History of illness Yes (n= 264) n (%)	History of illness No (n = 507) n (%)	Test Statistics	p-value
Age of under-five (months)				
6-11	67 (38.7)	106 (61.3)	$\chi^2 = 13.751$	0.008
12-23	68 (48.2)	91 (57.2)		
24-35	48 (30.6)	109 (69.4)		
36-47	48 (32.9)	98 (67.1)		
48-59	33 (24.3)	103 (75.7)		
Sex of under-five				
Male	148 (39.4)	228 (60.6)	$\chi^2 = 8.546$	0.004
Female	116 (29.4)	279 (70.6)		
Birth order of under-five *				
1 - 3	179 (35.2)	330 (64.8)	$\chi^2 = 10.917$	0.004
4 - 6	42 (31.1)	93 (68.9)		
7 and above	10 (76.9)	3 (23.1)		
History of completed immunization *				
Yes	215 (33.7)	423 (66.3)	$\chi^2 = 0.077$	0.813
No	29 (32.2)	61 (67.8)		
Wealth Quintile *				
Poorest	38 (28.8)	94 (71.2)	$\chi^2 = 3.565$	0.470
Poorer	47 (35.3)	86 (64.7)		
Middle	41 (32.5)	85 (67.5)		
Richer	47 (30.1)	109 (69.9)		
Richest	40 (38.8)	63 (61.2)		

Sixty-seven (38.7%) of under-fives' aged 6 to 11 months of age compared to 33 (24.3%) aged 48 to 59 months had a previous illness. The association between age and morbidity status of under-fives' was statistically significant (p = 0.008).

One hundred and forty-eight (39.4%) male under-fives' compared to 116 (29.4%) female under-fives' had a previous illness. The association between sex of under-fives' and morbidity status was statistically significant (p = 0.004).

One hundred and seventy-nine (35.2%) under-fives' belonging to birth order 1 to 3 compared to 10 (76.9%) in birth order 7 and above had a previous illness. The association between birth order of under-fives' and morbidity status was statistically significant (p = 0.004).

Two hundred and fifteen (33.7%) under-fives' who completed immunization compared to 29 (32.2%) who did not have completed immunization status for age had a previous illness. status. The association between completed immunization and morbidity status of under-fives was not statistically significant (p = 0.813).

Forty (38.8%) respondents' in the richest wealth quintile compared to 38 (28.8%) in the poorest wealth quintile had under-fives with a previous illness. The association between wealth quintile and morbidity status of under-fives was not statistically significant (p = 0.470).

Table 38: WASH practices and history of fever of under-five children

Variable	History of Fever Yes (n = 119) n (%)	History of Fever No (n = 652) n (%)	Test statistics	p-value
Main source of drinking water				
Piped borne	80 (13.7)	504 (86.3)	Fisher's = 6.613	0.070
Sachet	37 (20.8)	141 (79.2)		
Bottle	2 (28.6)	5 (71.4)		
Well	0 (0.0)	2 (100.0)		
Household refuse disposal*				
Use of waste managers	56 (15.3)	309 (84.7)	χ2 = 1.457	0.497
Burning	23 (11.8)	172 (88.2)		
Open dumping	18 (15.5)	98 (84.5)		
Type of toilet *				
Water closet	92 (18.6)	402 (81.4)	χ^2 = 14.106	<0.001
Pit latrine	16 (7.6)	195 (92.4)		
VIP toilet	5 (13.2)	33 (86.8)		

WASH - Water, Sanitation and Hygiene

Eighty (13.7%) under-fives who drank from pipe-borne water source had fever in the two weeks preceding the survey compared to 37 (20.8%) who drank from sachet water. The association between main source of drinking water and history of fever among under-fives was not statistically significant (p = 0.070).

Fifty-six (15.3%) under-fives who lived in households that used waste disposal managers had fever in the two weeks preceding the survey compared to 18 (15.5) who lived in households that practiced open dumping had diarrhoea. The association between method of refuse disposal and history of fever among under-fives was not statistically significant (p = 0.497).

Five (13.2%) under-fives who lived in households that used VIP toilet had fever in the two weeks preceding the survey compared to 92 (18.6%) who used the water closet toilet. The association between type of toilet used and history of fever among under-fives was statistically significant (p = 0.012).

Table 39: WASH practices and history of diarrhoea of under-five children

Variable	History of Diarrhoea		Test statistics	p-value
	Yes (n = 39) n (%)	No (n = 732) n (%)		
Main source of drinking water				
Piped borne	32 (5.5)	552 (94.5)	Fisher's = 1.269	0.725
Sachet	7 (3.9)	171 (96.1)		
Bottle	0 (0.0)	7 (100.0)		
Well	0 (0.0)	2 (100.0)		
Household refuse disposal*				
Use of waste managers	16 (4.4)	349 (95.6)	χ2 = 0.216	0.896
Burning	10 (5.1)	185 (94.9)		
Open dumping	6 (5.2)	110 (94.8)		
Type of toilet *				
Water closet	34 (6.9)	460 (93.1)	χ^2 = 8.865	0.012
Pit latrine	3 (1.4)	208 (98.6)		
VIP toilet	2 (5.3)	36 (94.7)		

WASH - Water, Sanitation and Hygiene

Thirty-two (5.5%) under-fives who drank from pipe-borne water source had diarrhoea in the two weeks preceding the survey compared to 7 (3.9%) who drank from sachet water. The association between main source of drinking water and history of diarrhoea among under-fives was not statistically significant (p = 0.725).

Six (5.2%) under-fives who lived in households that practiced open dumping had diarrhoea in the two weeks preceding the survey compared to 16 (4.4%) who used waste disposal managers. The association between method of refuse disposal and history of diarrhoea among under-fives was not statistically significant (p = 0.896).

Two (5.3%) under-fives who lived in households that used VIP toilet had diarrhoea in the two weeks preceding the survey compared to 34 (6.9%) who used the water closet toilet. The association between type of toilet used and history of diarrhoea among under-fives was statistically significant (p = 0.012).

Table 40: WASH practices and history of ARI of under-five children

Variable	History of ARI Yes (n = 112) n (%)	History of ARI No (n = 659) n (%)	Test statistics	p-value
Main source of drinking water				
Piped borne	77 (13.2)	507 (86.8)	Fisher's = 5.186	0.114
Sachet	35 (19.7)	143 (80.3)		
Bottle	0 (0.0)	7 (100.0)		
Well	0 (0.0)	2 (100.0)		
Household refuse disposal *				
Use of waste managers	50 (14.0)	315 (86.0)	χ2 = 0.328	0.849
Burning	24 (12.3)	171 (87.7`)		
Open dumping	14 (12.1)	102 (87.9)		
Type of toilet *				
Water closet	79 (16.0)	415 (84.0)	χ^2 = 8.030	0.019
Pit latrine	22 (10.4)	189 (89.6)		
VIP toilet	1 (2.6)	37 (97.4)		

WASH - Water, Sanitation and Hygiene

Seventy-seven (13.2%) under-fives who drank from pipe-borne water source had ARI in the two weeks preceding the survey compared to 35 (19.7%) who drank from sachet water. The association between main source of drinking water and history of ARI among under-fives' was not statistically significant (p = 0.114).

Fourteen (12.1%) under-fives who lived in households that practiced open dumping had ARI in the two weeks preceding the survey compared to 50 (14.0%) who used waste disposal managers. The association between method of refuse disposal and history of ARI among under-fives was not statistically significant (p = 0.849).

Twenty-two (10.4%) under-fives who lived in households that used pit latrine toilet had ARI in the two weeks preceding the survey compared to 79 (16.0%) who used the water closet toilet. The association between type of toilet used and history of ARI among under-fives was statistically significant (p = 0.019).

Table 41: WASH practices and history of blood in stool of under-five children

Variable	History of Blood in stool		Test statistics	p-value
	Yes (n = 4) n (%)	No (n = 50) n (%)		
Main source of drinking water				
Piped borne	2 (4.5)	42 (95.5)	Fisher's = 2.837	0.092
Sachet	2 (20.0)	8 (80.0)		
House refuse disposal *				
Use of waste managers	3 (13.0)	20 (87.0)	Fisher's = 2.324	0.373
Burning	0 (0.0)	17 (100.0)		
Open dumping	0 (0.0)	7 (100.0)		
Type of toilet *				
Water closet	4 (9.3)	39(90.7)	$\chi^2 = 0.808$	0.668
Pit latrine	0 (0.0)	6 (100.0)		
VIP toilet	0 (0.0)	2 (100.0)		

WASH - Water, Sanitation and Hygiene

Two (4.5%) under-fives who drank from pipe-borne water source had blood in their stool in the two weeks preceding the survey and also 2 (20.0%) who drank from sachet water also had blood in their stool. The association between main source of drinking water and history of blood in stool among under-fives was not statistically significant (p = 0.092)

Table 42: WASH practices and history of worm in stool of under-five children

Variable	History of worm in stool Yes (n = 79) n (%)	No (n = 311) n (%)	Test statistics	p-value
Main source of drinking water				
Piped borne	66 (18.6)	273 (81.4)	Fisher's = 1.617	0.432
Sachet	13 (26.5)	36 (73.5)		
Bottle	0 (0.0)	2 (100.0)		
Household refuse disposal *				
Use of waste managers	35 (21.2)	130 (78.8)	$\chi2 = 35.511$	<0.0001
Burning	6 (5.7)	99 (94.3)		
Open dumping	32 (42.7)	43 (57.3)		
Type of toilet *				
Water closet	22 (9.4)	211 (90.6)	$\chi^2 = 96.789$	<0.0001
Pit latrine	30 (25.9)	86 (74.1)		
VIP toilet	27 (84.4)	5 (15.4)		

WASH - Water, Sanitation and Hygiene

Sixty-six (18.6%) under-fives who drank from pipe-borne water source had worm in their stool in the two weeks preceding the survey compared to 13 (26.5%) who drank from sachet water. The association between main source of drinking water and history of worm in stool among under-fives was not statistically significant (p = 0.432).

Thirty-two (42.7%) under-fives who lived in households that practiced open dumping had worm in their stool in the two weeks preceding the survey compared to 35 (21.2%) who used waste disposal managers. The association between method of refuse disposal and history of worm in stool among the under-fives was statistically significant (p <0.0001).

Thirty (25.9%) under-fives who lived in households that used pit latrine toilet had worm in stool in the two weeks preceding the survey compared to 22 (9.4%) who used the water closet toilet. The association between type of toilet used and history of worm in stool among under-fives was statistically significant (p <0.0001).

Table 43: Predictors of morbidity status among under-five children

Variables	B (regression coefficient)	p value	Odds ratio	95% C.I.	
				Lower	Upper
Mothers' Age	-0.004	0.840	0.996	0.958	1.036
Mother's marital status					
Not married*			1		
Married	1.325	0.245	3.762	0.403	35.119
Mother's level of education					
No formal/Primary *			1		
Secondary/ Tertiary	0.211	0.577	1.235	0.588	2.591
Father's level of education					
No formal/Primary *			1		
Secondary/ Tertiary	-1.157	0.003	0.314	0.147	0.672
Number of persons in the house	0.066	0.444	1.069	0.902	1.266
Number of children under five residing in the house	-0.449	0.004	0.638	0.469	0.867
Average household income (₦)					
<18,000*			1		
18,001 - 36,000	-0.392	0.197	0.676	0.373	1.226
36,001 - 54,000	-0.850	0.012	0.427	0.221	0.828
54,001 - 72,000	-1.060	0.014	0.346	0.148	0.809
>72,000	-0.643	0.352	0.526	0.136	2.036
Childs' age (months)	-0.018	0.015	0.983	0.969	0.997
Sex of Child					
Male*			1		
Female	-0.544	0.012	0.580	0.380	0.887
Birth Order					
1 - 3*			1		
4 - 6	-0.459	0.155	0.632	0.336	1.189
7 and above	1.747	0.045	5.739	1.042	31.595

Table 43 Continued: Predictors of morbidity status among under-five children

Variables	B (regression coefficient)	p value	Odds ratio	95% C.I.	
				Lower	Upper
Wealth Quintile					
Poorest*			1		
Poorer	-0.012	0.971	0.988	0.510	1.913
Middle	0.168	0.640	1.183	0.585	2.395
Richer	-0.132	0.716	0.876	0.430	1.788
Richest	0.306	0.439	1.358	0.626	2.946
Child feeding index					
Low*			1		
High	-0.362	0.105	0.696	0.449	1.079
Duration in community (years)	-0.072	0.001	0.931	0.894	0.969

***Reference category R^2 (coefficient of determination) = 19.4% to 27.0%**

With one-year increase in age of mothers, under-fives were less likely to have a previous illness with an odd of 0.996. This association was not statistically significant (p = 0.840) (95%CI = 0.958 - 1.036).

Married mothers compared to not married mothers were more likely to have under-fives with a previous illness with an odd of 3.762. This was however not statistically significant (p = 0.245) (95%CI = 0.403 - 35.119).

Respondents with tertiary level of education compared with those with no formal education were more likely to have under-fives with a previous illness with an odd of 1.235. This was however not statistically significant (p = 0.577) (95%CI = 0.588 - 2.591).

Respondents' spouses with tertiary level of education compared with spouses with no formal education were less likely to have under-fives with a previous illness with an odd of 0.314. This was statistically significant (p = 0.003) (95%CI = 0.147 - 0.672).

With an increase in the number of persons in the house, under-fives were more likely to have a previous illness with an odd of 1.069. This was however not statistically significant (p = 0.444) (95%CI = 0.902 - 1.266).

With an increase in the number of under-five's children in the household, under-fives were less likely to have a previous illness with an odds of 0.638. This was statistically significant (p = 0.004) (95%CI = 0.469 - 0.867).

Respondents who earned between ₦ 36,001 - 54,000 compared to those who less than ₦ 18,000 were less likely to have under-fives with a previous illness with an odd of 0.427. This was statistically significant (p = 0.012) (95%CI = 0.221 - 0.828).

With one-year increase in age, under-fives were less likely to have a previous illness with an odds of 0.983. This association was statistically significant (p = 0.015) (95%CI = 0.969 - 0.997).

Female under-fives compared to males were less likely to have a previous illness with an odds of 0.580. This was however statistically insignificant (p = 0.012) (95%CI = 0.380 - 0.887).

Under-fives' belonging to birth order 7 and above compared to under-fives' in birth order 1 to 3 were more likely to have a previous illness with an odds of 5.739. This was statistically significant (p = 0.045) (95%CI = 1.042 - 31.595).

Respondents in the richest wealth quintile compared with those in the poorest wealth quintile were more likely to have under-fives with a previous illness with an odds of 1.358. This was however not statistically significant (p = 0.439) (95%CI = 0.626 - 2.946).

Under-fives' with high feeding index compared with under-fives with low feeding index were less likely to have a previous illness with an odds of 0.696. This was statistically significant (p = 0.001) (95%CI = 0.449 - 1.079).

With an increase in the duration of years lived in the community, under-fives were less likely to have a previous illness with an odds' of 0.931. This was statistically significant (p = 0.001) (95%CI = 0.894 - 0.969).

QUALITATIVE DATA ON FACTORS AFFECTING THE MORBIDITY PATTERN OF UNDER FIVES

Focus group sessions were carried out within six selected wards in the survey area. The findings revealed some factors that affect child health. Most mothers did not often assess their Childs' growth. Few mothers had knowledge of ARI. Most mothers had knowledge of deworming, fever, diarrhea and ORT. Most mothers still fed their child normally during the course of illness and sought medical advice.

All mothers agreed that they did not often check their child's weight and height except during the immunization when routine growth monitoring was carried out.

*'na only during immunization i dey check my pikin weight oo.. once e end (laughs) na there e end o... i no dey check again'…***28-year-old mother from ugbekun**

'aaah aaah who get that time .na for health centre oo during that immunization. nurses go dey check your pikin weight every time u go''. ***36-year-old mother from Aduwawa***

All mothers had knowledge of deworming and its importance. The most reoccurring time the mothers stated that they dewormed their child was every six months.

*'i dey deworm my pikin after every six months… deworming na to purge your pikin na.. e dey clean pikin belle, dey remove worm . e dey good for pikin.''….****32-year-old mother from Ikpema***

*'deworming na when u dey give your pikin purge medicine for every 3months or 6months. e depends on how you like do am..me i dey do my own every 6months'' …****30-year-old mother from obakharaye***

Only few mothers had knowledge of acute respiratory tract infections. All mothers had a good knowledge of Fever.

'i sabi say when my pikin get fever e body go dey hot well well and na paracetamol i dey give am and if e continue i fit treat am malaria but for that other one wey u explain so i never experience am for my pikin body before oo''. ***30-year-old mother from Obakharaye***

*'(laughs) who no sabi fever? Pikin body go dey hot... e go dey get headache ... na common thing na.. but u go reach chemist go buy fever medicine. respiratory tract infection eeeee. na when catarrh don block pikin noose and e no dey fit breathe well ... i dey go chemist go buy am antibiotics, then i fit dey baff am with hot water…**26-year-old mother from Evabreke***

All mothers had good knowledge of Diarrhea. Most Mothers stated that they fed their child as usual during diarrhea. . All mothers had good knowledge of oral rehydration therapy. The most frequently used form of ORT is the *Sachet ORT.* The reason they gave for using the *Sachet ORT* is accessibility and easiness to prepaation.

'' Diarrhea... na when pikin dey purge... e dey shit more than normal…. When my pikin get diarrhea i dey give am food and water as usual. though e fit dey delay before e chop... ORS na salt and sugar solution wey them dey give pikin when e dey purge so e go fit get strength .. Na the satchet one i know … and na during antenatal i take sabi am... Them dey share am for health centre sometimes . dem teach us say u go turn the satchet into 1 litre of clean water .. me i dey use eva bottle take measure my own.''…. ***30-year-old mother from Ikpema***

Generally, most mothers prefer to seek medical advice from private health workers, the reason they gave for this was low costs and good access.

*'since my aunty dey work for ubth I dey take my pikin go meet am. I prefer that one to health center because if i go them go talk pay this one, pay that one, you go come tire instead of them to save im life first them go dey demand for money. Money, money, do this one do that one, before you know time dey go pikin done die' but if na private nurse the person go say, o ya madam take this one quick to bring pikin temperature down fess, … '**29 year old mother from Aduwawa***

'i dey like go one chemist wey dey near my house because the person wey get am be nurse and i fit even call am for phone e go bring the drug come house come treat my pikin'.. ***34-year-old mother from Ugbekun***

'i dey call the nurse wey dey my compound make e treat am.. she no dey too charge and sometimes na free, she dey work for health centre too''.. ***30-year-old mother from Obakharaye***

SECTION H: ASSOCIATION BETWEEN NUTRITIONAL STATUS AND MORBDITY PATTERN OF UNDER-FIVE CHILDREN IN BENIN-CITY EDO STATE

Table 44: Nutritional status and history of fever in the preceding two weeks among under-fives

Anthropometric parameters	History of Fever Yes (n = 119) n (%)	No (n = 652) n (%)	Test Statistics	p-value
Height for Age (n = 691)*				
Abnormal	37 (12.5)	259 (87.5)	$\chi^2 = 5.243$	0.022
Normal	75 (19.0)	320 (81.0)		
Weight for Age (n = 771)				
Abnormal	11 (13.7)	69 (86.3)	$\chi^2 = 0.194$	0.660
Normal	108 (15.6)	583 (84.4)		
Weight for Height (n =666)*				
Abnormal	49 (13.9)	304 (86.1)	$\chi^2 = 2.324$	0.127
Normal	57 (18.2)	256 (81.8)		
BMI for Age (n = 691)*				
Abnormal	56 (14.6)	328 (85.4)	$\chi^2 = 1.681$	0.195
Normal	56 (18.2)	251(81.8)		
MUAC (n = 598)				
Abnormal	5 (3.5)	136 (96.5)	$\chi^2 = 16.580$	<0.0001
Normal	77 (16.8)	380 (83.2)		

Seventy-five (19.0%) under-fives with normal Height for Age had been ill with fever in the two weeks preceding the survey compared to 37 (12.5%) under-fives' who had an abnormal Height for Age. The association between Height for Age and history of fever among under-fives was statistically significant (p = 0.022)

One hundred and eight (15.6%) under-fives with normal Weight for Age had been ill with fever in the two weeks preceding the survey compared to 11 (13.7%) under-fives' who had an

abnormal weight for age. The association between Weight for Age and history of fever of under-fives was not statistically significant (p = 0.660)

Fifty-seven (18.2%) under-fives with normal Weight for Height had been ill with fever in the two weeks preceding the survey compared to 49 (13.9%) under-fives' who had an abnormal Weight for Height. The association between Weight for Height and history of fever among under-fives was not statistically significant (p = 0.127)

Fifty-six (14.6%) under-fives with normal BMI for age had been ill with fever in the two weeks preceding the survey compared to 56 (18.2%) under-fives' who had an abnormal BMI. The association between BMI for age and history of fever among under-fives was not statistically significant (p = 0.195)

Seventy-seven (16.8%) under-fives with a normal MUAC had been ill with fever in the two weeks preceding the survey compared to 5 (3.5%) under-fives' who had abnormal MUAC. The association between MUAC and history of fever of under-fives' was statistically significant (p <0.0001).

Table 45: Nutritional status and history of blood in child's stool among under-five children

Anthropometric parameters	History of Fever		Test Statistics	p-value
	Yes (n = 4) n (%)	No (n = 50) n (%)		
Height for age *				
Abnormal	3 (13.6)	19 (86.4)	Fishers = 1.696	0.193
Normal	1 (3.6)	27 (96.4)		
Weight for age				
Abnormal	0 (0.0)	6 (100.0)	Fishers = 0.540	0.462
Normal	4 (8.3)	44 (91.7)		
Weight for height *				
Abnormal	0 (0.0)	21(100.0)	Fishers = 2.588	0.108
Normal	3 (11.5)	23 (88.5)		
BMI for Age *				
Abnormal	1 (4.0)	24 (96.0)	Fishers = 1.087	0.297
Normal	3 (12.0)	22 (88.0)		
MUAC				
Abnormal	0 (0.0)	17 (100.0)	$\chi^2 = 1.985$	0.296
Normal	4 (10.8)	33 (89.2)		

***Sample size for respondents who provided information.**

Three (13.6%) under-fives' who had abnormal Height for Age had blood in their stool in the two weeks preceding the survey. The association between Height for Age and history of blood in stool among under-fives was not statistically significant (p = 0.193)

Four (8.3%) under-fives with normal Weight for Age had blood in their stool in the two weeks preceding the survey. The association between Weight for Age and history of blood in stool among under-fives was not statistically significant (p = 0.462)

Three (11.5%) under-fives with normal Weight for Height had blood in their stool in the two weeks preceding the survey. The association between Weight for Height and history of blood in stool among under-fives was not statistically significant (p = 0.108)

Three (12.0%) under-fives with abnormal BMI for age had blood in their stool in the two weeks preceding the survey. The association between BMI for age and history of blood in stool among under-fives was not statistically significant (p = 0.297)

Four (10.8%) under-fives with a normal MUAC had blood in their stool in the two weeks preceding the survey. The association between MUAC and history of blood in stool among under-fives was statistically significant (p = 0.296).

Table 46: Nutritional status and history of worm in child's stool among under-five children

Anthropometric parameters	History of worm in child's stool Yes (n = 79) n (%)	No (n = 311) n (%)	Test Statistics	p-value
Height for age *				
Abnormal	32 (20.3)	126 (79.7)	$\chi^2 = 0.119$	0.730
Normal	42 (21.8)	151 (78.2)		
Weight for age				
Abnormal	1 (3.6)	27 (96.4)	$\chi^2 = 5.199$	0.023
Normal	78 (21.5)	284 (78.5)		
Weight for height *				
Abnormal	35 (19.4)	145 (80.6)	$\chi^2 = 0.566$	0.452
Normal	36 (22.8)	122 (77.2)		
BMI for Age *				
Abnormal	40 (19.3)	168 (80.7)	$\chi^2 = 0.637$	0.425
Normal	34 (23.1)	113 (76.9)		
MUAC *				
Abnormal	14 (9.0)	142 (91.0)	$\chi^2 = 20.488$	<0.0001
Normal	65(27.8)	169 (72.2)		

***Sample size for respondents who provided information.**

Forty-two (21.8%) under-fives with normal Height for Age had worm in their stool in the two weeks preceding the survey compared to 32 (20.3%) under-fives' who had an abnormal Height for Age. The association between Height for Age and history of worm in stool among under-fives was not statistically significant (p = 0.730)

Seventy-eight (21.5%) under-fives with normal Weight for Age had worm in their stool. The association between Weight for Age and history of worm in stool among under-fives was statistically significant (p = 0.023)

Thirty-six (22.8%) under-fives with normal Weight for Height had worm in their stool in the two weeks preceding the survey compared to 35 (19.4%) under-fives' who had an abnormal Weight for Height. The association between Weight for Height and history of worm in stool among under-fives was not statistically significant ($p = 0.452$)

Thirty-four (23.1%) under-fives with normal BMI for age had worm in their stool in the two weeks preceding the survey compared to 40 (19.3%) under-fives' who had an abnormal BMI. The association between BMI for age and history of worm in stool among under-fives was not statistically significant ($p = 0.425$)

Sixty-five (27.8%) under-fives with a normal MUAC had worm in their stool in the two weeks preceding the survey compared to 14 (9.0%) under-fives' who had abnormal MUAC. The association between MUAC and history of worm in stool of under-fives was statistically significant ($p < 0.0001$).

Table 47: Nutritional status and history of ARI among under-five children

Anthropometric parameters	History of ARI Yes (n = 112) n (%)	History of ARI No (n = 659) n (%)	Test Statistics	p-value
Weight for age				
Abnormal	7 (8.7)	73 (91.3)	$\chi^2 = 2.399$	0.121
Normal	105 (15.2)	586 (84.8)		
Height for age *				
Abnormal	43 (14.5)	253 (85.5)	$\chi^2 = 0.059$	0.809
Normal	60 (15.2)	335(84.8)		
Weight for height *				
Abnormal	50 (14.2)	303 (85.8)	$\chi^2 = 0.973$	0.324
Normal	53 (16.9)	260 (83.1)		
BMI for Age *				
Abnormal	52 (13.5)	332 (86.5)	$\chi^2 = 1.268$	0.260
Normal	51 (16.6)	256 (83.4)		

One hundred and five (15.2%) under-fives with normal Weight for Age had been ill with acute respiratory tract infection in the two weeks preceding the survey compared to 7 (8.7%) under-fives' who had an abnormal Weight for Age. The association between Weight for Age and history of ARI among under-fives was not statistically significant (p = 0.121)

Sixty (15.2%) under-fives with normal Height for Age had been ill with ARI in the two weeks preceding the survey compared to 43 (14.5%) under-fives' who had an abnormal height for age. The association between Height for Age and history of ARI among under-fives was not statistically significant (p = 0.809)

Fifty-three (16.9%) under-fives with normal Weight for Height had been ill with acute respiratory tract infection in the two weeks preceding the survey compared to 50 (14.2%) under-fives' who had an abnormal Weight for Height. The association between Weight for Height and history of ARI among under-fives was not statistically significant (p = 0.324)

Fifty-one (16.6%) under-fives with normal BMI for Age had been ill with ARI in the two weeks preceding the survey compared to 52 (13.5%) under-fives' who had an abnormal BMI for age. The association between BMI for Age and history of ARI among under-fives was not statistically significant (p = 0.260)

Table 48: Nutritional status and history of diarrhoea among under-five children

Anthropometric parameters	History of diarrhoea Yes (n = 39) n (%)	History of diarrhoea No (n = 732) n (%)	Test Statistics	p-value
Weight for age				
Abnormal	4 (5.0)	76 (95.0)	$\chi^2 = 0.001$	0.980
Normal	35 (5.1)	656 (94.9)		
MUAC for age				
Abnormal	2 (2.0)	100 (98.0)	Fishers = 2.690	0.167
Normal	13 (18.3)	58 (81.7)		
Weight for Height*				
Abnormal	13 (3.7)	340 (96.3)	$\chi^2 = 3.137$	0.077
Normal	21 (3.9)	292 (96.1)		
Height for age*				
Abnormal	15 (5.1)	281 (94.9)	$\chi^2 = 0.021$	0.884
Normal	21 (5.3)	374 (94.7)		
BMI for Age *				
Abnormal	15 (3.9)	369 (96.1)	$\chi^2 = 2.974$	0.085
Normal	21 (6.8)	286 (93.2)		

Thirty-five (5.1%) under-fives with normal Weight for Age had been ill with diarrhoea in the two weeks preceding the survey compared to 4 (5.0%) under-fives' who had an abnormal Weight for Age. The association between Weight for Age and history of diarrhoea among under-fives was not statistically significant (p = 0.980)

Thirteen (18.3%) under-fives with normal MUAC for age had been ill with diarrhoea in the two weeks preceding the survey compared to 2 (2.0%) under-fives' who had an abnormal MUAC for Age. The association between MUAC for Age and history of diarrhoea among under-fives was not statistically significant (p = 0.167)

Twenty-one (3.9%) under-fives with normal Weight for Height had been ill with diarrhoea in the two weeks preceding the survey compared to 13 (3.7%) under-fives' who had an abnormal Weight for Height. The association between Weight for Height and history of diarrhoea among under-fives was not statistically significant ($p = 0.077$)

Twenty-one (5.3%) under-fives with normal Height for Age had been ill with diarrhoea in the two weeks preceding the survey compared to 15 (5.1%) under-fives' who had an abnormal Height for Age. The association between Height for Age and history of diarrhoea among under-fives was not statistically significant ($p = 0.884$)

Twenty-one (6.8%) under-fives with normal BMI for Age had been ill with diarrhoea in the two weeks preceding the survey compared to 15 (3.9%) under-fives' who had an abnormal BMI for Age. The association between BMI for Age and history of diarrhoea among under-fives was not statistically significant ($p = 0.085$)

Table 49: Anthropometric parameters and morbidity status among under-five children

Anthropometric parameters	Morbidity status Yes (n = 265) n (%)	Morbidity status No (n = 506) n (%)	Test Statistics	p-value
Height for age (n = 691) *				
Normal	150 (38.0)	245 (62.0)	$\chi^2 = 1.287$	0.257
Abnormal	100 (33.8)	196 (66.2)		
Weight for age (n = 771)				
Normal	247 (35.6)	446 (64.4)	$\chi^2 = 4.907$	0.027
Abnormal	18 (23.1)	60 (76.9)		
Weight for height (n = 666) *				
Normal	123 (39.3)	190 (60.7)	$\chi^2 = 2.013$	0.156
Abnormal	120 (34.0)	233 (66.0)		
BMI for Age (n = 691) *				
Normal	120 (39.1)	187 (60.9)	$\chi^2 = 2.024$	0.155
Abnormal	130 (33.9)	254 (66.1)		
MUAC (n = 598)				
Normal	174 (38.1)	283 (61.9)	$\chi^2 = 27.936$	<0.0001
Abnormal	13 (9.9)	118 (90.1)		

One hundred and fifty (38.0%) under-fives with normal Height for Age had a previous illness compared to 100 (33.8%) under-fives' who had abnormal Height for Age. The association between Height for Age and morbidity status of under-fives was not statistically significant (p = 0.257)

Two hundred and forty-seven (35.6%) under-fives with normal in Weight for Age had a previous illness compared to 18 (23.1%) under-fives' who had abnormal weight for age. The association between Weight for Age and morbidity status of under-fives was statistically significant (p = 0.027)

One hundred and twenty-three (39.3%) under-fives with normal Weight for Height had a previous illness compared to 120 (34.0%) under-fives' who had abnormal Weight for Height. The association between Weight for Height and morbidity status of under-fives was not statistically significant ($p = 0.156$)

One hundred and twenty (39.1%) under-fives with normal BMI for age had a previous illness compared to 130 (33.9%) under-fives' who had abnormal BMI for age. The association between BMI for age and morbidity status of under-fives was not statistically significant ($p = 0.155$)

One hundred and seventy-four (38.1%) under-fives with a normal MUAC had a previous illness compared to 13 (9.9%) under-fives' who had an abnormal MUAC. The association between MUAC and morbidity status of under-fives was statistically significant ($p < 0.0001$).

CHAPTER FIVE

DISCUSSION

The characteristics of the study participants reflected the socio-economic context of the study area, which is mostly urban. The mean age of mothers in the study was 32 years. This observation is similar that of a study conducted in Lagos in 2019[81] and similar to another study conducted in Ethiopia in 2019.[82] This finding indicates that majority of mothers who took part in this study were in their reproductive age.

The family structure was described by the fact that most of the mothers were married and in a monogamous family setting. The findings from this study agrees with that of a similar study that was conducted in Sub-Saharan Africa in 2014[83], involving three countries; Cameroon, Nigeria, and Democratic Republic of the Congo (DRC); and similar with findings from another study conducted in Ghana in 2018[84]. The effect of family structure on children's health, survival, and well-being in general is anchored on economic resource and parental care. Child well-being is closely linked to economic resources available in a family, and relative to two-parent households; single mothers have less economic resources. However, the relative advantage of children in two-parent families in economic resources is dependent on if the parents are gainfully employed; optimally committed to children's well-being, and the commitment is expressed in substantial cash contribution to children's nutrition and health care. In this study, majority of the mothers and their spouses were employed, however, most of them were within the poorest to middle class quintile and this observation indicates an economically challenged population. Coupled with the fact that most of the vegetables, fruits and animal protein used in the households were purchased, it becomes clear that a less agrarian society with the rise of urbanization is not matched by an

increase in earnings, which is an indicator for poverty among our study respondents and this in turn, places the under-five children at greater risk of malnutrition despite the stable family structure.

Majority of the respondents were from a family size of 1 – 6 persons. This finding is similar to the average family size for Nigeria as reported by the 2013 and 2018 National demographic health survey.[2, 85] The larger a family is, the more resources it would need for proper upkeep of its members. In other words, having a large family can have negative effects on the health and well-being of both parents and children. Large family size connects to poverty, deviance and illiteracy. The desirability of a large family size is not without the interplay of some underlying key socio-economic factors. Among the many determinant factors influencing family size preference is the educational status of couples and as observed from this study, majority (93.6%) of mothers were literate and this could be a reason for their choice of a small/ moderate family size. Also, literacy and numeracy skills that women acquire in school enhance their ability to recognize illness and seek treatment for their children. Also, they are better able to read medical instructions for treatment of childhood illness and apply the treatment. Additionally, children born to educated women suffer less from malnutrition which manifests as underweight, wasting and stunting. This observation has been reported in similar studies conducted in various settings including, studies conducted in; Ethiopia in 2013[86], Kenya in 2012[87], Zaria in 2013[37] and the 2013 and 2018 NDHS.[2, 85] It could be inferred from the findings of this study that the mothers will be more receptive to educational initiatives targeted at combating malnutrition.

Clean water is a basic need for human life; above three-quarters (76.7%) of the respondents' in this study obtained their drinking water from improved water sources'. The observation from this study is above the national average of 62% as reported by the 2018 National Demographic health

survey.[85]Despite this positive observation, it was a major drawback to find out that only 4.8% of these respondents purified their water before drinking and this was similar to the findings from the 2018 NDHS where it was reported that most households in Nigeria (92%) do not treat their water prior to drinking. Slightly above three quarters (71.6%) of the respondents had access to improved sewage disposal/toilet facilities, this finding is above the national average of 56% which was reported by the 2018 NDHS.[85] Poor access to improved water and sanitation in Nigeria remains a major contributing factor to high morbidity and mortality rates among children under five. The use of contaminated drinking water and poor sanitary conditions result in increased vulnerability to water-borne diseases, including diarrhea which leads to deaths of more than 70,000 children under five annually. Seventy-three per cent of the diarrheal and enteric disease burden is associated with poor access to adequate water, sanitation and hygiene (WASH), and is disproportionately borne by poorer children. Frequent episodes of WASH related ill-health in children; contribute to absenteeism in school, and malnutrition.[88]The finding from this study calls for an intensified effort towards improving water, sanitation and hygiene (WASH) in Benin-City.

Appropriate infant and young child feeding (IYCF) practices include early initiation of breastfeeding (within the first hour of life), exclusive breastfeeding in the first 6 months of life, continued breastfeeding for 2 years or more, and introduction of safe, appropriate, and adequate complementary foods at age 6 months. After six months of exclusive breast-feeding, appropriate complementary foods should be introduced while breastfeeding is continued until age 2 or older. The transition from exclusive breastfeeding to complementing breastfeeding with family foods is when children are most vulnerable to becoming undernourished, and during this time it is important that they receive solid, semisolid, or soft foods.[89]

The early initiation of breastfeeding; putting newborns to the breast within the first hour of life, is critical to newborn survival and to establishing breastfeeding over the long term. The first breast milk contains colostrum, which is highly nutritious and has antibodies that protect the newborn from diseases. Early initiation of breastfeeding also encourages bonding between the mother and her newborn, facilitating the production of regular breast milk. It was a negative observation in this study that only a few mothers (47.3%), initiated breastfeeding within an hour after birth. The observation from this study is similar to that of the 2018 NDHS[85] where it was reported that only a little above two-fifths (42.0%) of the children were breastfed within 1 hour of birth. The focus group sessions with the mothers revealed, "delay in lactation" as an under-lying factors for this low output; '*from when i born my pikin my breast no quick rush … so e dey cry too much ,, na im my people help me buy baby food i begin give am..*'' 30 year old mother from Ikpema. 'Delay in lactation' has been reported by previous studies as a factor affecting early initiation of breastfeeding , of note , in a study conducted in 2016 in Central America[37], physical inability to breastfeed was reported as a justification for not initiating breastfeeding within an hour after birth and also, as an under-lying factor for early initiation of complementary feeding. Another factor discovered in this study responsible for poor initiation of breastfeeding was "religious belief", as some Muslim mothers stated that they gave their baby water from Saudi Arabia immediately after birth; *'The first food wey you suppose give your pikin nah breast milk and water from Saudi Arabia………….' -26 year old Mother from Obakhareye***.** The finding from this study indicates a need for interventions towards improving early initiation of breastfeeding.

Exclusive breastfeeding is a cornerstone of child health and survival because it provides essential, irreplaceable nutrition for a child's growth and development. It serves as a child's first

immunization – providing protection from respiratory infections, diarrheal disease, and other potentially life-threatening ailments. Exclusive breastfeeding also has a protective effect against obesity and certain non-communicable diseases later in life. Exclusive breastfeeding practice involves giving an infant breast-milk for the first 6 months of life (no other food or water). In this study less than two-thirds of the mothers, 64.9%, practiced exclusive breastfeeding. This observation is higher than the findings of the 2013 NDHS[2] (17%) and 2018 NDHS[85] (29%). Globally, in 2012 only 38% of infants aged 0 to 6 months were exclusively breastfed. In 2016 this proportion increased to 40%. The World Health Assembly resolution 65.6 endorsed a comprehensive implementation plan on maternal, infant and young child nutrition, with achieving a 50% global level of exclusive breastfeeding rate in 2025 as its fifth target. The findings from this study reflect a positive growth towards achieving that target. Despite this positive report, only 46.3% actually practiced exclusive breastfeeding for its full course of six months. However, there was widespread familiarity with recommendations for exclusive breastfeeding among the women as it was commonly referred to as 'Baby Friendly". For example during the focus group participant said '*Baby friendly na breast milk for 6 months, you go start am from the first day you born your pikin.. I do my own for 6 months.. i no add water.. baby friendly good, na im dey make your pikin strong''* . These findings call for intensified efforts towards maintaining and improving on the exclusive breastfeeding rate in Benin-City.

The poor practice of exclusive breastfeeding which translates to early introduction of other feeds can predispose children to malnutrition and in extreme cases lead to a reduction in the child's immunity and general well-being. Consequently, a greater proportion of children introduced quite early to complementary feeding may be at risk of diarrhea diseases, which is one of the major killer diseases of under-fives.[85] In the long term there could be increased risk of obesity

and cardiovascular disease.[78] Also, evidence has shown that complementary foods offered before 6 months of age tend to displace breast milk and do not confer any growth advantage over exclusive breastfeeding .[90] However, contrary to WHO recommendations for commencement of complementary feeding at 6 months, some mothers (32.0%) introduced complementary feeds early at less than 6 months. This observation is lesser than the findings from previous studies conducted in; Pakistan[91] in 2017 (48%), Tanzania[24] in 2016 (40.7%), Ogun[92] in 2014 (53.8%), and Cross-River State[93] in 2016 (85.4%) where complementary feeding was initiated too early. This may reflect differences in the level of awareness and culture of the different populations with respect to appropriate infant feeding practices. Only 27.9% of the mothers had introduced complementary foods to their children at the appropriate time and this observation is far lesser than the findings from previous researchers who obtained 63% in Ethiopia in 2018 [20], 66.3% in Uganda in 2019[94], 67% in Nigeria in 2013[2] and 62.8% in Ghana in 2018[84]. Introduction of solid food after six months can lower morbidity through reducing infections. Almost all public health authorities, including the WHO and the American Academy of Pediatrics, recommend introducing solid foods at or after six months.[95] In this study 24.8% of the mothers introduced complementary foods after six months and this finding is similar to a study conducted in Ethiopia in 2018[96], where 25.5% of children were experienced delayed introduction of complementary feeding. However, too late an introduction of complementary foods may compromise the supply of total energy, protein, and some micronutrients and might also result in problems with acceptance of new tastes and textures.[97]

Appropriate complementary feeding should include feeding children a variety of foods to ensure that nutrient requirements are met. Fruits and vegetables rich in vitamin A should be consumed daily. Eating a range of fruits and vegetables, in addition to those rich in vitamin A, is also

important. Studies have shown that plant-based complementary foods by themselves are insufficient to meet the needs for certain micronutrients. Therefore, it has been recommended by the World Health Organization that meat, poultry, fish, or eggs be part of the under-fives daily diet or eaten as often as possible .In this study, the most common foods given to the children were foods made from grains, roots and tubers (26.9% among breastfeeding children and 73.1% among non-breastfeeding children). Generally, consumption of all types of foods was higher among non-breastfeeding children than among breastfeeding children. This observation is in line with reports from previous research works[15, 20, 21, 85], a notable one is the 2018 NDHS[85] where the most common foods reported to be given to under-fives were made from grains (78% among breastfeeding children and 90% among non-breastfeeding children) and consumption of all types of foods was higher among non-breastfeeding children than among breastfeeding children.

Early weaning at less than 24 months was noted to be high at 93.3%, while normal weaning (at 24 months) was low at 3.9% and late weaning was at 2.8%. Delay in weaning is a risk factor for nutritional rickets and other micronutrient deficiencies.[98] Therefore it is a positive observation that only 2.8% of the mothers delayed weaning. Weaning practices may depend on the cultural practices of a people, influence of family members or even socio-economic factors of the family for as seen in this study, common reasons respondents' reported for stopped breast-feeding included feeling the child was of age, mother commenced work, child refusing breast milk, another pregnancy, illness of mother/child, and because child was not gaining weight. The reasons cited in this study are also similar to that reported in similar studies in; Kuwait Gaza strip[99] in 2011, Sokoto[26] in 2017 and in Edo State[78] in 2018 with the mother getting pregnant being the most prevalent reason for commencement of weaning. This is not surprising as there is a general belief that mothers who are pregnant should no longer breast feed their infants as the

breast milk is perceived to be harmful and no longer nutritious and so the need to abruptly stop the child from breast milk.[26] The most common food mothers used to wean their child in this study was *AKAMU*. AKAMU is a locally prepared maize gruel. This observation is in consonance with the reports from another study conducted in Ogun state in 2014.[92] In this study, the reasons they gave for choosing *AKAMU* was its easiness to prepare and that it was the normal food used for weaning a child.

Until now, indicators used to measure infant and young child feeding practices in population-based surveys have focused mostly on breastfeeding practices.[100] However, it is necessary that consideration be given to the quantity and quality of complementary foods including dietary diversity. Only 14.7% of children had an adequately diverse diet, in which they had been given foods from at least five food groups, and 10.6% had been fed the minimum number of times appropriate for their age. Overall, only a little above one-third (33.6%) of the children were fed according to the appropriate complementary feeding practice in the 24 hours preceding the interview. This observation from this study higher than the findings from previous research works carried out in; Southern Ethiopia in 2017[21,] Northwest Ethiopia in 2018 [20,] Uganda in 2016[23,] Northern Ghana in 2016[25], the 2013 NDHS[2] , Cross River State in 2016[28] and the MICS 2017[3]. However, this finding is lesser than that obtained in; the 2018 NDHS[85], the 2017 Belize Demographic health Survey[18], Brazil in 2018[19] and in Lagos in 2017[27].The report from this study highlights the fact that there may be inadequate complementary feeding knowledge and practices among mothers of under-five children, which may be contributory to the low proportion of IYCF. Also, well-educated and nutritionally literate mothers who have control over the purchase of the dietary items would be more qualified and capable of taking care of their children properly and this will be reflected in the dietary pattern of their children and the vice versa for the illiterate

mothers. In this study, child feeding index tended to increase with an increase in mothers level of education, mothers with tertiary level of education compared to those with no formal education were more likely to have under-fives' with high child feeding index , 41.7% versus 24.0% and this was statistically significant (p = 0.001).Also, respondents with spouses who had tertiary level of education were more likely to have under-fives with high feeding index compared to those whose spouses had no formal education. Previous studies have reported similar findings especially in sub-Saharan Africa, [25, 27, 2, 34, 43, 85], one of such notable studies is the 2018 NDHS[85], which reported that the proportion of children receiving a minimum acceptable diet rose with increasing mother's education, from 7% among children whose mothers have no education to 23% among children whose mothers have more than a secondary education. Poverty and insufficient income for the household also results in the lack of the food diversification.[2] In this study, respondents in richest wealth quintile compared to those in the poorest were more likely to have under-fives' with high child feeding index and this was statistically significant (p = 0.016).Also, respondents with household income of ₦ 54,001 - 72,000 compared to those with an income less than ₦ 18,000 were more likely to have under-fives' with high child feeding index and this was statistically significant (p = 0.003). Similarly in the 2018 NDHS[85], the proportion of children receiving a minimum acceptable diet increased with increasing household wealth, from 8% to 19%.Also, in a similar study conducted in India[15], the reports showed that, in households with the highest wealth quintile about 29% of the children were fed in compliance with all three IYCF practices while in households with the lowest wealth quintiles, only about 16% were fed in compliance with all three IYCF practices. Infants require a high energy intake to meet up with their nutritional demands and as they grow the energy intake and macronutrient intake increases with age. [2, 15] In this study, with one-year increase in age, under-fives' were

more likely to have high child feeding index and the association between age and having good child feeding index was statistically significant ($p = 0.001$). In a similar study conducted in India[15], the reports showed that, dietary diversity among breastfeeding and non-breasting feeding children increased with the age of the children from 10% in age 6 to 8 months to 48% and in age 18 months to 23 months. Non-breastfeeding children are more likely to consume more solid or semi-solid food than breastfeeding children. Respondents with 1 to 3 under-fives' in household had a high child feeding index compared to respondents with 4 to 6 under-fives' in household. The association between number of under-fives' and feeding index was statistically significant ($p < 0.0001$).

According to the National Demographic and Health Survey (NDHS) conducted in 2018, the prevalence of stunting, underweight, wasting and over-weight among the under-five children are 37%, 22%, 7% and 2%, respectively.[85] The prevalence of stunting (42.8%) and overweight (10.7%) in this study, is higher than the national average, while the prevalence of underweight (10.1%) and wasting (4.9%); are both lower than the national average. The prevalence of under-weight and wasting in this study was also found to be lower than the prevalence reported in the previous surveys carried out by the NDHS in 2013[2] under-weight (29%) and wasting (18%) and in 2003 (29%) and (9.2%) [101] respectively. Also, the prevalence of under-weight and wasting in this study is lower than the 25% and 9% that was reported by the Nigerian Food Consumption and Nutrition (NFCN) survey between 2001 and 2003. The figures in this study for the different classifications of malnutrition were generally lower than that reported by Dhatrak et al[32] in a slum in Nagpur, India in 2013 where it was seen that 45(35%) children were underweight and 24(16%) were severely underweight, 34 (22.7%) children were stunted and 44 (29.3%) were severely stunted, 19(12.7%). Also the figures in this study were lower than that reported in Zaria,

Nigeria[34] in 2014, where fifty-two percent were stunted, 30% were underweight and 25% were wasted. Also the situation among this study population is better than that reported in Kaduna[36] where 62.2% were found to be stunted, 12.6% wasted, and 48.7% underweight. Also in a similar study in Northern Nigeria [37], the prevalence's were still relatively high as 87 (29%) were found to have under-weight, 21 (7%) were wasted, and 93 (31%) were stunted. In contrast, figures reported in a study conducted in Akure south local government[35], Ondo state, Nigeria were generally lower, as the overall assessment of nutritional status of children showed that 12.5%, 8.5% and 14.8% were stunted, wasted and underweight respectively and the mid-upper circumference revealed that 5.9% were undernourished, which is lower than that reported in this study. Summarily, the statistics on under-nutrition in this study, although less in some aspects in comparison to other studies and in the national average still constitutes a problem, and further underscores the slow progress made in curbing this deficiency. For in comparison to areas in East Asia and the Pacific where there have been remarkable reductions in prevalence of stunting from 42% in 1990 to 12% in 2011; [102] reductions in Sub-Saharan Africa has been limited as shown in this study. It is important to note that the significant improvement in prevalence of under-nutrition in Southeast Asia has been related largely to improvement in their socioeconomic indices.[102] The levels of malnutrition in the present study underline the great need for nutritional intervention and improvement in socio-economic indices.

In this study factors associated with the Height for Age of the under-five children was mothers skill Level ($p = 0.024$), number of under-fives' in households ($p = 0.046$), mothers BMI ($p = 0.049$), age of under-fives' ($p < 0.0001$), birth order ($p = 0.008$). Factor reported to be associated with weight for age was the average monthly household income ($p = 0.014$). Respondents' in the middle wealth quintile compared to those in the poorest quintile were more likely to have under-

fives' with normal Weight for Height with an odds' of 2.172. This was statistically significant (p = 0.028). Factors associated with BMI for age was birth order (p = 0.047) and wealth quintile (p = 0.007). Factors associated with MUAC for age was number of under-fives in household (p = 0.0001), monthly household income (p = 0.0001), wealth quintile (p = 0.001) and age of under-five (p = 0.0001). The reports from this study is similar with reports from other studies,[44-51] notably the 2018 NDHS[85], where the proportions of children who were stunted, wasted, and underweight declined substantially with increasing mother's education and household wealth. For example, the prevalence of stunting was 54%, among children whose mothers have no education, as compared with 14% among those whose mothers had more than a secondary education .Children whose mothers were thin (a body mass index [BMI] below 18.5) were more likely to be stunted, wasted, or underweight than children whose mothers had a normal BMI and children whose mothers were overweight or obese. The prevalence of stunting in children whose mothers were thin was twice that (49%) of children whose mothers were overweight or obese (23%).

Evaluation of the morbidity profile of the under-five children show a seeming effect of public health campaigns as a majority ,99.6%, of under-fives had ever received immunization : BCG vaccination was completed by 99.9% of under-fives' while Polio was 94.1%; Pentavalent vaccine, 91.5% complete; Yellow fever, 91.1% and Measles vaccination was completed by 94.7% of under-fives'. The observation of 99.6% basic immunization coverage in this study is higher than the proportion of 56.3% in Edo State that was reported by NDHS 2018 [85] to have completed basic immunization, but the individual reports for the vaccine coverage in Edo State was similar with the coverage reports of this study; BCG (95.0%), Polio (84.8%); Pentavalent vaccine (93.5%); and Measles vaccination (80.6%).[85] Also, the country wide coverage of basic

immunization (21.0%) that was reported by the NDHS 2018 [85] was also lower that the coverage reported in this study. In addition, the immunization coverage in this study was greater than the 44% reported by Debnath et al;[39] and the 90.9% reported by Rayhan et al,[52] in Bangladesh, India. Notably as at the time of this study**,** no under-five child had oedema; very few had had sunken eyes and protruding stomach while dehydration was seen in only 4.9% of the respondents.

History of illness in the two weeks preceding the survey was less than expected, fever was reported among 119 (15.4%) by their mothers; past history of ARI was 14.5% among under-fives' and diarrhoea was 5.1%; overall only 34.2% of under-fives had a history of illness. The morbidity pattern of under-five children in this study in comparison to other studies indicates a positive trend in eradicating childhood diseases. For example, in a study conducted in Enugu[41], the most commonly reported symptoms among the children were fever, diarrhoea, cough and fast breathing (acute respiratory symptoms). Diarrhoeal (40%) and acute respiratory symptoms (37.6%) occurring singly or as a comorbidity were the most common illnesses while fever without any other appreciable symptoms was documented in 25.4% of the children, with a total of 69 deaths mostly from febrile illness reported from 58 households. Also, in another study conducted in south western Nigeria[63], fever, diarrhoea and acute respiratory infection childhood illnesses were the most common illnesses among the under-fives. In a similar study conducted in India[40] the most common diseases were acute respiratory tract infection (30%), fever (19%) and diarrhoea (14%). Also, the 2018 NDHS reported that 24.0% of the children suffered from fever, 13.0% from diarrhoea and 3% form ARI.

The results from this study in terms of the morbidity pattern were complemented by good health seeking behaviour, as treatment for ARI among under-fives by respondents included antibiotics, paracetamol, and cough/catarrh and vitamin syrup. Also, treatment for fever among under-fives

by respondents included use of antibiotic; anti-malaria and use of antipyretics like paracetamol and taking child to a hospital/clinic. Also, 67.4% respondents reported deworming their under-five children in the past 6 months and 68.6% had given their under-fives' vitamin supplementation with 31.9% respondents reported giving their under-five children iron supplementation in the past 6 months. This is in contrast to that reported by Ojinnaka et al., [41] where 50.4% of the households visited only orthodox health facilities for treatment, and 14.6% and 6.9% use only self-medication and traditional health practitioners respectively.

The somewhat mitigated morbidity profile could be adduced to improved toilet practices among the respondents as only 4.9% use ventilated improved latrine while only 8.8% share toilet facilities with more than ten households. Also, the fact that five hundred and ninety-one respondents have access to improved water source and over half of the respondents used improved methods of waste disposal. Also, this could be indices of improved community health practices that must have been a result of public health drives. However, the results further indicate the need for continued public health drives and government intervention.

The evaluation of the different variables with the different component of morbidity showed that there was a significant association between educational level of mother and father and the morbidity status of child. Also, it was seen that respondents' spouses with tertiary level of education compared with spouses with no formal education were less likely to have under-fives with a previous illness with an odd of 0.314, which was statistically significant. The results are in agreement with a study conducted by Gobir et al[58] in Kaduna, where the researchers found a statistically significant association between Under- five morbidity and Paternal Education (p=0.026) and Maternal Education (p=0.04). A possible explanation for paternal and maternal education playing an important role, is that formal education enables individuals to better

understand a disease, its dangers, susceptibility to it and to take necessary preventive actions that are necessary for a child's health and survival. It also enables a household head to make the right decision regarding disease prevention and treatment. Rahyan et al[52], also reported that educated mothers tend to make better use of health services and provide better child-care, including feeding, which is similar to this study's finding. However, in contrast, Gupta et al, [61] reported that there was no statistically significant association of the morbidity with literacy of parents even though the episodes of illness were less in number among children of literate parents which is in not in agreement with the results of this study.

Findings in this study also indicated that with one-year increase in age of mothers, under-fives' were less likely to have a previous illness with an odds' of 0.996. This could be explained by women having more experience in handling the children with respect to disease morbidities and preventive measures with increasing age; which could also be linked to the fact that there was a statistically significant association between number of under-fives' in household and morbidity.

The association between monthly household income and morbidity status of under-fives' was statistically significant ($p = 0.010$). Respondents who earned between N 36,001 – 54,000 compared to those who less than N 18,000 were less likely to have under-fives' with a previous illness with an odds' of 0.427.Monthly income is a social determinant of morbidity for example adequate income improves living conditions of households and health of Under-fives. Our finding is similar to that of another Nigerian study[58] which shows that those who received a monthly income of less than N10, 000 had under-fives with more morbidity.

The association between age and morbidity status of under-fives' was statistically significant ($p = 0.008$), which was also reported in Gupta et al.[61] Possible reasons why there was a significant

association between age and morbidity could be that as the child grows, immunity increases thereby reducing the susceptibility to infections, which could be one of the reasons for reported decline in morbidity with the advancement of age in this study. Few other studies have also found the age of the child to be significantly associated with morbidity similar to the finding of our study. [52, 57]

The association between sex of under-fives' and morbidity status was statistically significant as female under-fives' compared to males, were less likely to have a previous illness with an odds' of 0.580. The results of this study are in contrast to the observation of Gupta et al[61] and Chowdhary et al[56] who reported higher morbidity rate among female children. However, Gulati[31] and Maltotra[33], as in this study; reported an increased morbidity in males as compared to females.

The association between birth order of under-fives' and history of previous illness was statistically significant (p = 0.004). Under-fives' belonging to birth order 7 and above compared to under-fives' in birth order 1 to 3 were more likely to have a previous illness with an odds' of 5.739. This could be explained by the usual relationship between larger households with correlates of poverty such as low education status, poor environmental conditions such as poor sanitation, and poor hygienic practices, which might increase under-five exposure to infectious agents. Additionally, it is documented that poor families often have more children and live in more crowded houses; which are usually conducive for the transmission of infectious agents. [103, 104] Also, poor people may not be able to afford nutritious food and this can lead to poor nutritional status, and inadequate nutrition is known to suppress the immune system's ability to fight off infections.

With an increase in the number of under-five's children in the household, under-fives' were less likely to have a previous illness with an odds' of 0.638. This was statistically significant (p = 0.004). This could be due to increased caregiver experience. Also, under-fives' with high feeding index compared with under-fives with low feeding index were less likely to have a previous illness with an odds' of 0.696. This was statistically significant (p = 0.001) which may be attributed to the fact that there were healthier with improved immune systems. The results of this study show healthy/normal children having more bouts of reported illness than the unhealthy/abnormal children. This calls for concern as the children may appear healthy but already are at risk of malnutrition.

As noted there is evidence on the relationship between morbidity and under-nutrition among under-fives, and it has been well discussed in the 1968 W.H.O monograph on the "Interactions of Nutrition and Infection". The monograph described the interaction as synergistic, for example illness suppresses appetite precipitating under-nutrition of a child, while on the other hand, nutritional deficiencies increase the susceptibility of the child to infectious diseases. In this study, there was no significant statistical association between, Height for Age and morbidity status of under-fives' (p = 0.507). Weight for Height and morbidity status of under-fives' (p = 0.507); BMI for age and morbidity status of under-fives' (p = 0.646). It should be noted in evaluating this results, that morbidity status was a historic as well as present state measurement. In other words, it measured if the child had had any history of morbidity; which at the time of Nutritional status assessment in this study, may have been treated/ non present- which could explain the various non-statistical significance. However, there was an association between MUAC and Morbidity status (p <0.0001); and Weight for Age and Morbidity status (p = 0.027). Weight for Age and MUAC are indicators for wasting. All studies that have examined the relationship

between anthropometry and mortality in representative population samples in Africa and in Asia have consistently reported that MUAC is more sensitive at high specificity levels for identifying children at high risk of death who should be the priority target for treatment.[105] This explains the strong relationship between MUAC and morbidity status in this study. Previous research works has reported an association between wasting (Low MUAC and WAZ) and history of illness, a study conducted in; Northeast Ethiopia in 2019[106] reported similar findings, Somali Region Ethiopia in 2015[47], Madagascar in 2016[60], Nigeria in 2017[107] and Kaduna in 2014[34]. All of these studies reported an association between history of diarrhea and wasting, in contrast to this, this study did not find any association between diarrhea and wasting but instead found a strong association between history of fever and wasting ($p < 0.0001$) and history of worm in stool and wasting ($p < 0.0001$).

CONCLUSION

The most consumed food were foods made from grains, roots and tubers (26.9% among breastfeeding children and 73.1% among non-breastfeeding children). The most common food mothers used for weaning as reported from the focus group sessions was *AKAMU*. Only 14.7% of children had an adequately diverse diet, in which they had been given foods from at least five food groups, and 10.6% had been fed the minimum number of times appropriate for their age. Overall, only a little above one-third (33.6%) of the children were fed according to the appropriate complementary feeding practice in the 24 hours preceding the interview. Factors associated with child feeding index were mothers level of education, number of under-fives' in the household, average monthly household income, age of under-five and wealth quintile.

Almost half of the children (42.8%) were stunted, 10.7% were overweight, 10.1% were underweight and 4.9% were wasted. Factors found to be associated with wasting were wealth quintile, average monthly household income, child's age, number of under-five in household. Factors associated with stunting were birth order, child feeding index, child age, mothers skill level. Factors associated with under-weight were number of under-fives' in the household, average monthly household income, birth order, wealth quintile. Factors associated with over-weight were birth order and wealth quintile.

History of illness in the two weeks preceding the survey was 34.2%; fever (15.4%), ARI (14.5%) and diarrhea (5.1%). Factors associated with history of illness were mother and father's level of education, mother's age, child's age, sex of under-five, birth order and average monthly household income. There was an association between MUAC and morbidity status, and Weight for Age and the morbidity status of under-fives'. MUAC and Weight for age are indicators for wasting. Wasting is a major health problem and owing to its associated risks for morbidity,

requires urgent attention from policymakers and program implementers alike. It will be difficult to continue improving rates of child survival without improvements in the proportion of wasted children receiving timely and appropriate life-saving treatment, alongside reductions in the number of children becoming wasted in the first place (prevention).[108] the factors associated with childhood wasting are multifactorial, complex and interrelated. Hence, there is a need to employ a multi-sectoral, multi-disciplinary and community/household-based approach.

RECOMMENDATION

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Based on the findings of this study, the following recommendations have been made.

FEDERAL GOVERNMENT

1. The Federal Ministry of Health should allocate more funds towards the promotion of exclusive breastfeeding and
2. The Federal Ministry of Health should set measures aimed at ensuring the implementation of the breastfeeding policy for working mothers.

EDO STATE GOVERNMENT

1. There is a need for continuous monitoring of the nutrition situation in the state for effective planning and preparedness. Also, the findings from the nutrition surveillance should be made available on the Edo State Open Data Set Portal, so that it can be easily accessed.

LOCAL GOVERNMENT AREA

There is a need for continuous training of health workers on integrated management of childhood illnesses .and prompt identification of malnutrition cases.

HEALTH CARE FACILITIES

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1. There is a need for health workers to encourage mothers to follow maternity care practices consistent with the Baby Friendly Hospital Initiative to aid effective breastfeeding within one hour after birth.

2. There is a need for the health workers to continuously sensitize mothers on the benefits of exclusive breastfeeding for six months, breastfeeding till age 2 and the consequences of early introduction of complementary foods.

3. Mothers should be constantly sensitized on the symptoms of common childhood illnesses and encouraged to always seek medical advice. This will help bridge the gap on knowledge of common childhood illnesses.
4. There is a need for a continued implementation of mass immunization campaigns (house to house) targeting children less than 5 years, and the continuous integration of these immunization campaigns with Vitamin A Supplementation, deworming and iron supplementation. In addition, the annual Edo State MNCH week should be extended to last for 2weeks or more to aid effective coverage.
5. There is a need for health care givers to create awareness on dietary diversification using locally available foods, conduct food demonstrations and also sensitize mothers on the nutrient profile of the locally available foods.

HOUSEHOLDS/CAREGIVERS

1. There is a need for mothers to increase child food diversity, and child feeding frequency.
2. There is a need for mothers to practice micro gardening to help reduce household food insecurity.

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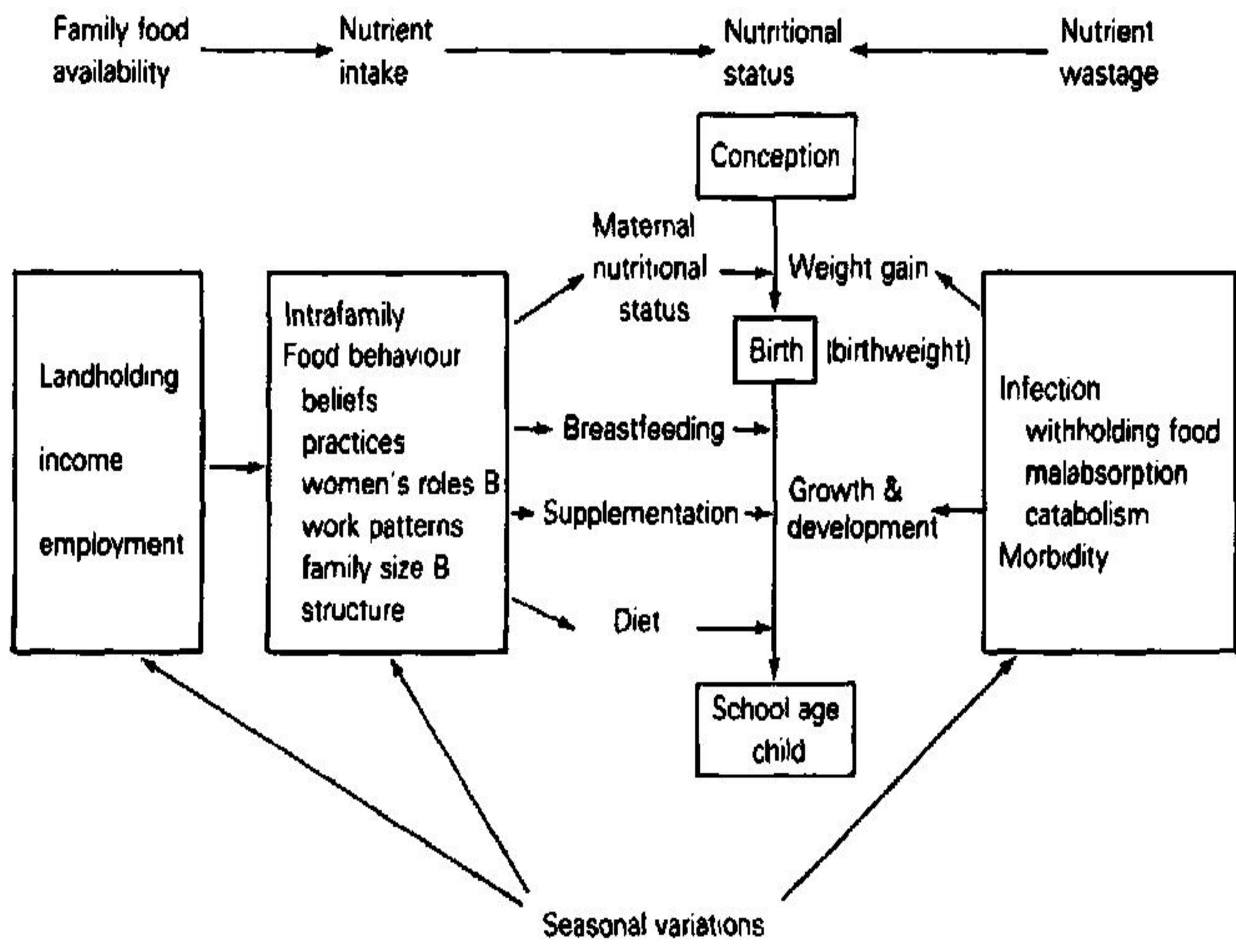
APPENDIX A

INFECTION – MALNUTRITION CYCLE



APPENDIX B

CONSENT FORM

INTRODUCTION

My name is ___________________. I am conducting a study on the nutritional status and morbidity pattern of children under-five years of age. In this interview, you will be asked questions related to this study. I will appreciate your participation and cooperation during this interview. The information you provide will be used for intervention programs against undernutrition and childhood illness. Information provided will be kept confidential, participation is voluntary and you can opt out anytime you desire without any consequence. If you need further information or details on any matter related to the conduct of this research, you can contact me through my address and contact phone numbers provided below.

Please kindly provide the correct information:

Signature of the Interviewer __________________ Date _____________

Signature of the Respondent __________________ Date _____________

Respondent did not agree to be interviewed (End of Interview)

Address of Researcher: Community Health Department, University of Benin Teaching Hospital, Edo State

Contact phone number of researcher: Helen Mbonu 08132731356

Email: Helen.Mbonu@med.uniben.edu

APPENDIX C

QUESTIONNAIRE

Section A- Socio Demographic and Economic Characteristics

Bio-data of mother

1. Name of the ward ________
2. Name of the community ________
3. How many years have you lived in this community? _______
4. Age of the mother (in years) ________
5. Mothers weight _____ and height_____
6. Marital status ___ 1- Single/Never Married 2- Married 3-Divorced/widowed/Separated
7. If married, what is the family type _______ 1- Monogamous 2-Polygamous
8. What is the household religion? ___ 1-Muslim 2-Orthodox 3-Catholic 4-Protestant, 96-Other/Specify_________________________
9. What is your ethnic group _____________________
10. Respondents' last level of completed education __ 1- No education 2-Primary Education 3- Secondary Education 4- More than secondary
11. Mothers occupation _______________________________
12. Spouses' last level of completed education __ 1- No education 2-Primary Education 3-Secondary Education 4- More than secondary
13. Spouses' Occupation ________________________________
14. What is the number of people residing in this household? ________
15. What is the number of children residing in the household? ____________
16. What is the number of children under five years of age residing in the household _______
17. What is the average household income (head of household monthly income)______ [1]= 0-18,000, 2= 18,001-36,000 3= 36,001 -54,000 4= 54,001- 72,000 5= 72,001 and above

18. Do you own this house you currently live in? ____ [1]- YES [2]-NO
19. Does your household have Electricity? [1]- YES [2]-NO
20. What type of cooking fuel mainly is used by the household? [1] Electricity,[2]LPG, [3]Natural Gas[4]biogas,[5] kerosene,[6]coal,[7] lignite,[8]charcoal,[9] Wood [10] Other/specify_______
21. What kind of toilet facility does members of your household use? 1-water closet, 2-Pit Latrine with Slab, 3-VIP Latrine 96-Others/Specify______
22. How many households in total use this toilet facility?___ 1=Only 1 Family[ ], 2=2–10 Families[ ] 3=10 Or More Families[ ] 98=Don't Know[ ]
23. How do you dispose of household refuse? ____________
24. What is the main source of drinking-water for members of your household? _____ 1=Bottled Water 2=Sachet water, 3= Piped Borne Water, 4= Well Water, 5=Lake/pond/stream, 96=Other/specify
25. Do you purify the water before use? 1-Yes 2-No
26. If yes, how do you purify the water ?__ 1=Boiling, 2=Add Bleach/Chlorine, 3=Strain Through A Cloth, 4=Let It Stand And Settle, 5=Filters For Water (Ceramic/Sand/Composite/Etc.), 6=Solar Disinfection, 7=Let It Stand And Settle, 96=Other/Specify_________________
27. In the past six months, did your household grow any vegetables? __ [1]Yes [2]No
28. In the past six months, what was the most important source of the vegetables that you gave to your children < 5 years of age?_ 1=Produced By The Household 2=Purchased 3=Other (Exchange, Gifts, Gathering From The Wild)_______

29. In the past six months, what was the most important source of the fruits that you gave your child under-five years of age? 1=Produced By The Household 2=Purchased 3=Other (Exchange, Gifts, Gathering From The Wild)_______
30. In the past six months, what was the most important source of the animal foods (meat, fish, eggs, milk products) that you gave to your children < 5 years of age? __ 1= Produced by the Household 3= Other (Exchange, Gifts, Gathering From The Wild) 98=Don't Know, 99=Not Applicable (No Children< 5 Years Of Age)

Bio-data of the index child

31. Age of index child (in months) _______
32. Sex of Index Child ____ [1] Male [2] Female
33. Birth Order of Index Child ________
34. Has the child started school? [1] Yes [___] [2] No [___]
35. If yes, what class? [1] Pre-School [___] [2] Nursery [___] [3] Primary [____]

SECTION B – DIETARY PATTERN OF THE INDEX CHILD

36. Has the child ever been breastfed?___ [1]Yes [2]No
37. How long after birth did you first put your child to the breast? [1] Within One Hour, [2] More than One hour
38. Was this child exclusively breastfed?___[1]Yes [2]No
39. If yes, how long did you exclusively breastfeed the child? _____ Months
40. Is the child being currently breastfed? ___ [1] Yes [2] No [3] Not applicable for children more than 24 months.
41. Was the child breastfed yesterday during the day or at night? __ [1]Yes, [2] No, [3] Not applicable

42. How many times did you breastfeed your child yesterday during the day or at night? (for children age 6 – 24months) ______
43. Has this child been introduced to complementary foods (other foods)? __ [1] Yes [2] No
44. If yes, at what age was this child introduced to complementary foods? (age in months) __________
45. Yesterday during the day or at night, did your child (age 6- 24months) drink anything from a bottle with a nipple, a cup or spoon? ___ [1]Yes, [2]No
46. If yes: which did your child did your child (age 6- 24months) drink from?__ [1] Bottle with a nipple [2]Cup, [3] Spoon [4] other [5] NO [98] don't know
47. I would like to ask you about liquids or foods your child had yesterday during the day or at night. Did your child drink? ___ (a) plain water (b) commercially produced infant formula (c) any commercially fortified baby food such as NAN, CERELAC (d) porridge or gruel (e) fruit juice
48. How many times did you give the child plain water yesterday during the day or at night? ___
49. Are you still breastfeeding? _____[1]Yes, [2]No
50. If yes, how old was the child when you stopped breastfeeding ___
51. What were the reasons for stopping breastfeeding? __ [1]Child not gaining weight [2]Child refused breast, [3]Child became ill, [4]Started working, [5]Another pregnancy [6]Mother became ill, [96] Other/specify
52. Yesterday during the day or last night, did your child eat any solid, semisolid or soft foods? [1] Yes [2] No [98]Don't Know

53. If yes, how many times did your child eat these foods during this time? (Solid, semisolid or soft foods?)__

54. If yes, during the day or last night did you give animal milk to your child (sheep, cow, and goat)? _________

55. If yes, did the child eat any of these foods during the day or night ;

Food Frequency and dietary diversity table

Food group	Food frequency (tick where applicable)			Dietary diversity
	At least once a day	2 to 3 times a day	4 or more times a day	1= Yes 2= No 98= Don't Know
Grains, Roots and Tubers White potatoes, white yam, White cassava or other foods made from roots, Corn/maize, rice, wheat, sorghum, millet or any other grains or foods made from these (e.g. bread, noodles, porridge or other grain products) + *insert local foods e.g.* *porridge or paste*				
Legumes, Nuts And Seeds Beans, dried peas, lentils, nuts, seeds or foods made from these.				
Dairy Products Milk, cheese, yogurt or other milk products				
Flesh Foods Beef, Chicken, Pork, Goat, Game Other Birds, Organ Meat. Fresh or Dried Fish, Shell Fish, periwinkle				
Eggs Chicken, Duck, Guinea Fowl Or Any Other Egg				
Vitamin A Rich Fruits and vegetables Ripe Mango, Pineapple, Pawpaw, Water melon, dried peach, dark green leafy vegetables, Pumpkin, Spinach, Carrot				
Other fruits and Vegetables				

56. Yesterday, during the day or night did the child eat any iron fortified solid, semi-solid or soft foods ___ [1] Yes [2] No
57. If yes, specify source of food _______________
58. Yesterday, during the day or night did the child drink any sugar, sweetened beverages or soft drink?___ [1] Yes [2] No
59. Yesterday, during the day or night did the child eat any candies, sweet, cakes or chocolates? ___ [1] Yes [2] No

SECTION C – ANTHROPOMETRIC MEASUREMENTS OF INDEX CHILD

60. What is the weight of the child? (measure and record) ________ (in kg)
61. What is the height of the child? (measure and record) ___________ (in Cm)
62. What is the mid upper arm circumference of the child? (measure and record) _____(in mm)
63. Is there presence of any of the following;

a) Edema [1] Yes [2] No,

b) Sunken eyes [1] Yes [2] No,

c) Protruding stomach [1] Yes [2] No

d) Dehydrated skin [1] Yes [2] No

e) Emaciated ribs [1] Yes [2] No

f) Thin brownish hair [1] Yes [2] No

SECTION D – CHILD HEALTH STATUS

64. What was the child's weight or size at birth? ______
65. Has this child received any type of vaccination before? ____
66. Does this child have an immunization/vaccination card? [1] Yes [2] No

(Check for vaccination scar on the child's left arm or shoulder)

67. If yes, what type?

BCG (1dose) ____________________ [1] given [2] not given

DPT/Pentavalent Vaccine (3 doses) __ [1] complete [2] not complete [3] not given

Polio Vaccine (4 doses) _____________[1] complete [2] not complete [3] not given

Measles Vaccine (1 dose) __________ [1] given [2] not given

Yellow fever ____________________ [1] given [2] not given

68. Has the child been ill with a cough accompanied by short, rapid breathing (ARI) in the two weeks preceding this survey? ___ [1] Yes [2] No

69. If yes, what treatment was given to the child? __________

70. If yes, where did you seek medical advice or treatment from (for ARI)? ___ [1] Health facility/provider [2] Pharmacy/Chemist/PMS [3] traditional practitioner/Herbal [4]Market/Shop [5] None [6] Others specify_____

71. Has the child had fever in the two weeks preceding this survey? ___ [1] Yes [2] No

72. If yes, what treatment was given to the child? __________

73. If yes, where did you seek medical advice or treatment from (for Fever)? ___ [1] Health facility/provider [2] Pharmacy/Chemist/PMS [3] traditional practitioner/Herbal [4]Market/Shop [5] None [6] Others specify_____

74. Has the child had diarrhea in the two weeks preceding this survey? ___ [1] Yes [2] No

75. If yes, was there blood in the Childs' stool? ___ [1] Yes [2] No

76. When the child was ill with diarrhea, what type of treatment/drug was given to the child? (tick as many as possible) ________ [1] antibiotics [2] ORS [3] Zinc Supplement [4] SSS (Salt Sugar Solution) [5]Plain Water [6] others(specify)______

77. During the episodes of diarrhea, how much fluid did you give the child? ____

[1]None at all [2] Less than usual [3] same as before [4] More than normal/usual

78. During the episodes of diarrhea, how much food did you give the child? ____

    [1]None at all [2] Less than usual [3] same as before [4] More than normal/usual

79. How did you dispose of the child's stool? [1] Water closet toilet [2] Latrine [3] Buried [4] Garbage [5] Open dumping [6] River

80. Did this child pass worm in the stool? [1]Yes [2] No

81. Have you given your child Deworming Medication in the past six months preceding this survey? _________[1]Yes, [2]No [98]don't know

82. Have you given your child Vitamin A supplement in the past six months preceding this survey? _________[1]Yes, [2]No

83. Where did you obtain the Vitamin A supplements? _____ [1] Health Centre/distributed, [2]Pharmacy/sold/reimbursed [3]Other/specify ________________

84. Have you given your child iron supplements in the past seven days? ___[1]Yes, [2]No

85. Where did you obtain the iron supplements? _____ [1] Health Centre/distributed, [2]Pharmacy/sold/reimbursed [96]Other/specify ___________________

86. Have you given your child Vitamin A supplement in the past six months preceding this survey? _________ [1]Yes, [2]No [98]don't know

87. Where did you obtain the Vitamin A supplements? _____ [1] Health Centre/distributed, [2]Pharmacy/sold/reimbursed [3]Other/specify ___________________

88. Have you given your child iron supplements in the past seven days? ___[1]Yes, [2]No

89. Where did you obtain the iron supplements? _____ [1] Health Centre/distributed, [2]Pharmacy/sold/reimbursed [96]Other/specify ___________________

(End of interview) Time ____________

APPENDIX D

FOCUS GROUP DISCUSSION GUIDE

1. **Opening Remarks** *(2 Minutes)*

Thanks for coming today. The goals of today's meeting is to know the Infant Young child feeding practices, Child health and treatment practices and the factors affecting child health and dietary pattern. There are only a few basic rules to keep in mind while participating today:

a) Everyone is expected to be an active participant.

b) There is no "right" or "wrong" answers.

c) Speak freely but remember not to interrupt others while they are talking.

d) Notes and audio records will be collected for analysis. Names will not be attached to the notes.

e) All information gathered will be analyzed to determine trends and make recommendations for intervention programs. Given that, the team will not get back to any individual participating in the sessions.

f) All feedback today will remain anonymous. In order to maintain anonymity, I just ask that anything that is said during our session is not repeated outside of our session.

2. **Introductions** *(3 Minutes)*

Before we start, I will like to go around the room and have everyone introduce themselves tell us your age and your child's age.

3. **Interactive Exercise**

a. **Let us discuss about Infant Young child feeding practices** ***(35 minutes)***

i. What is the first food given to child after birth?

ii. What do you know about exclusive breastfeeding?

Probe 1: did you practice it? Why?

Probe 2: How long did you practice it? Why?

Probe 3: what are the challenges of practicing exclusive breastfeeding?

iii. Tell me about your feeding practices

Probe 1: at what age did you give your child other foods?

Probe 2: why did you choose that age?

Probe 3: what complementary foods are commonly given?

Probe 4: what informed your choice of food?

Probe 5: How many times a day do you feed your child?

Probe 6: what factors affect the number of times you feed your child?

Probe 7: what are the challenges you face while practicing complementary feeding?

Probe 8: what do you do when your child refuses to eat?

iv. How do you prepare the child’s food?

Probing; together with family diet or separately? Why?

v. How do you feed your child?

Probe 1: with a spoon or bottle? Why?

b. **Let us discuss about Child health and treatment practices**

i. How often do you take measurements of your child’s weight and height?

ii. What do you know about deworming?

Probe 1: How often do you deworm your child?

Probe 2: what factors affect the frequency at which you deworm your child?

iii. Tell me about your treatment practices

Probe 1: What do you know about respiratory tract infections or cough?

Probe 2: What do you do when your child is sick with cough or ARI?

Probe 3: What do you do when your child is sick with fever?

Probe 4: What do you know about diarrhea?

Probe 5: How often do you feed your child when your child is sick with diarrhea?

Probe 6: How much food do you give when your child is sick with diarrhea? Why?

Probe 7: How much fluid do you give your child when your child is sick with diarrhea?

Probe 8: What do you know about oral rehydration therapy?

Probe 9: What type of oral rehydration solution do you give your child? Why?

Probe 10: How do you prepare your solution?

iv. Where do you seek medical advice when your child is sick?

Probe 1: what factors influence your choice?

4. Closing

Thank you for taking the time to participate today.

APPENDIX E: MAP OF STUDY AREA

APPENDIX F

ETHICAL CLEARANCE

UNIVERSITY OF BENIN TEACHING HOSPITAL
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CHAIRMAN, BOARD OF MANAGEMENT: **CHIEF ADEDOJA ADEWOLU, MFR**

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DIRECTOR OF ADMINISTRATION: **M.O. JIMOH-KADIR**

ETHICS AND RESEARCH COMMITTEE CLEARANCE CERTIFICATE

PROTOCOL NUMBER: ADM/E 22/A/VOL. VII/14688

PROJECT TITLE: **"NUTRITIONAL STATUS AND MORBIDITY PATTERN OF UNDERFIVE CHILDREN IN BENIN CITY, EDO STATE"**

PRINCIPLE INVESTIGATOR(S): **MBONU HELEN SOCHIMA**

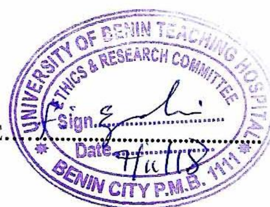
DEPARTMENT/INSTITUTION: **DEPARTMENT OF COMMUNITY HEALTH, SCHOOL OF MEDICINE UNIVERSITY OF BENIN, BENIN CITY, NIGERIA**

DATE CONSIDERED NOVEMBER 7TH, 2018

DECISION OF THE COMMITTEE: APPROVED

REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI **SIGNATURE & DATE**..........



SUPERVISOR(S): PROF. V.O. OMUEMU

DECLARATION BY INVESTIGATOR(S):

PROTOCOL NUMBER (please quote in all enquiries)
To be completed in four and three copies returned to the secretary, Ethics and Research committee, Clinical services and Training Division, University of Benin Teaching Hospital Benin City.
I/We fully understand the conditions under which I am/we are authorized to conduct the above mentioned research and I/We undertake to resubmit the protocol to the Ethics and Research Committee.

Signature.................................... **Date** 13/11/2018

APPENDIX G

APPROVAL FROM EGOR LOCAL GOVERNMENT AREA

OFFICE OF THE EXECUTIVE CHAIRMAN

EGOR LOCAL GOVERNMENT COUNCIL

OFFICE:
Local Government Secretariat Building,
Uselu, Benin City, Edo State.

*Our Ref:*________ *Date:* 16/01/2019

Dr. V.Y. Adam,
HOD, Department of Community Health,
University of Benin Teaching Hospital,
Benin City.

Dear Sir,

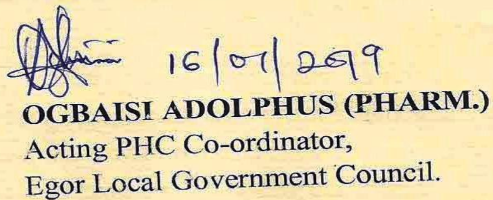
PERMISSION TO CARRYOUT RESEARCH IN EGOR LOCAL GOVERNMENT AREA

I write to convey the approval of management of Egor Local Government Council to you to carryout a research on "Nutritional Status and Morbidity pattern of under five children in Benin City, Edo State".

It is also the belief of management of the Local Government Council that the study will be relevant to inform formulation and implementation of policies and programmes aimed at improving Child Health and Nutrition in Benin City.

Congratulation.

Yours Faithfully,



OGBAISI ADOLPHUS (PHARM.)
Acting PHC Co-ordinator,
Egor Local Government Council.

APPENDIX H

APPROVAL FROM OREDO LOCAL GOVERNMENT ARE

DEPARTMENT OF PRIMARY HEALTH CARE

P.M.B. 1052,
KING'S SQUARE,
BENIN CITY
EDO STATE OF NIGERIA.

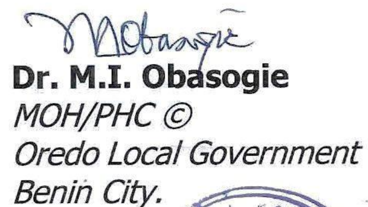
Date: 28th January, 2019.

All OICs
PHC Dept
Oredo Local Government.

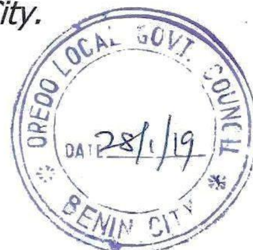
MBONU HELEN SOCHIMA MPH RESEARCH STUDENT, UNIBEN

The above name is undertaking a research titled: **Nutritional Status & Mortality Pattern of Under 5 Children in Benin City.**

You are requested to give her all the assistance she deserves to have a smooth study.



Dr. M.I. Obasogie
MOH/PHC ©
Oredo Local Government
Benin City.



APPENDIX I

APPROVAL FROM IKPOBA-OKHA LOCAL GOVERNMENT AREA

IKPOBA-OKHA LOCAL GOVERNMENT
P.M.B. 1094,
IDOGBO
EDO STATE OF NIGERIA

Our Ref: BF 108

Your Ref: ______ 18—1—2019

Miss Mbonu Sochima Helen

APPROVAL TO CARRY OUT RESEARCH

Sequel to your letter dated 6th December, 2018 approval is hereby conveyed to you to carry out your research study titled **"Nutritional Status and Morbidity Pattern of Under-Five Children in Benin City, Edo State".**

Accept the assurance of the Hon. Chairman's regards.

C. OGBEBOR
For Director PHC,
Ikpoba Okha Local Govt.,
Idogbo.