



IMPACT OF MALNUTRITION ON UNDER-FIVE CHILDREN MORTALITY IN NIGERIA

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Abstract

The study examined impact of malnutrition on under-5 children mortality rate in Nigeria. The objectives of the study include evaluating the impact of Stunting, wasting and underweight on under-five child mortality Rate. Under the methodology the study adopted ADF test of Stationary properties of the series, Test of exogeneity, Selection of lag length, Selection of optimal model, general modelling, Bound test for co-integration, Estimation of long run coefficients and granger Causality Test so as to realize its intended purposes. The findings of this study shows that all variable obtain stationary by taking the first difference and the estimation results reveal significant coefficient at all of 1%, 5% and 10% in the long-run. The estimation result of MTR indicates a positive and significant coefficient. This means that a one percent increase in stunting results to 0.04 per cent increase in mortality rate. The result of wasting indicates a positive and significant coefficient. This means that a one percent increase in wasting results to a 0.28 percent increase in the in a long run. The result of underweight indicates a negative and significant coefficient; this implies that underweight increases mortality rate accordingly. Base on the above finding the following the study recommendations: Practice of exclusive breastfeeding should be encouraged and nursing mothers should be adequately educated to ensure that the infants receive both the fore and hind breast milk for proper growth. Health workers in post-natal care should undergo special training on breastfeeding to enable them provide a scientifically sound nutrition to nursing mothers beyond the basic knowledge they acquired when in training. Ensure appropriate complementary feeding, which promotes growth and prevents stunting among children 6–24 months.

Keywords: Malnutrition, Under-five Mortality, Cointegration, Granger Causality, Nigeria

1. Introduction

Malnutrition can be caused by deficiencies, excesses, imbalances in an individual's consumption of nutrients (WHO, 2017). Malnutrition can be under nutrition or over nutrition (World Bank, 2018), but in this review, malnutrition solely refers to the deficiency of nutrition. One of the major health problem faced by children in developing countries today is under nutrition (Ocheke, 2015). Under nutrition leads to diseases and death in children, especially in the low and middle income countries. Malnutrition causes Nigeria billions in lost revenue through reduced economic productivity, days away from work due to illness and money spent on treating ailments (World Bank, 2018). The negative impact of malnutrition is seen in families and

communities in various aspects such as economically, socially and medically.

Nutritional status is defined as the evident state of nutrition of an individual. A person is said to have a good nutritional status if he shows no evidence of malnutrition, whether open or latent (Onyesili, 2000). Nutrition is the aspect of science that interprets the relationship of food to the functioning of living organisms. It includes the uptake of food, liberation of energy, elimination of wastes and the biochemical synthesis that are essential for maintenance of normal growth and development (Amosu et al, 2011). The nutritional status of any person is his/her health as dictated by the quality of nutrients consumed, and the body's ability to utilize them for its metabolic needs.

Under-5 children's nutritional status is generally accepted as an indicator of the nutritional status of any particular community (Amosu et al, 2011). Children in this age group require a high supply of nutrients since they are usually very active and their growth is rapid. Also during this period, under-nutrition in the form of kwashiorkor, marasmus, anaemia and xerophthalmia are not uncommon (Ene-Obong, 2017). It has been estimated that approximately one out of every three Under-5 children is chronically malnourished and thereby subjected to a pattern of ill health and poor development in early life (UNICEF, 2021), with malnutrition being associated with more than half of all deaths of children worldwide.

Reducing malnutrition among children under the age of five remains a huge challenge in developing countries of the world, an estimated 59 million under-5 children are believed to be chronically malnourished in developing countries (UNICEF 2022). Similarly, about 50% of deaths among children of this age group are believed to be associated with malnutrition in developing countries (UNICEF Data 2022). Malnutrition is widespread in Nigeria, especially in the rural areas. This is partly due to inadequate food and nutrient supply. The 2018 Nigeria Demographic and Health Survey revealed that 37% of under-five children in Nigeria are stunted, 22% underweight and 7% wasted. These surveys indicated significant variation between the rural and urban areas with children from rural areas worse affected by malnutrition.

Malnutrition is insufficient, excessive or imbalance consumption of dietary energy and nutrients, it manifests in different forms, such as under nutrition, over nutrition and micronutrients malnutrition (Smith & Haddad, 1999). Malnutrition in early childhood is associated with functional impairment in adult life as malnourished children are physically and intellectually less productive when they become adults (Smith & Haddad, 1999). Children that are malnourished tend to have increased risk of morbidity and mortality and often suffer delayed mental development, poor school performances and reduced intellectual achievement. Malnutrition in early childhood often leads to deficits in cognitive development, malnourished children are found

to score poorly on tests of cognitive function and have poorer psychomotor development and poorer fine motor skills. They tend to have lower activity levels, interact less with their environments, and fail to acquire skills at normal rates. Also, malnutrition may have long-term consequences due to the intergenerational transmission of poor nutrition and anthropometric status. Short-term hunger may affect a child's attention span. Malnutrition in children manifests in the form of stunting, wasting and underweight all which have long term effect on the child performance in adulthood which through the cycle affect his capability to contribute to the growth performance of the country.

Children of low income earners, which majorly are rural dwellers that cannot make ends meet, are believed to be malnourished since the limited income available to the family is expended majorly on necessities so as to survive which avail the family no opportunity to cater for the little children in the family. Thus, household economic status has a long term impact on the nutritional status of under-5 children in the family. This therefore implies children that are stunted, underweight and wasting are victim of low income families that cannot afford the needed nutrient thereby causing malnutrition. This study sets out to appraise the nutritional status of under 5 children in Nigeria.

In Nigeria, it is estimated that 2 million children suffer from severe acute malnutrition (SAM), Nigeria has the 2nd highest burden of stunted child in the world with a national prevalence of 37% and of the 2 million children that suffer malnutrition only 2 out of 10 children affected is currently reached with treatment national nutrition and health survey (NNHS 2018), half of all under-five deaths in 2020 occurred in just 5 countries: Nigeria, India, Pakistan, Democratic Republic of Congo and Ethiopia (UNICEF 2021). Over the past five years, infants and under-five mortality have remained steady in Nigeria, at 34 and 117 deaths per 1,000 live births respectively, at these mortality levels, one Nigeria child of every 13 born dies before reaching age 1, and one in every eight does not survive to their fifth birthday (NDHS 2018). Malnutrition puts the child on greater risk of dying from common infections, increase the frequency and the severity of such infections and

also delay recovery (UNICEF 2021). The recalcitrant high rates of childhood mortality in Nigeria, the concern and the desire for significant reduction in the rates has stimulated several studies on the nutritional status of the under-five children. Studies have justified that despite the increase in the health expenditure statistics of Nigerian government, and laudable programme like the MDG and SDG which aim at reducing number of persons suffering from by 50% by the year 2015, yet the cases of malnutrition and malnutrition related mortality rate among children has not reduced significantly in the recent years.

According to 2018 National Demographic and Health Survey (NDHS), 37% of Nigeria children age 0-59 months are stunted (short for their age), 7% wasted (thin for their height), 22% are underweight (thin for their age) and 2% are overweight (heavy for their height). Report from 53 developing countries showed that 56% of child's death (mortality) is attributable to malnutrition potentiating effects (Zebenay, 2021). Nearly half of all death in children under the age of 5 is blamed on malnutrition, Stunting results from recurrent malnutrition in early childhood and children that are stunted may never reach their full cognitive potentials and subsequently decrease productivity in adult life hence contributing to economy losses (GDP). Annually Nigeria loses over 1.5 billion US dollars yearly in GDP to malnutrition and scaling up core micronutrients intervention would cost less than 1.88million dollars yearly, thus saving Nigeria about 1.498 billion dollar yearly (UNICEF 2011). It is important to examine the causes the incessant increase in under- 5 child malnutrition and its consequences (mortality). Therefore this study will focus on impact of Malnutrition on under 5 children in Nigeria using Appropriate Methodology and current time period.

The following are the questions that the study empirically seeks to investigate and proffer answers to them which include:

- i. What is the impact of Stunting on under -five child mortality Rate in Nigeria?
- ii. What is the impact of wasting on under- five child mortality Rate in Nigeria?

- iii. What is the impact of underweight on under - five child mortality Rate in Nigeria?

2. Literature Review

2.1 Conceptual Issues

Overview of Child and Maternal Nutrition in Nigeria

The national demographic health Survey (NDHS 2018) shows that nationally 37 percent of children under-five years are stunted, 22 percent are underweight, and 7 percent are wasted. Stunting refers to shortness that is a deficit or linear growth that has failed to reach genetic potential reflecting long-term and cumulative effects of inadequate dietary intake and poor health conditions.

When weight is low for age is refer to as underweight, while wasting is a recent and severe process that has produced a substantial weight loss(weight for height) and stunting(height for age), usually as reported based on the NCHS/CDC/WHO International Growth Reference. Significant variations were reported across rural and urban regions, geopolitical, and agro-ecological zones.

The 2018 NDHS showed that rural children (45 percent stunted) are disadvantaged compared to urban children (27 percent stunted) and children living in the North West geopolitical zone stand out as being particularly disadvantaged (percent stunted in North West is 50.4, compared to 42.8 in the North East, 29.7 in North Central, 17.2 in the South East, 20.4 in the South- South and 20.8 in the South West). Among the three broad agro ecological zones used in the NFCNS 2001-2003, the stunting rate was 58 percent in the dry savannah, about 46 percent in the moist savannah and lowest (27 percent) in the humid forest zone. Similar patterns were reported for underweight and wasting.

The national food consumption and nutrition survey (NFCNS 2001-2003) showed that 11.6 percent of women of child bearing age were chronically energy deficient (CED) or underweight or thin (Body Mass Index < 18.5). The proportion of underweight women was as high as 16.4 percent in the dry savannah, 10 percent in the moist savannah and 9 percent in the humid

forest zone. The NDHS 2018 reported 15 percent prevalence of chronic energy deficiency among women, ranging from 7 percent in the North Central to 23 percent in the North East and about 16 percent CED among rural women compared to 13 percent among urban women.

Birth weight, child growth, and adolescent growth determine nutritional status before and during pregnancy (maternal nutrition). Maternal nutrition also influences foetal growth and birth weight (ACC/SCN, 1992). The presence of an intergenerational link between maternal and child nutrition means a small mother will have small babies who in turn grow to become small mothers. Some findings on the relationship between maternal and child nutrition (Teller et al., 2000; Genebo et al., 1999) showed that a high proportion of low-birth-weight and stunted children were observed among malnourished mothers.

Child Nutrition Determinants: Some of the socioeconomic and demographic factors explaining child nutrition according to studies done in different places are reviewed below.

Household economic status; as in the case of women, the economic status of a household is also one of the most important determinants of child nutritional status (UNICEF, 1990). Comparative studies on child nutrition for more than 15 countries (Sommerfelt, Elizabeth & Kathryn, 2016) and some local studies in Ethiopia (Yimer, 2018) showed that the higher the level of economic status of the household, the lower the level of child stunting.

Education is one of the most important resources that enable women to provide appropriate care for their children, which is an important determinant of children's growth and development (Engle & Menon, 1996). Studies in the Philippines (Aguillion et al, 1982), Libya (Popkin & Bisgrove, 1988), Uganda (Statistics Department and Macro International Inc., 1996), and Ethiopia (Yimer, 2018; Genebo et al., 1999) show a decreased incidence of malnutrition among young children with an increase in the level of mothers' education.

Although women's employment enhances the household's accessibility to income, it may also have negative effects on the nutritional status of children, as it reduces a mother's time for childcare. Some studies have revealed that mothers of the most malnourished children work outside their home (Abbi et al., 1991). Another study argued that there is no association between maternal employment and children's nutritional status (Leslie, 1988).

Unfavourable health environment caused by inadequate water and sanitation can increase the probability of infectious diseases and indirectly cause certain types of malnutrition. A comparative study in some developing countries (Sommerfelt et al., 2016) and in Jimma, Ethiopia (Getaneh et al., 1998) showed that unprotected water source and non-availability of latrine were associated with low child stature. Diarrhea and other infectious diseases manifested in the form of fever affect both dietary intake and utilization, which may have a negative effect on improved child nutritional status. A comparative study on children's nutritional status (Sommerfelt et al., 2016) indicated that stunting was highest among children with recent diarrhea.

Children's nutritional status is also more sensitive to factors such as feeding/weaning practices, care, and exposure to infection at specific ages. A cumulative indicator of growth retardation (height-for-age) in children is positively associated with age (Anderson, 1995 as cited in Aschalew, 2000). Local and regional studies in Ethiopia have also shown an increase in malnutrition with increase in age of the child (Yimer, 2018; Samson and Lakech, 2000). It is expected that parents give less attention to older children when they give birth to a new child who needs much attention and care. One study showed that stunting is rare in birth order 2-3 (Sommerfelt et al., 2016), and higher birth order (5+) is positively associated with child malnutrition.

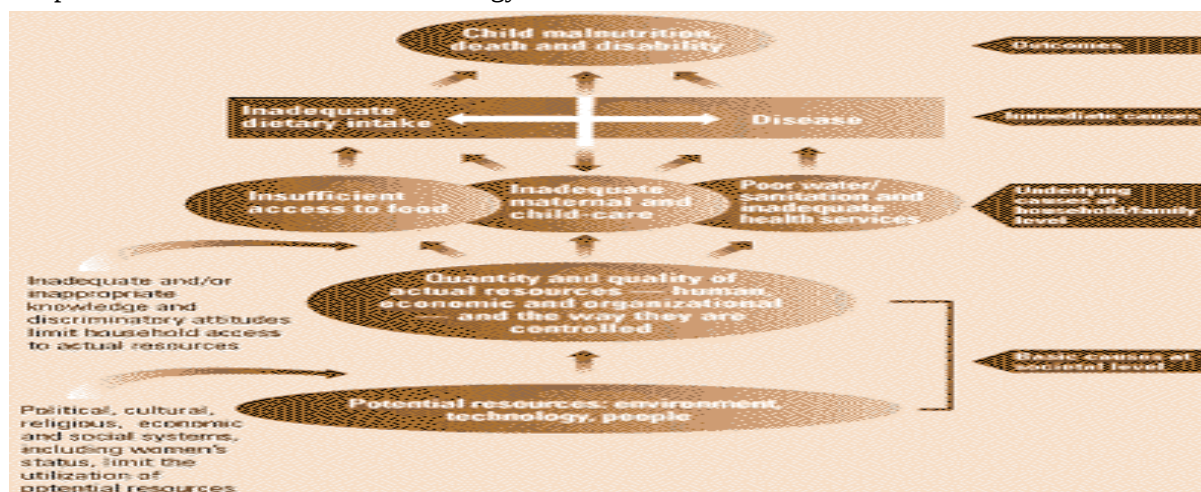
Closely spaced pregnancies are often associated with the mother having little time to regain lost fat and nutrient stores (ACC/SCN, 1990). Higher birth spacing is also likely to improve child nutrition, since the mother gets enough time for proper childcare and feeding. Studies in developing countries showed that children born after a

short birth interval (less than 24 months) have higher levels of stunting in most countries where DHS surveys have been conducted (Sommerfelt et al., 2016; GSS and MI, 1999).

Causes of Child Malnutrition:

The figure 1 below attempt to describe the conceptual framework on the causes of malnutrition was developed in 1990 as part of the UNICEF nutrition strategy. The

framework shows that causes of malnutrition are multi-sectorial, embracing food, health and caring practices. They are also classified as immediate, underlying, and basic, whereby factors at one level influence other levels. The framework is used at national, district and local levels, to help plan effective actions to improve nutrition. It serves as a guide in assessing and analysing the causes of the nutrition problem and helps in identifying the most appropriate mixture of actions.



Source: UNICEF 1997

Methods of Assessing Nutritional Status

Nutritional assessment is the first step in the treatment of malnutrition. The goals of nutritional assessment are identification of individuals who have, or are at risk of developing malnutrition, to quantify the degree of malnutrition and to monitor the adequacy of nutrition therapy. The methods of assessment are based on series of anthropometric, dietary, laboratory and clinical observations used either alone or more effectively, in combination. Correct interpretations of the results often require consideration of other factors such as socio-economic status, cultural practices, and health and vital statistics (Gibson, 2015). In this study dietary method and anthropometric measurements were used because they yield satisfactory results within the limit of resources available.

Anthropometric Method

Anthropometry involves measurement of variation of physical dimension and gross composition of human body at different age level and degree of nutrition. Anthropometry is particularly useful when there is chronic imbalance between intake of protein and energy (Gibson, 2015). Anthropometric indices are derived from combination of raw measurement. These include height, weight, and age of the individuals whose nutritional status is being determined. The measurements are then used to calculate the anthropometric indicators of nutritional status such as height-for-age, weight-for-age and weight for height. The indicators are then used to classify and interpret nutritional status of individuals as shown in table 1 below. Anthropometric methods of assessments are preferred in most study for its advantages. The equipment used is portable and inexpensive. Measurements can be performed relatively quickly and with ease hence do not require highly skilled staff to

perform them. This method however has some limitation as well. Although sometimes the method can detect moderate and severe form of malnutrition, it cannot be used to identify specific nutrient deficiency states (Gibson, 2015). The main imprecision errors in anthropometric are random imperfection in measuring

instruments or in the measuring and recording techniques (Arroyo et al., 2010). To control and minimize errors during the assessment, examiners need to be carefully trained on techniques of calibrating the equipment and taking accurate measurements.

Table 1: Cut Off Points for Malnutrition

Indicators	Moderate(GAM)	Severe(SAM)
Wasting	WHZ; <-2 to $\geq$ -3Z scores	WHZ; below -3Z
Underweight	WAZ; <-2 to $\geq$ -3Z scores	WAZ; below -3Z
Stunting	HAZ; <-2 to $\geq$ -3Z scores	HAZ; below -3Z

Source: WHO, 2006

Biochemical or Laboratory Methods

The assessment of nutritional status by laboratory tests potentially offers a reproducible quantitative means of measuring specific nutrients that can be of great use to clinicians, nutritionists, and researches. It can provide objective confirmation of nutritional deficiencies.

Laboratory tests can also be used to monitor nutritional therapy with greater precision compared to separate use of dietary, anthropometric, or clinical assessment techniques. They may be used to determine quantitative alterations in biochemical levels of nutrients, their metabolites, or dependent enzyme activities that are often not detected by anthropometric methods. Although they nicely quantify levels of a certain nutrient in a specific body fluid at a particular time, these measurements may not correlate with values at other times, in other body pools, or with deficiencies of other nutrients. Furthermore, many drugs, diseases, and end environmental conditions not related to nutrition can affect measured levels of nutrients (Falcao, 2000).

Clinical Methods

The method it utilize a number of physical signs (specific and non-specific), that are known to be associated with malnutrition, deficiencies of vitamins and micronutrient. This method involves getting good nutritional history and general clinical examination with special attention to organs like hair, nail, and angle of the mouth, eyes, skin, tongue, muscles, bones and thyroid glands. Detection of relevant sign helps in establishing a nutritional diagnosis. The method is fast

and easy to perform, inexpensive and non- invasive. However it has a limitation in ascertaining early diagnosis (Gibson, 2015).

Dietary Assessment Method

Diet is one of the prime determinants of health and nutritional status. An inadequate diet, poor in both quality and quantity has been one of the reasons for high levels of malnutrition in children. Dietary surveys are therefore one of the essential components of nutritional assessment. (Kulsum et al, 2008). The appropriate tool for dietary assessment will depend on the purpose for which it is needed. The purpose may be to measure nutrients, foods or eating habits. Different methods have been developed for the purpose of assessing dietary intake. These range from detailed individual weighed records collected over a period of 7 days or more to food frequency questionnaires, household survey methods and simple food lists. Each has merits, associated errors and practical difficulties to be considered when choosing one method above another (Wendy et al, 2003). Dietary assessment can be done at household level or individual level depending on the objective of the survey.

Household Methods

The methods of assessment at the household level are: household recall, food accounts and inventories. Data generated by these methods are useful for comparing food availability among different communities, geographic areas and socioeconomic groups. However, these data do not provide information on the distribution of foods among individual members of the household.

Food Account Method

Household members keep a detailed record of the quantities of food entering the household, including home produced food, purchases gifts, and from other sources. The method is widely used in household budget surveys. Main disadvantage of this method is that data are limited to food brought into the home and fail to account for food consumed outside home.

Household Record

In the household record method, the foods presented for consumption to household members are weighed or estimated in household measures. This method may be well suited to populations in which a substantial proportion of the diet is home produced rather than purchased (Gibson, 2015).

Individual methods

Dietary Diversity

Dietary diversity is defined as the number of individual food items or food groups consumed over a given period of time (Ruel, 2003). The type and number of food groups used for assessment and subsequent analysis may vary depending on the level of measurement and intended purpose. At the household level, dietary diversity is usually considered as a measure of access to food, while at individual level it reflects dietary quality, mainly micronutrient adequacy of the diet. The reference period can vary, but is most often the previous day or week (FAO, 2011, WFP, 2009). For this study individual dietary diversity score of the children was determined based on simple counts of number of food groups consumed in the past 24 hour (8 food groups by FAO for individual dietary diversity). DDS is easy to calculate (Ruel, 2003), moreover majority of respondent's do not find the questions associated with assessing DDS intrusive (Swindale & Bilinsky, 2006). However the method also has a limitation since Measures of dietary diversity typically do not include quantities consumed. There can also be significant fluctuations over time in consumption of food groups. This poses challenges in extrapolating survey data to arrive at broad conclusions

about the food security status (IPC Global Partners, 2008).

Challenges in Assessing Dietary Intake

The recall ability and psychological characteristics of individuals can influence dietary reporting. For example, an individual may be aware that their diet is unbalanced and so may be reluctant to provide honest answers to questions, or their recollection of intake may simply be flawed. Participants may report behaviour that they perceive as socially desirable rather than accurate, National Obesity Observatory UK (NOO, 2010).

Childhood Nutrition and Malnutrition in Nigeria

According to the Food and Agriculture Organization of the United Nations (FAO 2013), more than 14 percent of the population in developing countries were undernourished in the period between 2011 and 2013. Malnutrition includes both nutrient deficiencies and excesses and is defined by the World Food Programme as "a state in which the physical function of an individual is impaired to the point where he or she can no longer maintain adequate bodily performance processes such as growth, pregnancy, lactation, physical work, and resistance to and recovering from disease" (2005). It results in disability, morbidity, and mortality, especially among infants and young children (Pelletier 1994). Malnutrition often begins at conception, and child malnutrition is linked to poverty, low levels of education, and poor access to health services, including reproductive health and family planning (IFPRI 2014). Under nutrition is mostly associated with developing countries like Nigeria (DHS 2013).

Two main types of malnutrition have been identified in Nigerian children: (1) protein-energy malnutrition and (2) micronutrient malnutrition. Protein-energy malnutrition among preschool children is a major public health problem across the country. "Stunting" is typically defined as low height-for-age, but, more specifically, it is a deficit of linear growth and failure to reach genetic potential that reflects long-term and cumulative effects of inadequate dietary intake and poor health conditions (ACC/SCN 2000). Low weight-for-age is called "underweight" while "wasting" is severe

underweight or substantial weight loss that is usually a consequence of acute food shortage or disease. (The NCHS/CDC/WHO International Growth Reference reports data on these levels in a set of published indices, which served as a reference for this study.)

National and regional statistics on anthropometric indicators in Nigeria have been consistently dire. In 1983–1984, the National Health and Nutrition Survey (HANS) conducted by the Federal Ministry of Health estimated the prevalence of wasting to be around 20 percent (FGN 1983–1984). A 1986 Demographic and Health Survey (DHS) of children ages 6–36 months in Ondo State (southwestern Nigeria) found the prevalence of wasting to be 6.8 percent, underweight 28.1 percent, and stunting 32.4 percent. In February 1990, an anthropometric survey of preschool children (2–5 years old) in seven states found underweight prevalence ranging from 15 percent in Akure (Ondo State) to 52 percent in Kaduna (Kaduna State) while stunting prevalence ranged from 14 percent in Iyero-Ekiti (Ondo State) to 46 percent in Kaduna. In addition, the 1990 DHS survey conducted by the Federal Office of Statistics estimated the prevalence of wasting at 9 percent, underweight at 36 percent, and stunting at 43 percent among preschool children.

These figures are lower than the figures published in 1994 by UNICEF-Nigeria from a 1992 survey conducted among women and children in 10 states; the UNICEF report showed the prevalence of wasting among women and children at 10.1 percent, underweight 28.3 percent, and stunting 52.3 percent. There was a decrease in prevalence of stunting in the 2003 NDHS with 11 percent of children wasted, 24 percent underweight, and 42 percent of children stunted (NDHS 2003). By 2008 prevalence of underweight had decreased to 23 percent and stunting had dropped to 41 percent but wasting increased to 14 percent (NDHS 2008).

Similar trends were reported by the 2001–2003 NFCNS: 9 percent wasting, 25 percent underweight, and 42 percent stunting, with significant variations across rural and urban areas, geopolitical zones, and agro-ecological zones (MaziyaDixon et al. 2004). The study showed that prevalence of stunting was lowest in the southeast at 16 percent; it reached 18 percent in the south and 55 percent

in the northwest. Among the states, stunting was highest among children in Kebbi (61 percent). The 2003 NDHS showed that rural children (43 percent stunted) were disadvantaged compared to urban children (29 percent stunted). Children living in the Northwest geopolitical zone stood out as being particularly disadvantaged at 55 percent compared to 43 percent in the Northeast zone, 31 percent in North Central, 25 percent in the Southwest, 21 percent in the South-South, and 20 percent in the Southeast. Among the three broad agro-ecological zones used in the 2001–2003 NFCNS, the stunting rate was 58 percent in the dry savannah, 46 percent in the moist savannah, and 27 percent in the humid forest zone. Similar patterns were reported for underweight and wasting. Additional studies have also shown that malnutrition is more pronounced in the rural areas and rural children are more disadvantaged than urban children in Nigeria (UNICEF 1998; MICS 2011; NDHS 2003, 2008, 2013).

There was a decrease in prevalence of malnutrition in the 2011 reports of the Multiple Indicator Cluster Survey (MICS) in Nigeria with 34 percent of children under five stunted, 31 percent underweight, and 16 percent wasted, while about 15 percent of children had low birth (at less than 2,500 grams at birth) (MICS 2011). It is evident from the 2013 NDHS that the proportion of children who are stunted has been decreasing over the years. However, the extent of wasting has worsened, indicating a more recent nutritional deficiency among children in the country. Prevalence of stunting decreased to 37 percent, with a higher concentration among rural children (43 percent) than urban (26 percent). However, the proportion of children underweight (29 percent) and wasting (18 percent) increased (NDHS 2013). Similarly, the 2014 *National Nutrition and Health Survey Report* by the National Bureau of Statistics and UNICEF shows that children's nutritional status modestly improved since 2013, according to the 2013 NDHS report, with 32 percent of children under five stunted, 21 percent underweight, and 9 percent wasted.

Malnutrition does not often exert equal impact on all population groups. Certain factors and circumstances dictate the target of occurrence (Keke, 1990). The causes of malnutrition are multidimensional and include both

food and non-food factors such as low income, uneven household food distribution, poor sanitation, infection, inadequate food production, marketing and preservation as well as poor knowledge of nutrition. Inadequate intake of food results in problems of malnutrition. Perspective field studies from several different regions of the world indicate that, as many as one third of death of children occurring between 6 months and 5 years of age in developing countries may be attributed to PEM. Also, psychological trauma which occurs as a result of the sudden separation from the mother after a prolonged period of continuous intimate contact, and permissive breast feeding frequently caused by another pregnancy is common (Pyke, 1979). Nutritional inadequacies, which prevent the growth of children to their genetic potential, are part of the reasons why those children are underweight, short or thin.

Malnutrition currently accounts for about half of the 5 million deaths each year among under-five children in the developing world. Malnutrition is strongly associated with poverty because levels of malnutrition are higher in poor countries than in better-off countries (World Bank 2000).

Although the last three decades have witnessed a 20 percent reduction in the proportion of malnourished children in developing countries, about 160 million children under-five years of age, almost one-third of the developing world's children are still malnourished (WHO 1999; Smith & Haddad 2000). It has been projected that under the most likely circumstances, about 135 million children under the age of five in developing countries will be malnourished by 2020 (Pinstrup Andersen et al, 2000). Clearly, the first few years are the most crucial to the intellectual capacity and physical development of children and can promote their future productivity growth (Pinstrup Andersen 2000). It is noted that no matter how much food is available, children must have nurturing from other humans to grow (Smith & Haddad 2000). This aspect of child nutrition is captured in the concept of care for children and their mothers, who give birth to children and who are commonly their main caretakers after they are born. Thus care, being the second underlying determinant, is captured by variables such as when mothers initiated

breast milk, whether a child was given complementary feeding (considering age appropriate feeding frequency and giving of minimum acceptable diet), whether a child was delivered in health facility, and whether the mother attended antenatal care during pregnancy.

Unfortunately the diets commonly offered to young children are of low quality and often lack variety, which is the key to specific nutrient adequacy. They are usually of low energy and nutrient density and as a result, multiple nutrient deficiencies are common in this age group (Ogbimi & Ogunba, 2011).

According to United Nations' World Food Program (WFP) (2020), in developing countries, almost 66 million children go to school hungry everyday about a third of them in Africa. Among the poor, there is often not enough food at home, and most schools in developing countries lack canteens or cafeterias. School meals are a good way to channel vital nourishment to poor children. Having a full stomach also helps them to concentrate better on their lessons (WFP, 2020). In countries where school attendance is low, the promise of at least one nutritious meal each day boosts enrolment and promotes regular attendance. Parents are motivated to send their children to school instead of keeping them at home to work or care for siblings (WFP, 2020)

According to Federal Ministry of Education, FME (2007), over 90% of morbidity and 80% of mortality in under-5 children arise from four causes: malaria, vaccine preventable diseases, diarrhoea and acute respiratory infections while malnutrition account for over 50% of such mortality (FME, 2007).

Malnutrition begins with changes in nutrient levels in blood and tissues. Alteration in enzyme levels, tissue abnormalities and organ malfunction may be followed by illness and death (Fyke, 1999). In under nutrition the incidence of anaemia due to haemoglobin concentration is common and lowest values have been found in children of 6-23 months, being in weaning period. Son (1987) reported that the percentages of school children having haemoglobin level below 11g% were: 76% in Jamaica, 42% in Gayman Islands, 41% in Guyana and 14.3% in Saint Lucia. In a study, Olivares et al. (2005) found that plasma levels of albumin, potassium and

calcium were lowered in malnourished children. Similarly, Chowdhury et al., (2008) found that total protein and albumin were significantly lowered than control in any form of PEM. Micronutrient deficiencies especially iron and iodine cause delayed psychomotor development and impaired cognitive function (Leo, 2011). There are many under nourished children in Katsina State (Doctors without Border, 2009).

Malnutrition is largely a preventable and treatable cause of childhood morbidity and mortality that can be dealt with for less than USD 20 per child per year (Chiabi et al., 2008).

Studies have shown the association between increasing severity of anthropometric deficits and mortality and substantial contributions are made by all degrees of malnutrition to child mortality (Mendez and Adair, 1999; de Onis et al., 2000). Strong evidence exists that poor growth is associated with delayed mental development and that there is a relationship between impaired growth status and both poor school performance and reduced intellectual performance, thus compromising the efforts to achieve universal education (MDG-1) (UN, 2004; Cesar et al., 2008).

Amosu et al (2011) using a descriptive cross sectional study to assess the nutritional status of children in ipokia local government area. They found out that there were no significant differences between the males and females except for males having a significant higher Lean Body Mass (LBM) than the females. Using weight-for-age, 82.13% of the Under-5 children were underweight, 33.52% were stunted while 85.15% were wasted. The intakes of protein, iron, calcium and vitamin A were inadequate in both males and females. Majority of mothers of the children were uneducated (80.7%) and earned a paltry monthly income in the range of N1, 500-N5, 900. The findings show that the nutritional status of Under-5 children in the study location which happens to be a rural area was quite poor.

Oluwole et al (2012) found that 37% of the families were food secure while the remaining (63 %) were food insecure. The percentage met of DRI by the children in terms of energy; protein and mineral (calcium, iron, zinc, sodium, potassium and magnesium) were considerably

less than recommended intakes. The mean height of female children was significantly higher when compared with male counterpart between 10-14 years, while that of their weight was lower between 6-9 years. For the BMI for-age z-score, 13.9% of the children were obese/overweight 39.6% normal and 46.5% underweight; while that of height-for-age z-score, 56.8% were normal and 43.3% stunted. Head circumference-for-age z-score, 52.7% of the children had normal head circumference and 47.3% had head circumference below normal.

Omilola(2010) Examining the relationship between the three most commonly used anthropometric indicators of child malnutrition (stunting, underweight, and wasting) as well as the relationship between the inequalities of these anthropometric indicators of child malnutrition, show that most Nigerian children who are both stunted and underweight are not likely to be wasted. This implies that most Nigerian children can be stunted and underweight or be underweight and wasted, but they are not very likely to be stunted and wasted Victor (2010) found that while maternal education and knowledge are critical for improved maternal and child nutrition, efforts to improve household economic status, increase the rural farmers' benefits from agriculture, and empower mothers to earn income and take decisions, complemented with nutritional and public health services, are more likely to improve both child and maternal nutrition in the rural areas than in urban, especially in regions with the highest burden of malnutrition.

Woldermariam et al (2002) revealed that women and children of very poor or poor (low economic Senbanjo et al (2011) found that the prevalence of PEM was 20.5 percent, the prevalence rates of underweight, wasting and stunting were 23.1 percent, 9 percent and 26.7 percent respectively. One hundred and twelve (26.7 percent) children had borderline malnutrition. However, severe forms of PEM were not common. Only 4 (1 percent) children had marasmus while there were no cases of kwashiorkor or miasmic-kwashiorkor. Of the 348 mothers, 336 (96.6 %) had secondary education at best while 12 (3.4 %) had post-secondary. Also, children of mothers who were not educated beyond secondary

school level had one and a half to two times the prevalence rate of stunting. On the other hand, children of mothers with post-secondary education were apparently more often affected by wasting than those with less educated mothers. There was a subtle inverse relationship between father's educational qualification and prevalence of underweight but the differences were not statistically significant ($p = 0.568$). There was no consistent trend in the pattern of wasting or stunting with respect to paternal educational level. Low maternal income and overcrowding were associated with higher prevalence of wasting in Ifewara local government of Osun state.

Raphael et al (2011) descriptive results indicate that 23.6%, 22.0% and 14.2% of the sample children were stunted, underweight and wasted respectively. Regression analysis shows that the significant determinants of malnutrition were gender and age of child, education and body mass index of mother, calorie intake of the households, access to clean water and presence of toilet in the households.

Oluwole et al (2012) study was a descriptive cross-sectional designed studied among 909 males and 897 females children randomly selected from public primary schools in Ondo State, Nigeria. Demographic characteristics, dietary intakes and anthropometric measurements (height, weight and head circumference) of the children were collected through questionnaires. The quantity of dietary intake and percentage RDI met of the children were determined using portion size/household instruments, chemical analysis and dietary reference intakes (DRI) standard. BMI-for-age and height for-age z-score of the children were also determined using the method and reference of W.H.O. The household food security status of the children's family was determined using household coping strategies.

Senbanjo et al (2011) using a structured questionnaire to collect information on the demographic, socio-economic and environmental characteristics of the families and anthropometric parameters of the child were recorded. The analysis was made base on the Pearson Chi squared (χ^2) test.

Raphael et al (2011) in their study analyse the determinants of a child malnutrition using a malnutrition model of a child consisting of vector of child specific variables, household specific variables, vector of child health and other variables using a regression technique. Since the dependent variable is dichotomous, the logit estimation technique was used to analyse the data.

Owor et al (2000) using a structured questionnaire in Uganda used the Pearson Chi-squared test to ascertain statistical significance for categorical variables. Comparison of continuous variables was done by comparing means and tests for significance using the t - test.

Several studies were carried out on the Impact of malnutrition on the under -five children mortality rate both within and outside Nigeria. More so, much empirical studies on the under-five children mortality rate with different methodologies by different authors, environments under which the studies were carried out, the nature of data and sources in different jurisdictions and the policy thrust, among others could account for these differences. Besides, the use of Different Methodology and current time period has established the Gap in this study. This study has added to the exiting literature using appropriate methodological framework and current time series data in bridging the disparity in previous studies.

3. Methodology

The data used for this study was obtained purely from secondary sources such as the World Bank Development Indicators (WBDI); the Central Bank of Nigeria (CBN) Statistical Bulletin of various years; and from other online sources including academic journals.

This study employed the causal research design which is also called explanatory research design (Pearl, 2000). Causal research design according to Kothari (2004) is essentially concerned with assessing cause-and-effect relationship among variables. It is founded on the principle that if a statistically significant relationship exists between two variables, then it is possible to predict the dependent variable using the information available on the independent variables. That is, to

determine causality, it is important to observe variations in the variable assumed to cause the change in the other variable(s), and then measure the changes in the other variable(s). It is further stated by Kothari (2004), that causal research is used to explore the effect of one variable on another, and this is consistent with this study, which seeks to establish the effect of the selected Malnutrition on under five children Mortality rate in Nigeria.

Time series data and Autoregressive Distribution Lag (ARDL) method of analyses are employed in this study. It starts by examining the Stationarity properties of the series, Test of exogeneity, Selection of lag length, Selection of optimal model, general modelling, and Bound test for co-integration and Estimation of long run coefficients.

Model Specification

The multiple equation models to be estimated are stated below as:

Table 2: Descriptive Statistics

	MTR	STG	WTG	UWT
Mean	34.43786	0.795596	1.751804	31.03308
Median	31.00000	0.164701	2.081269	8.037800
Maximum	81.64000	7.268343	2.344131	134.0378
Minimum	0.600000	0.005946	0.244159	0.546400
Std. Dev.	35.43251	4.473020	4.160903	4.231883
Skewness	-0.027113	-0.217475	0.401348	-0.136038
Kurtosis	1.380799	1.997960	2.387303	1.886636
Jarque-Bera	3.827764	1.740179	1.487089	1.915673

Source: Author's computation using E-view 9.0

From the table 2 above it can be seen that distribution of variables exhibit positive and negative skewness values. A value of 0.4 for wasting Variable signifies high skewness in data distribution. -0.02, -0.21 and -0.13 for mortality Rare, Stunting and underweight respectively imply a fairly symmetrical data distribution since these values fall within -0.01 to 0.5 ranges. On kurtosis front all variables have values less than 3 indicating a flat distribution of these data relative to normal. In other words these data sets possess lighter tails in comparison to a normal distribution.

$$MTR = f(STG, WTG, UDW) \dots\dots\dots (1)$$

Econometrically, it is stated as

$$MTR = b_0 + b_1STG + b_2WTG + b_3UDW + u \dots (2)$$

Where

MTR = Mortality Rate

STG = Stunting

WTG = Wasting

UDW = Underweight

b_0 = constant

b_1 and b_2 = the parameters to be estimated

U = stochastic term.

4. Results and Discussion

Descriptive Statistics

Summary descriptive statistics for variables in a data set have a very important role in data evaluation and measurement of each variable for further advanced statistical analysis.

As for the Jarque-Bera's case p values of not more than 20 in all variables reveals lack of normality in these data sets. Put it differently, the null hypothesis for normality can be rejected at 5% significance level.

Correlation Analysis

As shown in Table 3, the study utilized correlation analysis in an attempt to observe the mutual relationship among the variables.

Table 3: Correlation Matrix

C	MTR	STG	WTG	UWT
MTR	1			
STG	0.6533305407667288	1		
WTG	0.8696246987958372	0.6807724953803688	1	
UWT	0.7600999637360489	0.7789583487462371	0.7176813063249328	1

Source: Author's computation using E-view 9.0

For matrix correlation, Pearson's correlation coefficient was employed to examine the extent of the relationship between the variables; the correlation matrix shows the magnitude and direction of the relationship between each pair of variables being analyzed. According to the technique, the nearer the correlation coefficient to one (1) the stronger the strength; a negative correlation shows that there is an inverse relationship between the two variables. The correlation matrix is symmetric about the diagonal and the values of the diagonal are 1.000000

since there is a perfect correlation of the variables with itself (Helwig, 2017).

Table 3 excavated that, Stunting (STG), wasting (WTG) and underweight (UWT) conjugates a positive relationship with the dependent variable Mortality Rate (MTR); therefore, it can be concluded that all the variables has a conjugal and blissful agreement with MTR.

Unit root test results

Table 4: ADF Stationary Test Results of Variables

	ADF @ Level	Prob.	ADF @ First Dif.	Prob	Result
MTR	0.193514	0.9677	-2.948478	0.0513	I(I)
STG	-2.475817	0.1300	-5.339392	0.0001	I(I)
WTG	-1.036489	0.7288	-7.547803	0.0000	I(I)
UWT	-2.209173	0.2068	-7.532035	0.0000	I(I)

Source: Author's computation using E-view 9.0

Notes: if $t^* > \text{ADF Critical value at } 5\%$, it implies that unit root exist (Non-stationary series)
 $t^* < \text{ADF Critical values at } 5\%$, it implies that unit root does not exist (Stationary series) Where t^* is the ADF test Statistic.

Since it is advisable that for meaningful statistical analysis, economic variables must undergo stationarity test, in this study stationarity examination was conducted initially at level and then at first difference using ADF technique. While examining stationarity using this tool, two hypotheses in the name of null (H_0) and alternative (H_1) were looked into. Under the null factor (H_0) it is simply presumed that a variable holds a unit root and the opposite is true for the alternative one (H_1). The results thus exhibited that apart from the all share index the rest of variables are not stationary or possess unit root at level and stationarity was realized upon taking up first differences as seen in table 4 above.

The results in Table 4 revealed that all the variables failed stationarity test at levels and became stationary after first difference.

ARDL Estimation Results

Based on the unit root results, which indicate that the series are integrated at both level and first difference, these imply that the model has an amalgamated order of integration, which suggests the utilization of the ARDL Bound approach. The appropriate lag selection for the dependent and independent variables is to be determined first.

Table 5: The Optimal ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
MTR(-1)	1.923525	0.218552	8.801212	0.0000
STUNING(-2)	-0.042009	0.019492	-2.155136	0.0467
WASTING	0.287664	0.106110	2.711005	0.0154
UNDERWEIGHT	-0.135679	0.049942	-2.716731	0.0152
C	3.356413	1.371845	2.446641	0.0263
R-squared	0.999991	Mean dependent var		161.1935
Adjusted R-squared	0.999984	S.D. dependent var		33.83283
S.E. of regression	0.136613	Akaike info criterion		-0.836993
Sum squared resid	0.298608	Schwarz criterion		-0.143128
Log likelihood	27.97338	Hannan-Quinn criter.		-0.610810
F-statistic	131427.1	Durbin-Watson stat		2.432593
Prob(F-statistic)	0.000000			
*Note: p-values and any subsequent tests do not account for model selection.				
Source: Author's computation using E-view 9.0				

From the above table 5, the result is significant as the coefficients are indicating both positive and negative values. However, all coefficients are significant despite the negative signs on the coefficients of Stunting and underweight accordingly.

The study employed bound test in order to check if there is long run relationship between the independent variables and dependent variable.

Table 6: ARDL Bounds Test					
Test Statistic	Value	K	Significance	I0 Bound	I1 Bound
F-statistic	4.264028	3	10%	2.72	3.77
			5%	3.23	4.35
			2.5%	3.69	4.89
			1%	4.29	5.61

Source: Author's computation using E-view 9.0

As observed in Table 6, the unit root estimations result for variables in model one, the variables are integrated same order i.e. stationary at a first different I(1). Based on the unit root result, the study utilized ARDL Bound in an attempt to explore the likelihood of the presence (or otherwise) of a long-run association between the variables. Having utilized the ARDL Bound technique, the co-integration test does not apply. Based on the Bound test results in Table 4 the F-statistics estimate

(value) is compared with the upper Bound value at a 5% critical level. The result indicates the presence of a long-run association within the model.

The Long-Run Estimates

Based on the results of the Bound test which indicate that the variables are co-integrated as observed in Table 6. Below are the long-run coefficient results of the ARDL method presented in Table 7

Table 7: ARDL Co-integrating And Long Run Form

Co-integrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MTR(-1))	0.920857	0.216669	4.250057	0.0006
D(STG(-1))	0.042009	0.019492	2.155136	0.0467
D(WTG)	0.287664	0.106110	2.711005	0.0154

D(UWT)	-0.135679	0.049942	-2.716731	0.0152
CointEq(-1)	0.002667	0.007714	0.345748	0.7340
Cointeq = MTR - (13.4009*STG -28.7692*WTG + 50.8696 *UWT -1258.4069)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
STG	13.400917	33.378169	0.401487	0.6934
WTG	-28.769166	110.663759	-0.259969	0.7982
UWT	50.869551	161.406675	0.315164	0.7567
C	-1258.406939	3845.905747	-0.327207	0.7478

Source: Author's computation using E-view 9.0

As observed in Table 7. In the long-run, the estimation results reveal significant coefficient at all of 1%, 5% and 10% in the long-run. The estimation result of MTR indicates a positive and significant coefficient. This means that a one percent increase in stunting results to 0.04 percent increase in mortality rate. The result of wasting indicates a positive and significant coefficient. This means that a one percent increase in wasting results to a 0.28 percent increase in the in a long run. While the result of underweight indicates a negative and significant coefficient. These imply that underweight increases mortality rate accordingly.

Discussion of Findings

Our results indicate that malnutrition variables such as Stunting, wasting and underweight cause mortality of under 5 children in Nigeria in the long term period.

The study findings shows that the coefficient of the malnutrition variable (Stunting) have significant impact on the mortality rate of under-five Children in Nigeria. The result indicate that positive relationship between stunting and mortality showing for every 1% increase in stunting there is a 0.4% increase in mortality.

The result of the data analysed indicated that there is positive and significant impact of Wasting as a variable of measuring the level of Malnutrition, on mortality of under-five children in Nigeria.

The study showed through empirical findings that underweight has negative and significant relationship with mortality rate of children under five in Nigeria. The findings on the variables above(stunting, wasting and underweight) were similar to studies conducted in

Northern Nigeria by shafique e tal(2021) Determinants of mortality among severely malnourished children in northern Nigeria and Adegoke O, Arif S, Bahwere P, et al(2020). Incidence of severe acute malnutrition after treatment in Sokoto, Nigeria, there is also a progressive evidence about the relationship between malnutrition and child mortality pioneered by Gomez et al (1956) and Scrimshaw et al (1968). These studies with recent ones (Chen et al, 1980; Scrimshaw, 1989; Pelletier et al, 1994; 1995; Schroeder and Brown 1994; Rice et al, 2000; Brundtland, 2000) agree that malnutrition and infection are 'mutually reinforcing' and that they are determined by poverty and ignorance. The contribution of malnutrition to child mortality is put roughly at 56%, 83% of this is due to mild and moderate malnutrition, which increases exponentially with the degree of malnutrition (Pelletier et al, 1995). Children with co-morbidities were 4 times more likely to die than children without co-morbidities in the study, which is in line with the study done in Southern Ethiopia and another study by NosiphiwoMandlaa*, Cheryl Mackayb and SiyaziMdac (2020) in south Africa. If the income of parents is increase it will result to an increase in weight for age of children under five. This could be explained on the grounds that parents who earn a substantial income will not find it hard to provide foods that contain the necessary nutrients needed for the child's/wards' growth and development.

5. Conclusions and Recommendations

One of the yardsticks to determine the level of development of any country is to consider the nutritional status of the under-5s. The under-5s are most at risk of malnutrition because they are more vulnerable to adverse environmental conditions and respond rapidly to dietary changes. They are also more at risk of becoming ill,

which will result in weight loss. Consequently, their nutritional status is considered a good gauge for population-based assessment of level of malnutrition. During the developmental years, children are susceptible to skeletal growth failure in ways that adults are not when there is acute or chronic malnutrition, which are good reflections of short-term and long-term malnutrition.

It is very important to state the crucial period when malnutrition usually sets in among Nigerian children. This includes the first trimester (when many women may not even know that they are pregnant at this time and if it is in adolescent girls, they will try to conceal the pregnancy either by not eating well to avoid bulging tummy or avoid visiting ante-natal care) and the 6th month post-delivery (period of transition from exclusive breastfeeding to complementary feeding and introduction of family diets). Access to adequate nutrition information and support during these periods will assist in the prevention of malnutrition. No nation can afford to waste its greatest national resource which is the intellectual power of its people. But that is precisely what is happening where low birth weight is common, where children fail to achieve their full potential growth, where micronutrient deficiencies permanently damage the brain, and where anaemia and short-term hunger limit children's performance at school. It is intellectual resources, not natural or physical resources that determine national power.

Nigeria and associated high mortality rate with the severe forms of malnutrition even in hospital settings, coupled with its unacceptable and unsustainable national economic impact, the 'Focusing on the young; Education, Nutrition, Early treatment and women empowerment'

(FYENEW) programme that can help prevent malnutrition need to be fully initiated, encouraged and strengthened and the time is now beyond any prevailing but surely surmountable limitations. It is quite obvious that malnutrition involves more than just shortage of food and there is no singular solution to prevent and treat under nutrition, so more evidence based researches, multi-sectorial involvement and political interest is needed.

Following the findings of the impact on malnutrition on under 5 children mortality in Nigeria, the study recommends the following measures to minimise if not eradicate issues of malnutrition of under 5 children situation in Nigeria.

Encourage adequate food intake of pregnant women, especially during the first trimester, which is the most crucial period to lay solid foundation for the unborn child in-utero. The nutritional needs of women can be supplemented by the government, non-governmental organizations and faith-based institutions among others. This seems to be the most cost-effective nutrition intervention approach because the cost per pregnant woman is affordable, even to the poorest of nations.

Practice of exclusive breastfeeding should be encouraged and nursing mothers should be adequately educated to ensure that the infants receive both the fore and hind breast milk for proper growth. Health workers in post-natal care should undergo special training on breastfeeding to enable them provide a scientifically sound nutrition to nursing mothers beyond the basic knowledge they acquired when in training.

Ensure appropriate complementary feeding, which promotes growth and prevents stunting among children 6–24 months. The period of complementary feeding is when other foods or liquids are provided along with breast milk. The 6– 11 month period is an especially vulnerable time because infants are just learning to eat and must be fed soft foods frequently and patiently (Brown et al., 1998).

Care must be taken to ensure that these foods complement rather than replace breast milk. For older infants and toddlers, breast milk continues to be an important source of energy, protein, and micronutrients. Therefore, breastfeeding should continue through 24 months and beyond. Rates of malnutrition usually peak at this time with consequences that persist throughout life. Stunting is seldom reversed in later childhood and adolescence. Inadequate feeding of girl children also affects nutrient stores and subsequent reproductive health problem, which may contribute to maternal mortality statistics. Improving complementary feeding requires a combination of strategies. Energy intake can be increased by increasing

breastfeeding frequency, increasing food portion sizes, feeding children more frequently, and/ or providing more energy-dense foods. Micronutrient intake can be increased by diversifying the diet to include fruits, vegetables, and animal products; using fortified foods; and/ or giving supplements. Choosing food combinations that enhance micronutrient absorption is also important (WHO, 2003).

The government should renew its commitment on social responsibilities/investments in area of giving to grants to SMEs, skills acquisition for youths and women empowerment, this will help the citizens have sustain means of income and hence bring good food to their tables. Reinforcement of issues of food safety/security and food fortification and serious punishments should be dish out to defaulters, the sacred cow and godfather syndrome should be eliminated.

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