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Risk Factors of Malnutrition in Children Under 5 in Nigeria

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Walden University
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Abstract

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by

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MSN/Ed, University of Phoenix, 2013

BSN, University of Phoenix, 2008

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Malnutrition in children under 5 years remains an important public health challenge as it spurs child mortality and morbidity in developing countries, including Nigeria. The purpose of this quantitative cross-sectional study was to explore the risk factors of malnutrition in children under 5 years of age in Akwa Ibom State, Nigeria. Socioecological and health belief models were applied to examine risk factors of malnutrition among these children. This study used a secondary dataset of 1,235 participants obtained from Akwa Ibom State Demographic and Health Survey database. Pearson's chi-square test and binary logistic regression were adopted for the analyses. The results showed a statistically significant relationship between household size (χ^2 (3) = 9.344, p = 0.025), child's gender (Wald (1) = 7.65, $p < 0.05$), breastfeeding type (Wald (2) = 12.154, $p < 0.05$), mothers' socioeconomic status (SES; Wald (2) = 8.576, $p < 0.05$), education level (Wald (2) = 7.808, $p < 0.05$), and child malnutrition status. The estimated odds ratio (*OR*) favored a decrease in child malnutrition by nearly 44% (*OR* = 0.557, $p < 0.05$) in a male child compared with a female child. The estimated *OR* favored an increase in child malnutrition by nearly 121% (*OR* = 2.213, $p < 0.05$) for a child in Ikot Ekpene relative to Uyo. Estimated *OR* favored an increase in child malnutrition by nearly 32% (*OR* = 1.321, $p > 0.05$) for mothers in low SES relative to mothers in high SES. The results may promote positive social change by providing insight for healthcare practitioners in future practices, increased awareness for mothers and caregivers to improve population health outcomes, and the opportunity for legislators to develop policies that empower and create income-earning opportunities for the marginalized.

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Dedication

This project is dedicated to God Almighty for safety, protection, and good health throughout my program and who made it possible to put this report together. I also dedicate this report to my beloved husband, Mr. Ita James, for his love, support, and encouragement all the way, to my amiable children, Jessica and Valerie James, and to all those who contributed in various ways to making this educational pursuit a success.

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I am indeed grateful to God, the giver of all wisdom, knowledge, and understanding, without whom I would have achieved nothing at all. Gratitude fills my heart towards my ever-supportive husband and children for their all-around prayers, love, and valuable suggestions. My sincere appreciation goes to my Committee Chair Dr. Joseph Robare and Committee Member Dr. Patrick Tschida, for their mentoring, guidance, and constructive feedback. Special thanks to my Citadel of Knowledge Walden University for its world-class virtual learning facilities, my professors for their outstanding facilitation and impacting knowledge throughout these rigorous years, and my colleagues for creating an engaging environment for scholarly collaborations, comparative learning, and scientific research. Finally, to everyone who contributed in one way or another towards this research; my success is your success.

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Section 1: Foundation of the Study and Literature Review

Introduction

Malnutrition can be described as the inadequate intake of some vital nutrients and the deficiency of the body to use or absorb these nutrients (World Health Organization [WHO], 2014). Poor nutrition in children under 5 years of age inhibits their ability to attain full physical and mental potential (Fentahun et al. 2016; WHO, 2014). Malnutrition remains an important public health challenge as it spurs child mortality and morbidity (WHO, 2013).

About 80% of the global malnutrition occurs in developing countries, including Nigeria, because of poor living conditions and lack of sanitary conditions (Fentahun et al. 2016). Despite the global reduction in incidence and prevalence of malnutrition among children under 5 years of age, Nigeria accounts for 11 million of the 60 million malnourished children under 5 years in developing countries (Kalu & Etim, 2018). Research findings have indicated that cultural, demographic, and socioeconomic factors are among risk factors that influence malnutrition in children (WHO, 2014).

In this study, I explored risk factors of malnutrition in children under 5 years of age, with a focus on Akwa Ibom State in Nigeria. I examined the relationship between household size (HHS) and malnutrition status of children under 5 years in Akwa Ibom State. I also investigated the relationship between child's age (CA), child's gender (CG), breastfeeding type, and malnutrition in children under 5 years in Akwa Ibom State. In addition, the relationship between mothers' age, socioeconomic status (SES), marital

status (MAR), education level and malnutrition in children under 5 in Akwa Ibom State was investigated.

Understanding risk factors of malnutrition in children under 5 years will provide more insights on how the challenges posed by malnutrition can be mitigated in Akwa Ibom State. The findings can be generalized for other States in Nigeria because they all share similar population characteristics. In addition, stakeholders will have more information to review action plans to curb malnutrition in children and adopt appropriate strategies in realizing these.

This first section includes background information on malnutrition in children under 5 years in Nigeria and the problem statement. The purpose of the study, research questions, hypotheses, theoretical framework, and nature of the study are also presented. Moreover, important definitions in the study, assumptions, scope and delimitations, limitations, significance are included. Lastly, a summary and conclusion end the section.

Background

Malnutrition in children under 5 years remains a vital public health problem because it contributes to mortality and morbidity in children (WHO, 2013). Poverty, low SES, and the presence of infectious diseases are among the variables correlated with malnutrition. Moreover, deficiencies in energy and protein intake results in protein-energy malnutrition, which is a common form of malnutrition. Malnutrition is comprised of undernutrition and overnutrition. Undernutrition consists of wasting, stunting, and underweight, as seen in Kwashiorkor where there is a severe lack of protein in the diet with evidence of severe weight loss and retention of fluids in the abdomen, ankles, and

feet (Butler, 2018) or marasmus, a severe form of malnutrition where intake of nutrients and energy is too low for a child's needs with the presence of wasting or the loss of body fat and muscle (Mehta, 2018). The later are long-term consequences of malnutrition

When children consistently fail to consume the required quantity and types of food that supplies important nutrients to their body, it culminates in malnutrition. Available evidence has shown that malnutrition contributes to nearly half of all forms of child mortality in the world (Black et al., 2013). Globally, about 45% of deaths among children under 5 years are attributed to malnutrition, and these occur mostly in developing and low-income countries (Black et al., 2013).

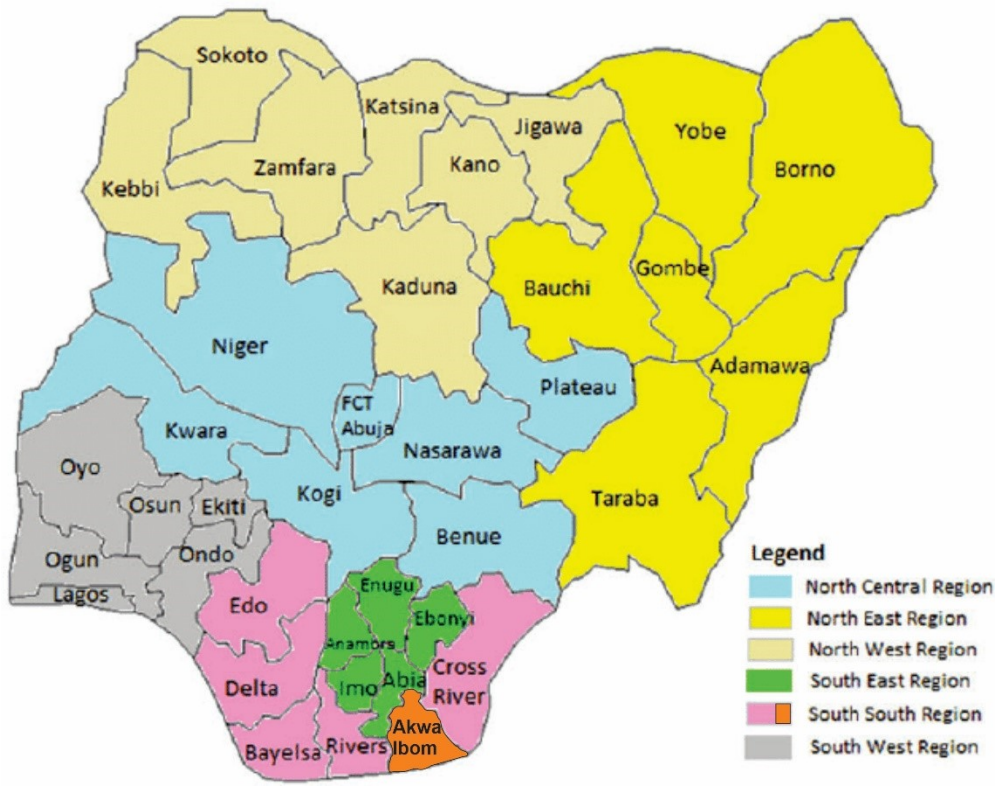
According to a UNICEF report in 2017, there were 151 million children under 5 years of age who were stunted, 51 million wasted, 16 million severely wasted, and 38 million overweight, globally. In regions of the globe, South Asia and Africa were reported to have the highest rate of child malnutrition in the world, accounting for about 33% of all malnourished children globally. In Africa, it was reported that 9.4% of children under 5 years were undernourished due to wasting (UNICEF, 2017). In spite of the reduction in malnutrition globally, malnutrition in children under 5 years in Nigeria has been on the increase in past decade (Kalu & Etim, 2018). Kalu and Etim (2018) attributed the increasing malnutrition among children in Nigeria to rising poverty, absence of exclusive breastfeeding, and household, child, maternal, and socioeconomic factors.

Malnutrition, therefore, portends a great danger and imminent threat to the lives of children, especially those under 5 years of age. Therefore, given the public health

importance of malnutrition to child health, in particular, and life expectancy, generally, it is pertinent to understand the risk factors of malnutrition in the Nigerian context. Figure one shows the map of Nigeria.

Figure 1

Map of Nigeria



Note. From https://www.researchgate.net/figure/Map-of-Nigeria-showing-the-36-states-and-Federal-Capital-Territory-FCT-Abuja_fig1_260023562

Figure two shows a map of Akwa Ibom State, the location of this research.

Figure 2

Map of Akwa Ibom State

Note. Fromhttps://akwaibomstate.gov.ng/local-government-councils/

Malnutrition does not affect just the current health status, it also influences the future health status of patients or individuals as it has been found that adulthood health is linked to early childhood health outcomes.

Increasing prevalence of children malnutrition, including those under 5 years in Nigeria, has become an important public health issue. In developing countries, 60 million children under 5 years are malnourished, and 11 million of them are Nigerian children (Kalu & Etim, 2018). According to the National Food and Nutrition Policy (2014), malnourished children under 5 years in Nigeria recorded the highest number in sub-Saharan Africa, and second highest in the world. In 2018, the National Nutrition and Health Survey of Nigeria reported that Akwa Ibom State was among the states in Nigeria with high malnutrition of children under 5 years. Akwa Ibom state also had the worst undernutrition status of children under 5 years in the South-South region of Nigeria (National Nutrition and Health Survey, 2018).

Low intake of calories, conflicts, political instability, poor implementation of government policies, and inadequate health interventions are some risk factors that influence malnutrition in children below age 5 (Adedeji et al., 2019; Kalu & Etim, 2018; Ozoka, 2018). Other factors that impact malnutrition in children include health and nutritional status of the mothers during pregnancy, breastfeeding, and socioeconomic, environmental, demographic, and health system factors (Adedeji et al., 2019; Jude et al., 2019; Kuku-Shittu et al., 2016; Ozoka, 2018). Recent data on socioeconomic and demographic risk factors influencing children under 5 in Nigeria, and Akwa Ibom State in particular, however, are unpublished**.** A number of studies on malnutrition in children under 5 in Nigeria considered the North-East (Adedeji et al., 2019), South-East (Jude et al., 2019) and North-Central (Kuku-Shittu et al., 2016) geopolitical regions; however, in this study, I focused on Akwa Ibom State, in the South-South geopolitical region of

Nigeria. Therefore, the specific research problem addressed through this study was malnutrition among children under 5 years in Akwa Ibom State, Nigeria.

Although researchers have investigated this issue, there is very little or no literature on the impacts of HHS, mothers' age, SES, MAR, education level, CA, CG, and breastfeeding type on malnutrition among children under 5 years in Akwa Ibom State, Nigeria. Therefore, I considered Akwa Ibom State, in the South-South geopolitical region of Nigeria. This was an exploratory study offers new evidence and enhances further research to be conducted; its findings can be generalized to a larger population with similar characteristics.

Purpose of the Study

The purpose of this quantitative study was to explore whether HHS, mothers' age, SES, MAR, education level, CA, CG, and breastfeeding type are associated with malnutrition in children under 5years in Akwa Ibom State, Nigeria.

The independent variables used in this study were HHS, mothers' age, SES, MAR, education level, CA, CG, and breastfeeding type. The dependent variable was child malnutrition status.

Research Questions and Hypotheses

In this study, I attempted to answer the following three research questions (RQs).

RQ1: What is the relationship between HHS and the malnutrition status of a child under5 years in Akwa Ibom State?

H_{01}: There is no statistically significant relationship between HHS and the malnutrition status of a child under 5 years in Akwa Ibom State.

H_{a1}: There is a statistically significant relationship between HHS and the malnutrition status of a child under 5 years in Akwa Ibom State.

RQ2: What is the relationship between a CA, CG, and breastfeeding type and malnutrition in children under 5 in Akwa Ibom State?

H_{02}: There is no statistically significant relationship between a CA, CG, and breastfeeding type and malnutrition in children under 5 in Akwa Ibom State.

H_{a2}: There is a statistically significant relationship between a CA, CG, and breastfeeding type and malnutrition in children under 5 in Akwa Ibom State.

RQ3: What is the relationship between mothers' age, SES, MAR, and education level and malnutrition in children under 5 in Akwa Ibom State?

H_{03}: There is no statistically significant relationship between a mothers' age, SES, MAR, and education level and malnutrition in children under 5 in Akwa Ibom State.

H_{a3}: There is a statistically significant relationship between a mothers' age, SES, MAR, and education level and malnutrition in children under 5 in Akwa Ibom State.

The dependent variable, child malnutrition status (CMS), was a categorical variable classified as malnourished or not malnourished using anthropometric variables. All the independent variables were also categorical variables. The categorical independent variables were CA, CG, child's breastfeeding type (BFD), mother's age (MA), SES) MAR, educational level (EDU), and HHS.

Theoretical and Conceptual Framework

The theories or behavioral models that ground this study included the socioecological model (SEM) in combination with the health belief model (HBM). In the

1970s, Urie Bronfenbrenner first introduced the SEM as a conceptual model for understanding human development, but it was later formalized as a theory-based framework for understanding the multilayered and interactive effects of personal and environmental factors in the 1980s (Kilanowski, 2017). The diagram of the multilevels of the SEM are illustrated in Figure 3.

Figure 3

Concept of Socioecological Model

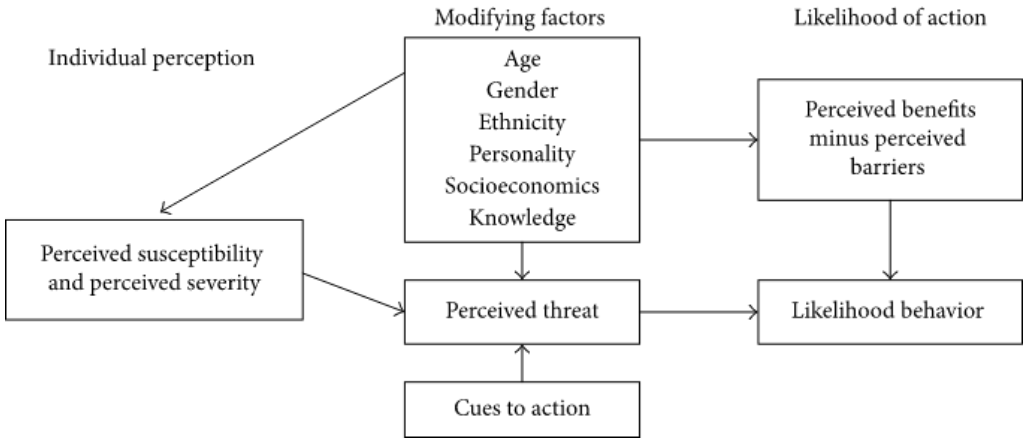
Note. From https://www.mdpi.com/1660-4601/16/19/3730/htm

Similarly, in the 1950s, a group of social psychologists, namely, Hochbaum, Rosenstock, and others within the United States Public Health Service, developed the HBM to describe people's failure for participating in programs to prevent and detect disease (LaMorte, 2019). Overtime, the application of the HBM expanse to study people's behavioral responses to health-related conditions. Its relevance has evolved to address

multiple P.H. concerns, a wide range of populations and health behaviors (LaMorte, 2019). The HBM contains several primary constructs or concepts, which include perceived susceptibility, severity, benefit, barrier, and self-efficacy. These perceptions prompt individuals to take action to prevent, screen for, or control illness conditions (Diddana et al., 2018). Figure 4 shows a diagrammatic representation of the HBM constructs and concepts

Figure 4

Concept of the Health Belief Model



Note. From https://www.hindawi.com/journals/jnme/2018/6731815/

SEM is a four-level model that showcases the interaction between individual, relationship, community, and societal factors (Centers for Disease Control and Prevention [CDC], 2015b; Coreil, 2010) as vital contributors to health problems. The SEM approach is versatile for use either in the preventive phase, modification of lifestyle, and

management of malnutrition in priority population (Glanz et al., 2015). Using the SEM permits the recognition of the complex interaction among the different levels, the broader social and cultural levels of influence on malnutrition in childhood years (Coreil, 2010), because no single intervention is likely to prevent malnutrition.

The prevention efforts target an upstream approach that aims at shaping the circumstances and conditions that are the underlying determinants of health and social equity in society (Baciu et al., 2017). Actions target the food environments, the broader socioeconomic environments, and other factors that may apply. Therefore, the SEM is a robust framework that helped me identify the factors that influence malnutrition in children under 5 as well as examine the interaction between and within the multiple levels of influence.

The HBM is a useful conceptual framework on its own and can also be combined with other models in interventional programs. Coreil (2010) identified HBM as the most used theory in health education, health promotion, and disease prevention. Its four components are perceived susceptibility, perceived severity, perceived benefits, and perceived barriers (Glanz et al., 2015). The HBM suggests that people cannot have a positive health behavior change if they do not believe that they are at risk.

The underlying concept of the HBM is that behavior is determined by personal beliefs or perceptions about a disease and the strategies available to decrease its occurrence. HBM posits that individuals must have perceived susceptibility to a disease or illness to take action, have perceived threat and perceived severity to understand the depth of the risk and seriousness of its effects, have perceived benefit to see usefulness

and applicability of the prevention, have cues to action, and have perceived barriers as a result to act to the preventive action (Khodaveisi et al., 2018).

Literature Search Strategy

The articles used in this study were searched from different databases, including MEDLINE, CINHIAL PubMed, ProQuest, ScienceDirect, and Google Scholar. Primary and secondary peer-reviewed articles, credible websites, and internet resources were also searched. Over 100 articles were reviewed. The literature review contains mostly articles published within the last 5 years, 2017 through 2021. The searched articles reviewed were used to explore the risk factors of malnutrition in children under 5 years in developing countries, and in Nigeria in particular. The key terms used in these searches were *malnutrition, children under 5 years, nutrition status, socioeconomic status, breastfeeding, Nigeria,* and *Akwa Ibom State.*

Literature Review Related to Key Concepts

Child Malnutrition and Household Characteristics

It is no more news that malnutrition can lead to cognitive and various physical impairments in children, ranging from weight loss, stunting, and more, especially those under 5 years old, with a high morbidity and mortality rate. Obasohan et al., (2020) embarked on a systematic review of existing literature to examine the risk factors associated with malnutrition among children under 5 years in sub-Saharan African (SSA) countries. They aimed at identifying research that used classical regression techniques on nationally representative health survey data to determine socioeconomic, demographic, and contextual risk factors associated with malnutrition among children under 5 years of

age in SSA. The researchers surfed and identified 229 papers from electronic databases. The identified papers were published between January 1, 1990, and July 31, 2020, and of the 229 papers identified, 26 studies were used for the review. The findings from the study revealed that risk factors that are child-related, parental/household-related, and community or area-related determine malnutrition in children under 5 years in SSA.

Daily, chronic Malnutrition in Nigeria is gradually becoming a heavy burden, especially for residents in Northern Nigeria. Using a quantitative correlational study, Amare et al., (2018) explored the determinants of chronic malnutrition in northern Nigeria and how these determinants vary across regions of the country. The study used child-level information of children aged between 6 and 23 months, obtained from the 2013 and 2018 Nigeria Demographic and Health Survey database. The researchers adopted decomposition analysis and regression-based techniques to carry out the investigation. The regression results showed that child, parent, household characteristics, and complementary feeding, dietary diversity, water sanitation, and access to information were determinants of stunting in the country. These results revealed significant differences in the determinants of undernutrition in young children between the northern part of Nigeria and other parts of the country. The decomposition analysis suggested that there are significant differences between the northern part of Nigeria and other regions of Nigeria in the impacts of the same determinants of undernutrition as it relates to the children's growth.

The active role and relationship between household wealth, parents' low level of education, and malnutrition cannot be overlooked as they are consistently identified as related determinants for malnutrition. In a study, Khan et al., (2017) evaluated the occurrence and related determinants of malnutrition in children below 5 years in selected regions in Sindh, Pakistan. They established that the prevalence was 48%, 16%, and 39.5% for stunted growth, wasting, and underweight, respectively. The percentages for wasting and underweight between girls and boys did not reveal a significant difference. There was a statistically significant relationship between households' wealth and probabilities for underweight, wasting, and stunted growth. The ORs from logistic regression indicated that children from deprived homes were twice likely to waste and underweight relative to children from wealthier households.

Without a doubt, children are vulnerable to malnutrition for differing reasons, and studies show this. Ahsan et al. (2017) carried out research to determine the frequency and causes of malnutrition in children between 6 and 59 months in rural Tharparkar, Sindh. This study revealed that 38.8% of children assessed were stunted, 19.1% were wasted, and 33.2% were underweight with no sex bias. Variables such as maternal illiteracy, family size, number of pregnancies, lack of vaccination, and absence of breastfeeding showed significant association with stunting.

Child Malnutrition, Child Characteristics, and Breastfeeding

Undernutrition and overnutrition pose a double burden to various localities in developing countries. Alamu et al. (2020), in a descriptive cross-sectional study, assessed the double burden of malnutrition in a selected population of Akwa Ibom State. The

researchers focused on mother-child pairs with children aged 6 to 59 months considered. A total of 660 mother-child pairs participated in the survey, and a Chi-squared test of proportions was used in the analysis. The study revealed that the prevalence of undernutrition among children below 5 years and overnutrition among their mothers pose a double burden to the population. Results also showed that 37.4% of the children were stunted, and the prevalence of wasting among the children was 13.1%. According to the results, of the 660 mothers, 9.0%, 23.3%, and 9.3% of them were underweight, overweight, and obese, respectively.

It is one thing to identify the causes, risk factors, and consequences of child malnutrition and another to think of a way forward. In another cross-sectional study, Imam et al. (2020) investigated the prevalence and risk factors for stunting among children under 5 attending acute malnutrition treatment programs in north-western Nigeria. The researchers aimed to ascertain the adoption of the Community Management of Acute Malnutrition (CMAM) program to manage stunting among children under 5. Two CMAM centers were selected in Kano State for the study, and relevant data were obtained from attendees, 6 to 59 months of age, using a well-structured questionnaire. The WHO standards were used to calculate stunting prevalence and severe wasting among the selected 472 children. The analysis employed in the study was the multivariate logistic regression approach. The findings were that children's age, male child, and attending rural malnutrition clinics were significantly correlated with increased probability of stunting. Imam et al. concluded that the CMAM programs should be adopted in reducing malnutrition prevalence in the country.

Malnutrition is not only limited to food, other health concerns cannot be excused. Ajakaye et al.'s (2020) study on the risk and prevalence of malaria, malnutrition, and anemia in children below 5 years in Nigeria established that the occurrence rates were 55.5%, 41.2%, and 54.0% for malaria, malnutrition, and anemia, respectively. Prevalence for stunting, underweight, and wasting were 39.2%, 11.2%, and 0.04%, respectively. The only risk factor associated with malnutrition in this research was being in the age group below 5 years. This study was essential for my research as it highlighted that malnutrition does not occur in isolation but amid other health concerns.

Also, to ascertain that health concerns are not excused in the discussions of malnutrition, more researchers have carried out research over the years. Mukuku et al. (2019) modeled risk predictors of severe acute malnutrition among children in developing countries. Results of the predictive model revealed that history of diarrhea, low childbirth mass, intake of fewer than three meals per day, breastfeeding cessation under 6 months, instigation of complimentary food under 6 months, more than two children under 5 years in a family, maternal age under 25 years, and family history of malnutrition were predictors of severe acute malnutrition. This study was essential for my research as it provided a base for my theoretical framework and support for the findings.

Furthermore, Awasthi et al. (2019) studied the path to severe malnutrition in children below 2 years in Pradesh, India. Based on participants' experience, the researchers found that the essence of exclusive breastfeeding is merely elusive, lack of understanding of complementary feeding concept was evident, family meals lacked diversity, malnourishment was not considered a health risk, and females lacked autonomy

in health and reproductive concerns. This study connected to my research topic as it gave me an understanding of the influencers of malnutrition.

The immediate and underlying factors promoting stunting in children are evidently intertwined. Mzumara et al. (2018) examined the factors linked with stunting in children below 5 years in Zambia. The research revealed that stunting was more prevalent in male children than in the female. Further, the study associated stunting with poor sources of drinking water, gender of the child, duration of breastfeeding, maternal education, household wealth, and area of residence. This study was essential for my research as it helped answer RQ2, whether gender of children influences or impacts malnutrition. Hence, the findings add to the body of knowledge of child malnutrition and determining factors.

Similarly, Mohammed and Asfaw (2018) conducted a Bayesian Gaussian analysis of malnourishment among children below 5 years in Ethiopia. The researchers established that variables like birth intervals, child age, paternal education level, water sources, sex of household head, maternal age at birth, household wealth, maternal body mass index, child's birth mass, and duration of breastfeeding all had a significant impact on child malnutrition. This study was useful for my research as it gives evidence of factors associated with stunting, underweight, and wasting, which are key aspects of malnutrition.

Wieringa et al. (2018) investigated acute malnutrition in children by offsetting gender bias through both mid upper arm circumference (MUAC) and weight for height (WHZ). Results of this study revealed that rates of malnutrition were higher in rural areas

compared to urban. WHZ and MUAC were gender biased, with WHZ identifying more boys with malnutrition and MUAC identifying more malnourished girls. The use of WHZ only identified more cases of malnutrition than MUAC, which only identified 11% of cases. The use of either MUAC or WHZ independently resulted in many undiagnosed cases. This study was important for my research as it highlighted the WHO standards against which malnutrition elements can be measured.

Increased morbidity among children with low child weight at birth and malnourishment is also perceived as malnutrition. Rahman et al. (2017) explored the relationship between low child weight at birth and malnourishment among children below 5 years in Bangladesh. The results revealed that incidences of malnutrition were distinctly higher in children with low birth mass relative to children with typical birth weight (51% versus 39% for stunted growth, 25% versus 14% for wasting, and 52% versus 33.5% for underweight). With known risk factors under control, children with low birth mass were more exposed to malnourishment compared to children with a usual birth mass. This study was important for my research as it added to the knowledge of causal factors of malnutrition in children below 5 years, which was part of my research problem.

Just as my study is about malnutrition in children under 5 years, children under 18 months have a place on the table. Ndemwa et al. (2017) assessed nutrition status and the connotation of demographics with malnutrition in children under 24 months in Kwale County, Kenya. The results of the study indicated that malnutrition incidences were high in the area of the sampled population; 29% of the children were stunted, with 13.4% being severely stunted. The prevalence of underweight children was 20.8%, with 9.5%

being severely underweight. A statistically significant difference in stunting between male and female children was observed ($p = 0.005$). Also, significant differences were noted between underweight and stunting due to age ($p < 0.005$).

Child Malnutrition and Mothers' Characteristics

Child undernutrition has long been associated with paternal and maternal occupation and income factors. Various researches back up this assertion. In a similar subject, Maje et al. (2019) assessed the prevalence and social-economic influencers of malnutrition in children under 5 years in Kano State, Nigeria. The researchers found a significant association between malnutrition and maternal and paternal occupation and household income (Maje et al., 2019). This study was crucial as it helped me justify my research topic and helped explain the findings.

When discussing the significant association between malnutrition and maternal and paternal occupation and household income, the research carried out by Omotesho is relevant. Omotesho et al. (2019) conducted research to assess the determining factor of malnutrition in children under 5 in rural households and resulting morbidity and mortality rates in Benue state, Nigeria. Descriptive results of the study indicated that malnutrition incidences in the region were lower compared to the national average. The study exposed that maternal education and household calorie intake had a statistically significant relationship with malnourishment for children under 5 years. This study was important for my research problem as it was conducted in the same setting (country--Nigeria) and addressed the same problem as my proposal.

Also, Taremwa and Ahabyoona (2018) studied the causes, burden, and prospects of malnutrition among children under 5 years in Karamoja, Uganda. The researchers found that the area had higher levels of stunting, underweight, and wasting than the national levels. The causes identified in the study were multifaceted and included infections, poor diets, environmental factors, and social-economic variables. Singh et al. (2019) also investigated the socioeconomic inequalities in malnutrition in children in India. The results indicated that 35% of children in India were underweight while 385 were stunted. An inverse relationship was reported between districts with high economic development and stunting and underweight children and vice versa. Moreover, malnourishment inequalities were exacerbated by access to safe drinking water, maternal height, and education. These studies were important for my research, as they gave hints of what to expect with the elements of malnutrition considered for research.

However, Mawa and Lawoko (2018) examined malnutrition in children under 5 years in Uganda, focusing on risk factors for stating and wasting. Descriptive results indicated that 33.5% of the children were stunted while 5% were wasted. The odd ratios revealed that children born of mothers with low body mass index were three times more likely to waste when compared to children born of mothers with average body mass index. Also, children whose mothers had acquired only primary education were three times more likely to waste relative to those with maternal education above primary level. In addition, the odd ratios showed that children between 6 and 11 months were twice likely to waste compared to those over 12 months. Concerning stunted growth, the study revealed that children with small birth sizes were at a high risk of stunting relative to

those with average or big birth sized. Further, the results indicated that children whose mothers had a height below 160 cm were at high risk of stunting relative to those whose mothers had heights equal to or greater than 160 cm. This study was vital to the current research problem as the objectives seem to synchronize only that the studies were in different countries. The study results by Mawa and Lawoko provided an inkling of what to expect in the current study and informed the methodology. This research was critical for my study as it addressed a similar problem and gave a base for results expectations.

Over the years, numerous individual or collective factors, such as income, parental education, and drinking water sources, have had a seat at the table where child malnutrition is discussed. Tasnim (2018) carried out a methodical appraisal of determining factors of malnourishment among children under 5 years in developing countries. The researcher reviewed 36 articles to identify malnutrition factors. These articles were searched from an array of automatic catalogs like Scopus, PubMed, Web of Science, Medline Ovid, and ProQuest. The research indicated that malnutrition in children under 5 years was caused by numerous single or combined factors, such as income, parental education, sources of drinking water, and toilet facilities. This research was essential for my current research problem as it showed that the current problem is not caused by one factor, and, thus, its solution also requires comprehensive, multifaceted initiatives.

Parents' level of education, household wealth, bottle breastfeeding, and many more remain some of the major unopposed factors causing child malnutrition. Pravana et al. (2017) conducted a case and control study in Nepal to investigate the causes of severe

malnutrition in children under 5 years. The researchers reported the prevalence of severe acute malnutrition in Nepal to be at 4.14%. The study attributed the prevalence rate to poverty, maternal age, birth intervals, paternal education, bottle feeding, and failure to start complementary feeding after 6 months. The study did not associate maternal education, exclusive breastfeeding, and colostrum feeding with severe-acute malnutrition. Researchers in Ethiopia monitored risk causes of diarrhea and malnutrition in children under 5 years in the Tigray region (Wasihun et al., 2018). The researchers established that the incidences of wasting, underweight, stunting, and severe undernutrition were 7.9%, 37%, 36.1%, and 5.4% respectively. Multivariate regression results indicated that water source, improper disposal of solid waste, failure to wash hand at critical times, and child age were predictors of diarrhea. Child age between 12 and 23 months was a predictor for stunting and underweight, and a family size below four members was inversely related to wasting (Wasihun et al., 2018). These findings were important as they informed my study conclusions on the reliability of literature concern factors associated with malnutrition.

Various studies show the existing evidence of the effects of parental education in promoting malnutrition in children. Khattak et al. (2017) investigated the effects of parental education in malnourishment in children below five years in a peri-urban area of Pakistan. The researchers found that high maternal and paternal education statuses had a statistically noteworthy association with normal nutrition status among children. The researchers concluded that parental education especially, maternal education in peri-urban communities should be encouraged and accorded the status it deserves. The

research is critical for my study as it adds to the knowledge of the impact of education of both parents in reducing the problem presented by my study.

Researchers explored complementary dietary knowledge, minimum diversity of diets and satisfactory diets in mothers to children below five years in Southwest Nigeria. The researchers reported that dietary knowledge was low and was linked to maternal education level, age, and MAR. Prevalence of instigation of complementary feeding, diversification of diet and minimum satisfactory diet for children below nine months were found to be low. A general finding was that the practice of complementary feeding was low and associated with maternal education and occupation (Olatona et al., 2017).

Definitions

Age: Indicates how old an individual (child or mother) is since birth (Acharya et al., 2018).

Breastfeeding type: This is defined as a form or process of feeding a child with breastmilk from his/her mother or wet nurse (Olodu et al., 2019).

Child malnutrition status (CMS): This is a state of undernutrition or overnutrition that interacts with infection that can potentially worsen illness and deteriorate nutritional status of a child under 5 years of age (UNICEF, 2013).

Child's gender: This is defined as the sex category a child belongs to (Nkunzimana et al., 2016).

Household size: This is defined as the number of members present in the household at the time of the survey (Umar Farooq et al., 2019).

Mother's education level: This is defined as any form of knowledge, skill, and understanding obtained from school and used by a child's mother/guardian to interact between subjects in society (Schaffar, 2014).

Mother's marital status: This describes the legally defined marital state or disposition of a mother (Kalu & Etim, 2018).

Mother's socioeconomic status (SES): Mother's SES is defined as the social rank of the mother/guardian of a child from a societal perspective that combines income, education, and work status (CDC, 2014).

Assumptions

An assumption of this study is that mothers or caretakers of the children provided proper information regarding their age, education, SES, MAR, family structure, and child breastfeeding, in the Akwa Ibom Demographic and Health (ADH) survey conducted which will be used in this study. Another assumption is that the children's data including age, weight, and height were correctly measured in the ADH survey. More so, it is assumed that sample size that will be used in this study will give an adequate representation of the population thereby allowing for generalization of the findings.

Scope and Delimitations

The scope of this study will be cross sectional in nature and will utilize quantitative data collected to explore risk factors of malnutrition in children under five years in Nigeria using Akwa Ibom as a case study. The study will examine the relationship between children's malnutrition status and their HHS in Akwa Ibom state. It will further assess the relationship between children's age, gender, and breastfeeding type

and malnutrition in children under five years in the State. The effects of mothers' socioeconomic characteristics on malnutrition in children under five years will also be investigated.

This study will be confined to only children between ages zero and 59 months old and their mothers or caretakers who participated in the ADH survey from 2019 through 2020. Both child and mother's demographic information will be utilized with anthropometric measures calculated from the ADH survey data.

Significance, Summary, and Conclusions

This study is significant in that so far in my reviews, previous studies focusing on malnutrition in children under five years in Akwa Ibom State did not address the impacts of mothers' age, SES, MAR, and education level on malnutrition among children under five years in Akwa Ibom State.

This study will also provide insights on the malnutrition status of children under five years in the state. The project could help improve health outcomes by providing empirical evidence on risk factors responsible for malnutrition among children under age five years. The results of the study could help shape up Akwa Ibom State health policy with appropriate interventions to curb incidence and prevalence of malnutrition among children in the state.

More so, information obtained from this study would be beneficial to parents especially mothers, healthcare practitioners, and policy makers in the state. Outcomes of this study will also be useful to researchers, academics, and the general public.

Malnutrition in children under five years is a major challenge to public health due to its contributions to mortality and morbidity in children (WHO, 2013). This section introduced the topic of the study and provided relevant background information and problem statement to support research on risk factors of malnutrition in children under five years in Nigeria. The purpose, RQs, and hypotheses of this study were clearly stated in this section. In addition, theoretical framework, nature, literature search strategy and review, operational definitions assumptions, scope, delimitations, limitations, and significance of the study were discussed.

Section 2: Research Design and Data Collection

Introduction

The aim of this study was to explore the factors that influence malnutrition in children under 5 years of age in Nigeria using Akwa Ibom State as a case-study. I examined whether mothers' age, SES, MAR, education level, HHS, CA, gender, and breastfeeding type are associated with malnutrition in children under 5 years of age in Akwa Ibom State, Nigeria. The independent variables used in this study were mothers' age, MAR, education level, SES, HHS, CA, gender, and breastfeeding type. The dependent variable was CMS.

This section includes discussion on the research design and rationale for the choice of the design. I also describe the population, sample, and sampling technique, and how data were gathered and analyzed. Moreover, reliability, validity, and ethical procedures for this study are discussed in this section.

Research Design and Rationale

In this quantitative study, I used a cross-sectional study design to explore the relationship between the dependent variable – malnutrition among children under 5 years of age– and the independent variables -- mothers' age, SES, MAR, education level, HHS, CA, gender, and breastfeeding type. A cross-sectional study design was appropriate for this study as the population consisted of only one group not exposed to some form of treatment. Previous researchers have also suggested that cross-sectional study design is more appropriate for fast collection of data due to time and resource constraints (Checkoway et al, 2007). The cross-sectional study design is very useful in studying

persistent health conditions relevant to public health planning and interventions (Checkoway et al., 2007)

Moreover, the cross-sectional study design is economical as information is obtained once from participants, unlike cohort or case-control studies (Creswell, 2009; Setia, 2016). A cross-sectional study design forms a bedrock for further studies, including randomized control study design and cohort study design (Mann, 2003). The cross-sectional study design, therefore, was consistent with other research designs needed to advance the study of risk factors of malnutrition in children under 5 years of age.

The cross-sectional study design facilitated my investigation of the relationship between malnutrition in children under 5 years and mothers' age, SES, MAR, education level, HHS, CA, gender, and breastfeeding type. The cross-sectional data used in this study were collected from the Akwa Ibom State Demographic and Health survey (ADHS) 2019 to 2020.

Methodology

Population

It is important for a researcher to properly define the population of interest in any study. Identifying population characteristics help provide required answers to the RQs of interest to a researcher. A population is a complete dataset from which a researcher elicits explanations to issues of interest (Frankfort-Nachmias & Nachmias, 2008). In this study, the population comprised mothers/caretakers of children under 5 years of age enrolled in a primary health care center in Ikot Ekpene or Uyo metropolises in Akwa Ibom State,

Nigeria, acting as proxy for their children and captured in the ADHS 2019 to 2020. The population included children under 5 years of age regardless of their nutrition status.

Sampling and Sampling Procedures

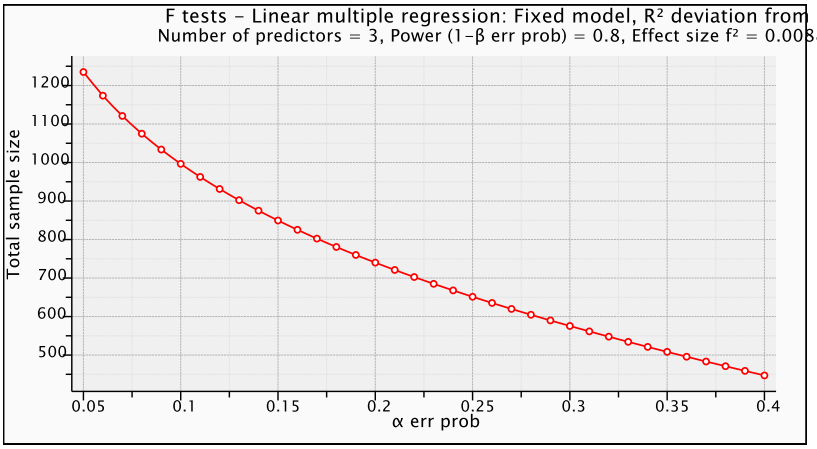
The sample was obtained from the ADHS 2019 to 2020 database by the State's Ministry of Health obtainable from selected primary health care facilities. Two primary healthcare centers were selected in this study based on the availability of data, one from Ikot Ekpene and one from Uyo Senatorial districts, both in Akwa Ibom State. The ADHS contains relevant data of children under 5 years and their mothers/caretakers who received health care in a primary health facility in the State and captured by the survey. Thus, children under 5 years of age and their mothers/caretakers residing in the State who did not visit primary health care facilities and captured by the survey were excluded from this study.

The use of an optimum sample size in research is crucial because it ensures the validity of a research findings (Pourhoseingholi et al., 2013). Pourhoseingholi et al. (2013) used the Cohen G*Power software to determine the optimum sample size to ensure validity and accuracy of the statistical analyses performed. To determine the optimum sample size, I drew from Pourhoseingholi et al., who assumed a linear multiple logistic regression, *F* test statistics, a statistical power of 80%, confidence interval level of 95%, and a medium effect size of 0.15. For this study, therefore, using a linear multiple logistic regression, *F* test statistics, a statistical power of 80%, confidence interval level of 95%, and a small effect size of 0.02, yielded a minimum sample of 485. However, a small effect size of 0.008856056 was used in this study alongside other

parameters (of the G*Power test) to obtain a sample of all participants from two different healthcare facilities involved in the ADHS 2019 to 2020. Thus, a total optimum sample size of 1,235 participants (420 from Ikot Ekpene and 815 from Uyo metropolises) were selected for this study. The G*Power graph is presented in Figure 5.

Figure 5

G Power Plot of Total Sample Size Against Level of Significance*



The statistical power detects the real association between variables, confidence interval indicates the confidence level of rejecting (or otherwise) a null hypothesis, and effect size measures the magnitude of association between variables (Ellis, 2010; Pourhoseingholi et al., 2013).

Data Collection Procedure

The data were generated by accessing the facilities' prenatal, postnatal, and immunization health records. Data were transcribed from the facilities' hand-written health registers to an electronic version. Transforming the data type storage (registers) to

computerized format was challenging and time-consuming, from hours, to days, weeks, and months.

Obtaining information or data from government agencies in Nigeria follows a sequence of actions and procedures that must be strictly adhered to. I submitted my letter of introduction from Walden University to the "Entry/Intake Department" at the commissioner's office of the State Ministry of Health. I also submitted a personal letter introducing myself, current program of study, my research topic, type of data needed, and purpose for requesting for access to data (See Appendices A and B).

Both letters were addressed to the commissioner, who is in charge of the State's Ministry of Health. The commissioner's endorsement grants interim permission with recommendations to the permanent secretary at the Ministry of Health for appropriate action (internal administrative procedure/correspondence). I was directed to meet other officials and departmental heads, namely the director of research, planning, and statistics (DRPS), director of public health (DPH), and the state nutritionist.

The DRPS, during our meeting, explained further requirements that I needed to meet. I submitted my personal letter, introductory letter from Walden University, and two copies of my study prospectus. Following a careful screening of my submissions and proving that I satisfied all requirements, the DRPS generated an approval standard letter on behalf of the commissioner for health authorizing me to access the central health records within the Ministry as well as other primary health facilities under the Akwa Ibom State Ministry of Health. The DRPS and the DPH arranged a meeting and introduced me to the state nutritionist and the assistant nutritionist. During our meeting,

the DPH and state nutritionist pledged their support should I have questions, concerns, or challenges along the way.

Access to government data is a complicated process, and even more challenging in a third-world country. For my study, it was imperative that I obtained permission from the commissioner for health. Without this initial authorization, I would not have succeeded. There were other steps/ internal processes I needed to activate (internal bureaucracy/ administrative hurdles), as already described above.

Government agencies are reputable and authentic sources of data collection (McCaston, 2005). They provide a clear baseline for research that is useful in answering RQs (McCaston, 2005). The Akwa Ibom State Government under the Ministry of Health collects and stores health records of indigens and every resident in the state. In this study, I explored malnutrition in Akwa Ibom State with a focus/emphasis on children under 5 years of age. Thus, obtaining and using datasets from the ADHS through the Ministry of Health archives was the best source for my study.

Operationalization of Variables

The variables used in this study helped in exploring risk factors of malnutrition in children under 5 years of age. The dependent and independent variables are defined below.

Dependent Variable

Child malnutrition status (CMS): This was a state of undernutrition or overnutrition that interacts with infection and can potentially worsen illness and deteriorate the nutritional status of a child under 5 years of age (UNICEF, 2013). In this

study, CMS was a nominal variable classified into malnourished (coded as 1) or not malnourished (coded as 0). The CMS categories were determined using anthropometric data (WHZ scores) of the children in line with the WHO child growth standard classification. A malnourished child had WHZ < -2 *SD* or > +2 *SD*; otherwise, the child was classified as not malnourished.

Independent Variables

Mother's socioeconomic status: Mother's SES was defined as the social rank of the mother/guardian of a child from a societal perspective that combines income, education, and work status (CDC, 2014). In this study, mother's SES was an ordinal variable classified into low (coded as 1), average (coded as 2), or high (coded as 3), as indicated by the ADHS data 2019 to 2020.

Mother's education level: This was defined as any form of knowledge, skill, and understanding obtained from school and used by a child's mother/guardian to interact between subjects in society (Schaffar, 2014). In this study, mother's education level was an ordinal variable classified as primary or no formal education (Kindergarten to 6^{th} grade; coded as 1), secondary education (7^{th} to 12^{th} grade; coded as 2), and tertiary education (some college/college; coded as 3).

Age: This indicated how old an individual (child or mother) was since birth (Acharya et al., 2018). In this study, age was a categorical variable quantified separately in years for mothers, and months for children (see Acharya et al., 2018). CA was an ordinal variable and was categorized into 0 to 11 months (coded as 1), 12 to 23 months (coded as 2), 24 to 35 months (coded as 3), 36 to 47 months (coded as 4), and 48 to 59

months (coded as 5). MA was also an ordinal variable and was categorized into; less than 20 years (coded as 1), 20 to 29 years (coded as 2), 30 to 39 years (coded as 3), and 40 years or greater (coded as 4).

Breastfeeding type: This was defined as a form or process of feeding a child with breast-milk from his/her mother or wet nurse (Olodu et al., 2019). In this study, breastfeeding type was a nominal variable categorized as exclusive breastfeeding (coded as 1), breastfeeding plus water (coded as 2), and complementary breastfeeding (coded as 3). Exclusive breastfeeding is when infants imbibe only breastmilk from their mother or wet-nurse or expressed breastmilk, and no other liquid or solid except medicines (Binns & Lee, 2014). Other forms of breastfeeding include infants receiving breast-milk and some liquid, such as water, or receiving breastmilk and some other food, which is termed complementary breastfeeding (Binns & Lee, 2014).

Household size: This was defined as the number of members present in the household at the time of the survey (Umar Farooq et al., 2019). In this study, HHS was an ordinal variable indicating how many persons present in a household and classified into 1 to 3 (coded as 1), 4 to 6 (coded as 2), 7 to 9 (coded as 3), and 10 or more (coded as 4).

Child's gender: This was defined as the sex category a child belongs to (Nkunzimana et al., 2016). In this study, CG was a nominal variable categorized into male (coded as 1) or female (coded as 2).

Mother's marital status: This described the legally defined marital state or disposition of a mother (Kalu & Etim, 2018). In this study, mother's MAR was a nominal variable that was classified into married (coded as 1) or not married (coded as 2).

Data Analysis Plan

The software used for data analysis in this study was the Statistical Package for the Social Sciences (SPSS) version 26 (IBM SPSS, Chicago II; Gerstman, 2015). Extracted data from the ADHS database were imported into this software. The imported dataset was aligned and cleaned to remove possible errors using same software. A combination of univariate, bivariate, and multivariate analytical approaches was performed in this study. Both the descriptive and inferential statistical techniques were also used. The univariate approach included a descriptive analysis of each variable in frequency and percentage distributions. The bivariate approach employed the Pearson's Chi-square test of independence to examine association between the dependent variable and each of the independent variables. Essentially, the Pearson's Chi-square test of independence was used to test the first research hypothesis**.** In addition, the multivariate approach involved inferential analysis, with the use of a binary logistic regression to evaluate the second and third research hypotheses. The binary logistic regression technique is a multivariate analytical approach that investigates the relationship between CMS and its covariates (Pourhoseingholi et al., 2012). A binary logistic regression technique is appropriate when evaluating the relationship between a dichotomous (binary) categorical dependent variable and other independent categorical variables (Pourhoseingholi et al., 2012). In this study, the dependent variable was CMS, categorized as either malnourished or not malnourished, coded as 1 or 0, respectively.

In examining the relationship between CMS and the independent variables, the *OR* of covariates such as CA, CG, breastfeeding type, MA, SES, MAR, and education

level were measured. The *OR* was interpreted accordingly, while its statistical significance was based on probability less than .05 (see Manjunath et al., 2014). The goodness of fit of the model was tested using the Hosmer–Lemeshow test. This tested for multicollinearity among the independent variables in the model (see Egata et al., 2014). In addition, the Levene test was performed on the model to test for homogeneity of variance (Egata et al, 2014). These tests were pertinent due to the assumptions of no multicollinearity and equal variance in logistic regression.

Research Questions and Hypotheses

RQ1: What is the relationship between HHS and the malnutrition status of a child under 5 years in Akwa Ibom State?

H_{01}: There is no statistically significant relationship between HHS and the malnutrition status of a child under 5 years in Akwa Ibom State.

H_{a1}: There is a statistically significant relationship between HHS and the malnutrition status of a child under 5 years in Akwa Ibom State.

RQ2: What is the relationship between a CA, CG, breastfeeding type, and malnutrition in children under 5 in Akwa Ibom State?

H_{02}: There is no statistically significant relationship between a CA, CG, breastfeeding type, and malnutrition in children under 5 in Akwa Ibom State.

H_{a2}: There is a statistically significant relationship between a CA, CG, breastfeeding type, and malnutrition in children under 5 in Akwa Ibom State.

RQ3: What is the relationship between mothers' age, SES, MAR, and education level and malnutrition in children under 5 in Akwa Ibom State?

H_{03}: There is no statistically significant relationship between a mothers' age, SES, MAR, and education level and malnutrition in children under 5 in Akwa Ibom State.

H_{a3}: There is a statistically significant relationship between a mothers' age, SES, MAR, and education level and malnutrition in children under 5 in Akwa Ibom State.

The dependent variable, CMS is a categorical variable classified as 'malnourished or not malnourished' using child anthropometric data. All the independent variables are also categorical variables. The categorical independent variables are: CA, CG, BFD, MA, SES, MAR, EDU, and HHS.

Threats to Validity

Validity issues remain germane in cross-sectional studies as some factors including systematic errors can influence the outcomes or results of a research (Taherdoost, 2016). It is therefore imperative to assess the external and internal validity of any study. Taherdoost (2016) posited that it is easier to assess reliability than validity issues in research.

Threats to External Validity

External validity refers to the generalization of outcomes or results of a research to a general population. Thus, the extent to which a research results or conclusions hold in a similar population underscores the discourse of external validity of the research. Carlson & Morrison (2009) noted that a precondition for external validity is internal validity. It implies that research must indicate that variation in its result is due to the exposure in the research before a universal generalization that the exposure causes the

outcome (Carlson & Morrison, 2009). It is necessary to understand whether the results from this study can be generalized for Akwa Ibom State and other States in Nigeria with similar population characteristics. In this study, a random sampling of the optimum sample will be used to ensure its external validity.

Threats to Internal Validity

Internal validity refers to the degree of accuracy by which research results are caused by the exposure (Shamliyan et al., 2012). It is important to address the process of data quality, collection, collation and analysis to ensure internal validity of a research. All variables, dependent and independent, must be clearly defined, and sample must be an adequately representative of the study population to spur internal validity of a research. Selection bias and low response rate pose threats to internal validity of a study (Shamliyan et al., 2012). Internal validity will be ensured in this study by considering a selected sample of children under five years of age captured in the ADHS 2019 to 2020. The ADHS contained data of children under five years of age years faced by malnutrition challenge, and recorded a high response rate.

Ethical Procedure

Heath records/registry are safe, secured in official vaults, and accessible to personnel for official use only. Also, available to students, scientists, educators after due processes for research purposes. Identifiers (names, addresses, telephone numbers, etc) were removed/masked during the transcription of data from hand-written registers/records to computerized format for easy usability, transmission, and analyses.

Strict confidentiality for use and storage of dataset is maintained. Datasets will be shared with Committee Chair (CC), second committee member, internal review board (IRB) member, and Walden University community as requirement in fulfilment of program study. The IRB number is: (612)257-6645.

Although not completely ruled out, but I do not anticipate any ethical issues or conflict of interest arising from using data from Akwa Ibom State for my study. I live, attend school (Walden University), and work in the USA. I do not have any direct or remote link with the facilities where the datasets were drawn from, Akwa Ibom State Ministry of Health, or any of its affiliates.

Summary

A quantitative cross-sectional design is proposed for this study. The entire dataset of children under five from the selected primary healthcare centers within Akwa Ibom State will be obtained and used for this study. The sample participants will consist of children under five years and their mothers/caretakers whose data will be obtained from the ADHS 2019 to 2020. The Pearson's Chi-square test of independence and binary logistic regression will be employed in the analysis. These analytical techniques will be used to examine the relationship between CMS (dependent variable) and the covariates such as CG, CA, BFD, MA, SES, MAR, EDU, and HHS. Section 3 of this study will include presentation and interpretation of results.

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this study was to explore the relationship between HHS, CA, CG, breastfeeding type, mothers' age, SES, MAR, and education level (independent variables) and malnutrition in children under 5 years of age (dependent variable) in Akwa Ibom State, Nigeria. In this study, three RQs formed the basis for data analysis, with subsequent corresponding hypotheses as a guide for this research.

RQ1: What is the relationship between HHS and the malnutrition status of a child under 5 years in Akwa Ibom State?

H_{01}: There is no statistically significant relationship between HHS and the malnutrition status of a child under 5 years in Akwa Ibom State.

H_{a1}: There is a statistically significant relationship between HHS and the malnutrition status of a child under 5 years in Akwa Ibom State.

RQ2: What is the relationship between a CA, CG, breastfeeding type, and malnutrition in children under 5 in Akwa Ibom State?

H_{02}: There is no statistically significant relationship between a CA, CG, breastfeeding type, and malnutrition in children under 5 in Akwa Ibom State.

H_{a2}: There is a statistically significant relationship between a CA, CG, breastfeeding type, and malnutrition in children under 5 in Akwa Ibom State.

RQ3: What is the relationship between mothers' age, SES, MAR, and education level and malnutrition in children under 5 in Akwa Ibom State?

H_{03}: There is no statistically significant relationship between a mothers' age, SES, MAR, and education level and malnutrition in children under 5 in Akwa Ibom State.

H_{a3}: There is a statistically significant relationship between a mothers' age, SES, MAR, and education level and malnutrition in children under 5 in Akwa Ibom State.

In this section, I present the data collection process and the demographic characteristics of the sample participants. This section concludes with a presentation of results and discussion of the analyses performed.

Data Collection

In this study, the population was comprised of mothers/caretakers of children under 5 years of age enrolled in a primary health care center in Ikot Ekpene or Uyo metropolises in Akwa Ibom State, Nigeria, who acted as proxy for their children and participated in the ADHS from January 2019 through December 2020. The population included children under 5 years of age, regardless of their nutrition status.

A total sample size of 1,235 participants was used in this study based on the outcome of G*power statistical analysis performed. The sample was selected from two primary healthcare centers based on availability of data, one from Ikot Ekpene (420 participants) and one from Uyo (815 participants) senatorial districts, both in Akwa Ibom State. Relevant data of children under 5 years and their mothers/caretakers who received health care from the selected primary health facilities are contained in ADHS 2019 to 2020 database.

I was permitted to access the ADHS dataset, after undergoing due process and satisfactorily meeting all the requirements, by the Akwa Ibom State Ministry of Health.

The approval letter is in the appendix, page 84. The data were generated by accessing the facilities' prenatal, postnatal, and immunization health records. Data were transcribed from the facilities' hand-written health registers to an electronic version. Datasets from the ADHS through the Ministry of Health archives were the best source for my study.

Results

Univariate Analyses

The univariate analyses describing participants' demographics are presented in Table 1. Of the 1,235 sample participants selected, 66% (*n* = 815) of the sample participants were from Uyo while the rest 34% (*n* = 420) were from Ikot Ekpene. Over half, 51.4% (*n* = 635), of the participants were from households having seven to nine persons, while 9.5% (*n* = 117) of participants were from households with 10 or more persons. Moreover, 24.2% (*n* = 299) and 14.9% (*n* = 184) of participants were from household having one to three, and four to six persons, respectively.

Table 1 further shows that 88.1% (*n* = 1088) of the children were in age bracket 0 to 11 months, while the remaining 11.9% (*n* = 147) were in age bracket 12 to 59 months. Based on gender of the children, 50.9 (*n* = 629) were male and 49.1% (*n* = 606) were female. On breastfeeding type received by the children, 42.1% (*n* = 520) received exclusive breastfeeding, 21.4% (*n* = 264) received breastfeeding plus water, while 36.5% (*n* = 451) received complementary breastfeeding.

Mothers' characteristics were also described in Table 1. A majority of the mothers, 60.7% (*n* = 750) were 20 to 29 years old, whereas 3.2%, (*n* = 40) were less than 20 years old, 35.1% (*n* = 434) were 30 to 39 years old, and 1% (*n* = 11) were 40 years old

or more. With regards to mothers' SES, 39.6% (*n* = 489) belonged to low SES, 53.9% (*n* = 666) belonged to average SES, and 6.5% (*n* = 80) belonged to high SES. Additionally, 71.3% (*n* = 881) of the mothers were married, while 28.7% (*n* = 354) were not married. Table 1 also shows that 8% (*n* = 99) of the mothers attained primary or no education, 62% (*n* = 766) attained secondary education, and 30% (*n* = 370) attained tertiary education.

Table 1

Participants' Demographics

Variables	Frequency	Percent
Location		
Ikot Ekpene	420	34
Uyo	815	66
Household size		
1-3	299	24.2
4-6	184	14.9
7-9	635	51.4
10 or more	117	9.5
Child's age		
0-11 months	1088	88.1
12-59 months	147	11.9
Child's gender		
Male	629	50.9
Female	606	49.1
Breastfeeding type		
Exclusive BFD	520	42.1
BFD + Water	264	21.4
Complementary BFD	451	36.5
Mother's age		
Less than 20 years	40	3.2
20-29 years	750	60.7
30-39 years	434	35.1
40 years or more	11	1
Mother's socioeconomic status		
Low	489	39.6
Average	666	53.9
High	80	6.5
Marital status		
Married	881	71.3
Not Married	354	28.7
Mother's education level		
Primary /No Education (K–6 grade)	99	8
Secondary Education (7-12 grade)	766	62
Tertiary Education (some college/college)	370	30

Table 2 provides the malnutrition status of the children under 5 years of age. Of the 1,235 sample participants selected, a majority of the children, 91.3% (n = 1,128), were malnourished, while 8.7% (n = 107) were not malnourished. Considering locations, of the 420 children selected in Ikot Ekpene, 95% (n = 399) were malnourished and 5% (n = 21) were not malnourished whereas among the 815 of the children selected in Uyo, 89.4% (n = 729) were malnourished and 10.6% (n = 86) were not malnourished (see Table 2).

Table 2

Participants' Malnutrition Status

Child malnutrition status	Sample participants *n (%)*	Ikot Ekpene *n (%)*	Uyo *n (%)*
Not malnourished	107 (8.7)	21 (5)	86 (10.6)
Malnourished	1128 (91.3)	399 (95)	729 (89.4)
Total	1235 (100)	420 (100)	815 (100)

Note. *n* equals frequency

Bivariate Analyses

Results of the Pearson's chi-square test of independence are presented in this section. The Pearson's chi-square test assesses whether there exists a statistically significant association between two categorical variables. This test (Pearson's chi-square test) is based on two assumptions (Field, 2009). First, it is assumed that the two categorical variables are mutually independent. In other words, the two categorical variables are not, in any way, associated. A second assumption underlying the Pearson's chi-square test is that expected counts in each cell must be greater than five. The Pearson's chi-square test is usually performed at the 95% percent confidence level, which

implies alpha equals 0.05 (Field, 2009). The decision rule is to reject a null hypothesis if a chi-square value has probability less than 0.05 ($p < 0.05$). Otherwise, if $p \geq 0.05$, the null hypothesis is not rejected.

Research Question 1

RQ1: What is the relationship between HHS and the malnutrition status of a child under 5 years in Akwa Ibom State?

H_{01}: There is no statistically significant relationship between HHS and the malnutrition status of a child under 5 years in Akwa Ibom State.

H_{a1}: There is a statistically significant relationship between HHS and the malnutrition status of a child under 5 years in Akwa Ibom State.

The Pearson's chi-square test was performed to assess association between HHS and CMS under 5 years in Akwa Ibom State. I assumed that HHS and CMS were independent to each other. The result indicated that the assumption of expected counts in each cell being greater than five was not violated (see Table 3). The result showed that there was a statistically significant association between HHS and malnutrition status of children under 5 years in Akwa Ibom State, Pearson's chi-square value (χ^2 (3) = 9.344, p = .025; see Table 3). I, therefore, rejected the null hypothesis and concluded that there is a statistically significant relationship between HHS and the malnutrition status of a child under 5 years in Akwa Ibom State.

Other Pearson's chi-square tests in Table 3 were also predicated on the assumptions of independence of the two categorical variables, and no expected count in each cell was less than five. The results in Table 3 indicated that CMS under 5 years in

Akwa Ibom State had a statistically significant association with CG (χ^2 (1) = 7.466, p = .006), BFD (χ^2 (2) = 12.208, p = .002), mothers' SES (χ^2 (2) = 8.420, p = .015), EDU (χ^2 (2) = 7.525, p = .023), and participants location (χ^2 (1) = 10.797, p = .001).

In addition, results in Table 3 highlighted that CMS under 5 years in Akwa Ibom State had no statistically significant association with CA (χ^2 (1) = 1.040, p = .308), mothers' age (χ^2 (3) =.410, p = .938), and mothers' MAR (χ^2 (1) = .357, p = .55). Thus, CA, mothers' age, and mothers' MAR were not included in the binary logistic regression analysis as earlier indicated. This was due to no statistical significant association with CMS from the bivariate analysis. Nonetheless, participants' location resulted in a statistically significant association with child's malnutrition status (Table 3), and, therefore, was considered a confounding variable in the multivariate analysis.

Table 3

Pearson Chi-Square Test Between Child Malnutrition and Each Independent Variable

Variables	Chi-square value	Degree of freedom	Probability
Child malnutrition status vs household size	9.344[a]	3	0.025
Child malnutrition status vs child's age	1.040[a]	1	0.308
Child malnutrition status vs child's gender	7.466[a]	1	0.006
Child malnutrition status vs breastfeeding type	12.208[a]	2	0.002
Child malnutrition status vs mothers' age	.410[a]	3	0.938
Child malnutrition status vs mothers' socioeconomic status	8.420[a]	2	0.015
Child malnutrition status vs mothers' marital status	.357[a]	1	0.55
Child malnutrition status vs mothers' education level	7.525[a]	2	0.023
Child malnutrition status vs location	10.797[a]	1	0.001

Note. a. implies 0 cells (.0%) have expected count less than 5.

Multivariate Analyses

This section provides results of the binary logistic regression analysis to address RQ2 and RQ3. The binary logistic model regresses a dichotomous dependent variable on its covariates and confounders control variables. An assumption of the binary logistic model is that covariate and confounder variables are assumed to be associated with the dichotomous dependent variable. Another assumption of the binary logistic model is that the covariate and confounder variables are independent and not significantly associated or have pairwise statistically significant correlation coefficient (Gujarati & Porter, 2009), hence the assumption of no multicollinearity among independent variables in the model.

In binary logistic regression, the value of the *OR* of an independent (covariate/confounder) variable indicates the magnitude and direction of relationship between the independent and dependent variables. The related probability value (of *OR*), also evaluated at alpha equals 0.05, determines the statistical significance of the *OR* value. The *OR* value is statistically significant if its probability value is less than 0.05 ($p < 0.05$). The Nagelkerke *R*-squared (R^2) value in a binary logistic model is a pseudo R^2 statistic that measures approximately, the variations in the dependent variable explained by the model. Thus, it is a measure of goodness-of-fit of the model. However, the overall significance of the binary logistic model is determined by the omnibus test of significance of the model coefficients.

Research Question 2

RQ2: What is the relationship between a CA, CG, breastfeeding type, and malnutrition in children under 5 in Akwa Ibom State?

H_{02}: There is no statistically significant relationship between a CA, CG, breastfeeding type, and malnutrition in children under 5 in Akwa Ibom State.

H_{a2}: There is a statistically significant relationship between a CA, CG, breastfeeding type, and malnutrition in children under 5 in Akwa Ibom State.

A binary logistic regression analysis was performed to examine a null hypothesis of no statistically significant relationship between CA, CG, breastfeeding type, and malnutrition in children under 5 in Akwa Ibom State. In the analysis, CA was dropped, leaving CG and breastfeeding type as covariates used, and controlling for location (a confounder variable). This was due to results from the bivariate analyses which suggested that the malnutrition status of children under 5 years of age was significantly associated with CG, breastfeeding type, and participants' location, but not with CA (see Table 3). Thus, the covariates in the analysis were CG and breastfeeding type while the confounder (control) variable was participants' location.

The binary logistic regression estimation showed that the estimated model had a good fit as the omnibus test of the model was significant (χ^2 (4) = 32.127, $p < 0.05$). This indicates that the independent (covariates and confounder) variables significantly explained the dependent (CMS) variable. A Nagelkerke R^2 value of .58 was obtained, indicating that about 58% of the variations in malnutrition status of children under 5 years were explained by the independent (covariates and confounder) variables. As shown in Table 4, the assumption of no multicollinearity among the independent variables was also met. The Spearman's correlation value (r) showed that there was no significant correlation between CG and breastfeeding type ($r = .036$, $p > .05$), CG and

participants' location (r = -0.027, p > 0.05), or breastfeeding type and participants' location (r = -0.019, p > 0.05).

Table 4

Spearman's Correlation Test of Independent Variables in RQ2

Independent variables	*N*	Spearman correlation value	Probability
Child's gender/breastfeeding type	1,235	0.036	0.202
Child's gender/location	1,235	-0.027	0.342
Breastfeeding type/location	1,235	-0.019	0.494

Note. *N* equals number of valid cases.

The estimated *OR*s from the binary logistic regression analysis are contained in Table 5. The estimated *OR* favored a decrease in child malnutrition by nearly 44% (*OR* = 0.557, p < 0.05) in a male child compared with a female child. Estimated *OR* favored an increase in child malnutrition by nearly 132% (*OR* = 2.318, p < 0.05) for every child who received exclusive breastfeeding relative to complementary breastfeeding. The result also showed that the estimated *OR* favored an increase in child malnutrition by nearly 14% (*OR* = 1.143, p >0.05) for every child that received breastfeeding plus water relative to complementary breastfeeding. The estimated *OR* favored an increase in child malnutrition by nearly 121% (*OR* = 2.213, p < 0.05) for a child in Ikot Ekpene relative to Uyo.

The result of the binary logistic regression analysis further indicated that malnutrition in children under five years in Akwa Ibom State had a statistically significant relationship with covariates, CG (Wald (1) = 7.65, p < 0.05), breastfeeding type (Wald (2) = 12.154, p < 0.05), and confounder variable, participants' location (Wald

(1) = 9.726, $p < 0.05$). I therefore rejected the null hypothesis and concluded that there is a statistically significant relationship between CG, breastfeeding type and malnutrition in children under five in Akwa Ibom State.

Table 5

Binary Logistic Regression Result of Child Malnutrition, Child's Gender, Breastfeeding Type and Controlling for Participants' Location

Variables	Wald statistic	Probability	Odds ratio
Male	7.65	0.006	0.557
Breastfeeding type	12.154	0.002	-
Exclusive breastfeeding	11.518	0.001	2.318
Breastfeeding + water	0.281	0.596	1.143
Ikot Ekpene	9.726	0.002	2.213
Constant	106.836	0	8.59

Research Question 3

RQ3: What is the relationship between mothers' age, SES, MAR, and education level and malnutrition in children under 5 in Akwa Ibom State?

H_{03}: There is no statistically significant relationship between a mothers' age, SES, MAR, and education level and malnutrition in children under 5 in Akwa Ibom State.

H_{a3}: There is a statistically significant relationship between a mothers' age, SES, MAR, and education level and malnutrition in children under 5 in Akwa Ibom State.

A binary logistic regression analysis was also conducted to assess the null hypothesis that there is no statistically significant relationship between mothers' age, SES, MAR, and education level and malnutrition in children under five in Akwa Ibom State. Mothers' age and MAR were excluded from this analysis while mothers' SES and

education level were the covariates adopted. This was due to the bivariate analyses which showed child malnutrition was significantly associated with mothers' SES and education level (Table 3). Participants' location was dropped from this analysis. This decision was based on the Spearman's correlation value (r) in Table 6 which indicated that participants' location correlated significantly with mothers' SES ($r = 0.162$, $p < 0.05$), and mothers' education level ($r = -0.178$, $p < 0.05$). Whereas, mothers' SES and education level were not significantly correlated ($r = 0.298$, $p > 0.05$) as displayed in Table 6. Thus, participants' location (a confounder variable) was eliminated to avoid violation of no multicollinearity among independent variables assumption, in binary logistic regression analysis. The covariates in this analysis therefore were mothers' SES and mothers' education level.

Table 6

Spearman's Correlation Test of Independent Variables in RQ3

Independent variables	*N*	Spearman correlation value	Probability
Socioeconomic status/education level	1,235	0.298	0
Socioeconomic status/location	1,235	0.162	0
Education level/location	1,235	-0.178	0

Note. *N* equals number of valid cases.

The binary logistic regression estimation showed that the estimated model had a good fit as the omnibus test of the model was significant (χ^2 (4) = 17.238, $p < 0.05$). It indicates that the covariates (mothers' SES and mothers' education level) significantly explained the dependent (CMS) variable. The Nagelkerke R^2 value of .31 indicated that

about 31% of the variations in malnutrition status of children under five years were explained by the independent (mothers' SES and mothers' education level) variables.

Table 7 provides the estimated *OR*s from the binary logistic regression analysis. Estimated *OR* favored an increase in child malnutrition by nearly 32% (*OR* = 1.321, $p > 0.05$) for mothers in low SES relative to mothers in high SES. The estimated *OR* favored a decrease in child malnutrition by nearly 32% (*OR* = 0.68, $p > 0.05$) for mothers in average SES relative to mothers in high SES. The result further showed that the estimated *OR* favored an increase in child malnutrition by nearly 36% (*OR* = 1.357, $p > 0.05$) for mothers' who attained primary or no education compared with mothers who attained tertiary education. The estimated *OR* favored a decrease in child malnutrition by nearly 45% (*OR* = 0.552, $p < 0.05$) for mothers' who attained secondary education compared with mothers who attained tertiary education.

The outcome of the binary logistic regression analysis in Table 7 further indicated that malnutrition in children under five years in Akwa Ibom State had a statistically significant relationship with mothers' SES (Wald (2) = 8.576, $p < 0.05$), and mothers' education level (Wald (2) = 7.808, $p < 0.05$). I therefore rejected the null hypothesis and concluded that there is a statistically significant relationship between mothers' SES, mothers' education level and malnutrition in children under five in Akwa Ibom State.

Table 7

Binary Logistic Regression Result of Child Malnutrition, Mothers' SES and Education Level

Variables	Wald statistic	Probability	Odds ratio
Mother's socioeconomic status (SES)	8.576	0.014	-
Low SES	0.289	0.591	1.321
Average SES	0.62	0.431	0.68
Mother's education level	7.808	0.02	-
No/primary education (K - 6 grade)	0.296	0.586	1.357
Secondary education (7 - 12 grade)	5.586	0.018	0.552
Constant	37.252	0	17.75

Summary

This quantitative and cross-sectional study included three research hypotheses evaluated using Pearson's chi-square test and binary logistic regression analyses. Result of the Pearson's chi-square test of the first null hypothesis revealed a statistically significant relationship between HHS and malnutrition in children under five years in Akwa Ibom State. The binary logistic regression was used to test the second and third hypotheses of this study. Result of the binary logistic regression revealed a statistically significant relationship between CG, breastfeeding type and malnutrition in children under five years in Akwa Ibom State. Moreover, the binary logistic regression result revealed a statistically significant relationship between mothers' SES, mothers' education level, and malnutrition in children under five years in Akwa Ibom State. All three null hypotheses stated in this study were rejected.

Section 4 provided an interpretation and discussion of the findings of this study. Limitations of this study, recommendations, and implications of this study for professional practice and social change were also discussed in Section 4.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

The purpose of this study was to explore the factors that influence malnutrition in children under 5 years of age in Nigeria using Akwa Ibom State as a case-study. This quantitative cross-sectional study used secondary data obtained from the ADHS database. The sample included 1,235 participants from two primary healthcare centers, one in Ikot Ekpene and the other in Uyo Senatorial Districts in Akwa Ibom State. In RQ1, I analyzed the relationship between HHS and the malnutrition status of children under 5 years in Akwa Ibom State. In RQ2, I examined the relationship between child's characteristics and malnutrition in children under 5 in Akwa Ibom State. Additionally, in RQ3, I investigated the relationship between mothers' characteristics and malnutrition in children under 5 in Akwa Ibom State.

For RQ1, the main finding revealed that there was a statistically significant relationship between HHS and the malnutrition in children under 5 years in Akwa Ibom State. The main finding for RQ2 upheld the hypothesis of a statistically significant relationship between CG, breastfeeding type, and malnutrition in children under 5 in Akwa Ibom State. For RQ3, the main finding supported a hypothesis of a statistically significant relationship between mothers' SES, mothers' education level, and malnutrition in children under 5 in Akwa Ibom State. Therefore, the three null hypotheses of this study were all rejected.

Interpretation of the Findings

The findings in this study revealed that HHS, CG, breastfeeding type, geographic location (Ikot Ekpene), mothers' SES, and mothers' education level were determinants of malnutrition in children under 5 years in Akwa Ibom State. The risk factors, therefore, of malnutrition in children under 5 years of age in Akwa Ibom State were HHS, CG, breastfeeding type, location, mothers' SES, and mothers' education level, as indicated by the findings.

Household Size

The relationship between HHS and malnutrition status of children under 5 years of age in Akwa Ibom State was statistically significant. Similar studies have also found a significant correlation between HHS and malnutrition in children under the age of 5 years. A systematic review of existing literature to determine risk factors associated with malnutrition among children under 5 years in SSA countries by Obasohan et al. (2020) found that household-related factors determined malnutrition. Amare et al. (2018), in a related study of the Northern part of Nigeria, using regression analysis on dataset obtained from Nigeria Demographic and Health Survey database 2013 and 2018, revealed that household characteristics determined malnutrition in children aged between 6 and 23 months. Large HHS has tendency of depriving children of basic healthcare and or nutrients (Khan et al., 2017). In their analysis of determinants of malnutrition in children under 5 years in selected regions in Sindh, Pakistan, Khan et al. (2017) found that children from deprived homes due to large family size were twice likely to be malnourished relative to children from wealthier households. Ahsan et al. (2017) also

found family size to be significantly associated with malnutrition in children between 6 and 59 months old in rural Tharparkar, Sindh. Wasihun et al. (2018) found that a family size below four members was inversely related to malnutrition in children. The findings of this study reported that more than one-half of the sampled children were from households with at least seven persons.

In this study, I highlighted concepts of SEM in which an individual's interpersonal relationship with family, friends, and social network influences health decisions and outcomes (CDC, 2015b). The result supports the SEM following the significant relationship found between HHS and malnutrition in children under 5 years. Smaller HHS, which correlates negatively with malnutrition in children, should be encouraged (Wasihun et al., 2018).

Child's Gender

In this study, there was a statistically significant relationship between the gender of a child and malnutrition in children below age 5 in Akwa Ibom State. Over one-half of the sampled children were male; however, a male compared to a female child was less likely by less than one to be malnourished, as found in this study. This finding was contrary to the studies by Imam et al. (2020) and Mzumara et al. (2018) on Nigeria and Zambia, respectively. Imam et al investigated the prevalence and risk factors for stunting among children under 5 attending acute malnutrition treatment programs in north-western Nigeria. Imam et al found that a male child relative to a female child was significantly correlated with increased probability of stunting in north-western Nigeria. Moreover, Mzumara et al. examined the factors linked with malnutrition in children under 5 years of

age in Zambia and found that malnutrition was more prevalent in male children than in the female children. Ndemwa et al. (2017) found a statistically significant difference in malnutrition status between male and female children under 24 months old in Kwale County, Kenya.

In the current study, the HBM was adopted to explain how individual characteristics and behavior determined health outcomes. In HBM, gender is one of the modifying factors that determines the likelihood of action by individuals based on their perceptions of health benefits or barriers. The result showed that CG significantly determined CMS, and therefore is supportive of the HBM.

Breastfeeding Type

There was also a statistically significant relationship between breastfeeding type and malnutrition in children under 5 years in Akwa Ibom State as revealed in this study. This finding supported studies by Mutuku et al. (2019), Amare et al. (2018), and Pravana et al., (2017), which affirmed that breastfeeding type was a significant predictor of malnutrition in children. Mutuku et al. analyzed risk predictors of severe acute malnutrition among children in developing countries and found that cessation of breastfeeding under 6 months and instigation of complimentary food on children under 6 months were significant determinants of severe acute malnutrition in children under 5 years. In a case and control study in Nepal by Pravana et al. (2017), bottle feeding and failure to start complementary feeding after 6 months contributed significantly to prevalence of severe acute malnutrition in children under 5 years. I found that children who received exclusive breastfeeding were over twice as likely to be malnourished

relative to children who received complementary breastfeeding. This outcome may be attributed to the merely exclusive nature of the essence of exclusive breastfeeding among mothers/caregivers (Awasthi et al., 2019) and the duration of exclusive breastfeeding (Mohammed & Asfaw, 2018), which have a large influence on malnutrition status of a child. I also found that children who received breastfeeding plus water were more likely to be malnourished compared to children who received complementary breastfeeding. This could be linked to low dietary knowledge among the mothers/caregivers (Khattak et al., 2017). Nearly 42% of the sampled children in this study received exclusive breastfeeding while 21% received breastfeeding plus water.

The HBM posits that individual's health behavior depends on their perception of benefit of health behaviors. The likelihood of individuals to adopt a health practice or make health decision largely depends on their perception about a health condition. The breastfeeding practice given to children are influenced by their mothers' perception of its health benefits to the children and themselves. The result indicated that breastfeeding type received by these children was significantly related to CMS, thereby corroborative of the HBM postulation.

Geographic Location

Furthermore, in this study, the location of the children (a control variable) was found to have a statistically significant relationship with malnutrition in children under 5 in Akwa Ibom State. This corroborated the results in similar earlier studies by Amare et al. (2018) and Wieringa et al. (2018). Amare et al. explored the determinants of chronic malnutrition in northern Nigeria using decomposition analysis and regression-based

techniques and found a significant difference in malnutrition prevalence in young children between the northern part of Nigeria and other parts of the country. Wieringa et al. found that rates of malnutrition were higher in rural areas compared to urban. Mzumara et al. (2018) also asserted that area of residence was a significant predictor of malnutrition in children. In this study, I found that children residing in Ikot Ekpene (sub-urban location) were over twice as likely to be malnourished compared to children residing in Uyo (urban location). A plausible explanation of this outcome is that children in urban areas stand a better chance to receive quality healthcare and have better access to healthy foods than their counterparts in rural areas. Thus, children malnutrition rates are higher in rural areas relative to urban areas, as posited by Mzumara et al. in their study. My study also found that nearly 89% of sampled children in Uyo were malnourished, whereas 95% of sampled children in Ikot Ekpene were malnourished.

In the SEM framework, people's lifestyles are modified by their interaction with their immediate community (Coreil, 2010). This interplay of individuals' interactions at the community level shapes the population health status, as affirmed by SEM. The result was supportive of the SEM framework in that location of participants was significantly related to CMS in Akwa Ibom State.

Mothers' Socioeconomic Status

Mother's SES had a statistically significant relationship with malnutrition in children in Akwa Ibom State, as shown in this study. This finding was aligned with related studies by Maje et al. (2019) and Singh et al. (2019). A similar study on Nigeria by Maje et al. that explored prevalence and socioeconomic influencers of malnutrition in

children under 5 years in Kano State revealed that maternal and paternal SES as it relates to their occupation and income levels were significantly associated with child malnutrition in Kano State. Singh et al. also examined the effect of socioeconomic inequalities on malnutrition in children under 5 years in India and found an inverse relationship between children of parents in high socioeconomic group and malnutrition of children in the country. This was supportive of a finding in my study that children of mothers in the low socioeconomic class were nearly one and a half times likely to become malnourished when compared with children of mothers in the high socioeconomic class. As noted earlier by Khan et al. (2017), children from deprived homes are twice likely to be malnourished relative to children from wealthier homes. On the other hand, I found that children of mothers who belonged to the average socioeconomic class were less likely, by a factor a little above one half, to become malnourished when compared with children of mothers in the high socioeconomic class. Clearly, this outcome contradicts the positions by Singh et al. and Khan et al.. It indicated that children of mothers in a high socioeconomic class did not receive adequate nutrition or dietary attention from their mothers compared to children of mothers in average socioeconomic class. Nearly 54% of sample mothers in this study belonged to the average socioeconomic class, while nearly 7% belonged to the high socioeconomic class.

The result of this study supports the SEM theoretical framework. Individuals' knowledge, skills, and attitudes are linked to health outcomes of a population under the SEM framework. The SES of mothers was significantly related to malnutrition in

children under 5 years in the current study. The SEM framework adopted in the current study was therefore relevant in exploring the link between CMS and mothers' SES.

Mothers' Education Level

Moreover, from this study, I found that there was a statistically significant relationship between mothers' education level and malnutrition in children under 5 years in Akwa Ibom State. A number of related studies, including Omotesho et al. (2019), Tasnim (2018), Mawa and Lawoko (2018), and Khattak et al. (2017), found similar outcomes. For instance, Omotesho et al. assessed the determining factors of malnutrition in children under 5 years of age in rural households and resulting morbidity and mortality rates in Benue state, Nigeria. Omotesho et al. found that maternal education was among the determining factors that had a statistically significant relationship with malnutrition in children under 5 years in Benue State. In same vein, Tasnim found a statistically significant relationship between child malnutrition and parental level of education in a systematic review and methodological appraisal of 36 articles to determine factors that cause child malnutrition in developing countries. In addition, I found that children of mothers who attained primary or no education were one time more likely to be malnourished compared with children of mothers who attained tertiary education. This finding supported Mawa and Lawoko, who found that children whose mothers had acquired only primary education were three times more likely to waste or stunt relative to those with maternal education above primary level. On the flip side, I also found that children of mothers who acquired secondary education were nearly half less likely to be

malnourished compared with children of mothers who attained tertiary education. I found that 62% of sampled mothers in this study acquired secondary education.

This result supported the HBM theoretical framework in people's perception about a health condition or health benefits are built on the amount of knowledge they have about the health condition and benefits of the health behaviors. In this study, CMS was significantly related with mothers' level of education in Akwa Ibom State. The theory of the HBM was therefore relevant to this study.

Limitations of the Study

In this study, I attempted to contribute to filling the identified gap in literature by exploring risk factors of malnutrition in children under 5 years in Akwa Ibom State. I adopted some robust analytical methods to generate statistically significant factors that determined malnutrition in children below age 5 in Akwa Ibom State. The study, however, was not without some limitations. No sampled participants were obtained from Eket Senatorial District of Akwa Ibom State. It was therefore difficult to generalize the outcomes of this study for Akwa Ibom State as there may be bias. Using more samples with a wider geographical coverage of the State would have provided more information and improved the level of precision of the study. The study relied on secondary data, thereby making it difficult to ascertain accuracy of data collection process. Underlying child's/mother's past and current ailments, like malaria, diarrhea, and HIV, which could have influenced the study outcome, were not included in the analysis. Mother's nutritional status and micronutrient status of the children, which could influence risk factors of child malnutrition, were also not considered in this study.

Recommendations

Considering the outcomes of this study, future research using a larger sample with wider geographical coverage is imperative for a more robust investigation of risk factors of malnutrition in children in Akwa Ibom State. I found that HHS, CG, breastfeeding type, location, mothers' SES, and mothers' education level significantly determined malnutrition in children under 5 in Akwa Ibom State. A study that includes mothers' nutrition status, micronutrients status of children, and underlying illness of mothers and children would enhance the quality of findings. In this study, I adopted a quantitative cross-sectional approach. It is recommended, therefore, that prospective researchers adopt mixed-method research design including quantitative and qualitative techniques to provide more information about participants in the study. Moreover, it is vital for future researchers to use longitudinal primary data. This would allow for inclusion of important information omitted in the secondary data. The researchers, through a longitudinal dataset, would better understand the behavioral pattern of the participants over some time.

SEM posits that interactions between personal, communal, environmental, and societal factors contribute to health challenges (CDC, 2015; (Kilanowski, 2017). This underscores some findings of the current study whereby HHS, location, and mothers in low SES significantly worsened malnutrition status of children. It was also found in the current study that exclusive breastfeeding type and mothers with primary or no education significantly contributed to increased malnutrition in children. These outcomes are underpinned by HBM which suggests that people will not have a positive change in

health behavior if they perceived that they are not at risk, and fails to partake in interventions that detect or prevent diseases (LaMorte, 2019). Low SES, and low dietary knowledge are linked to maternal level of education (Khattak et al. (2017). Therefore, improving mothers' education, health, and SES are germane in curbing malnutrition in children.

I therefore recommend that health practitioners at various levels in public and private health facilities focus on educating mothers, and make them see reasons to adopt good or evidence-based practices in caring for their children. I encourage the Akwa Ibom State Health Ministry, Education and Information Ministries, and other relevant health authorities, to embark on aggressive sensitization of mothers about ills of malnutrition in children under five years. Policy makers should formulate policies that would create jobs and income earning opportunities for women.

Implication for Professional Practice and Social Change

Preventing and reducing the challenges of malnutrition, especially in children under five years in Akwa Ibom State in particular, and Nigeria in general, is a very cost-effective strategy which promotes healthier societies with improved social and health outcomes. The findings of this current study have some implications for professional and social change. The outcome of this current study could influence future practices of healthcare practitioners and enhance the approaches and interventions used by them to curb malnutrition in children, especially those under the age of five years. The need to reduce malnutrition among children less than five years old would be beneficial in bringing down child morbidity and mortality rates. Intervention programs to educate

mothers and caregivers is also encouraged. Moreover, the outcome of this current study would spur future researchers to increase the target population to more than one health facility per senatorial district. All senatorial districts should also be represented in future studies, and adopting a larger sample size to enhance the evaluation of results. The choice of using a mixed-methods research design, and several independent variables would improve the quality of findings by providing more information.

Furthermore, the outcomes of this current study would promote positive social change. The findings of this current study possess the potentials to assist caretakers and mothers of children under five years of age to adapt better dietary intakes for the health benefit of their children. This would lead to having improved health outcomes with healthier population to support growth and development. The findings of this study supports a target of the sustainable development goals which is to reduce child mortality by three-fourths across the globe (Pravana et al., 2017). The use of SEM is vital to engage leaders in communities, institutions, and government to encourage and empower individuals, especially mothers, to kick against attributes that could result in child malnutrition. The onus is upon people to adopt better health behaviors for better health outcomes. As such people's perception of child malnutrition via orientations and reorientation to reduce the challenges of malnutrition. Healthcare practitioners therefore, should collaborate with communities and other relevant bodies and develop interventions that would yield envisaged positive outcomes. Using a longitudinal dataset with a larger sample size could provide a better understanding of the relationship between the independent variables on malnutrition in children under five years in Akwa Ibom State.

My study therefore contributes to existing knowledge and supports social awareness and education of caretakers and mothers in a bid to reduce malnutrition in children under five years in Akwa Ibom State. Improved collaborative efforts by health practitioners, health authorities at the local, state and federal levels, as well as non-governmental bodies will go a long way in fighting the menace of malnutrition across and beyond Nigeria.

Conclusion

The purpose of this quantitative cross-sectional study was to explore risk factors of malnutrition in children under five years old in Akwa Ibom State. Three RQs with related null hypotheses were stated and evaluated in the current study. All three null hypotheses were rejected. The findings from this study showed that malnutrition in children under five years of age in Akwa Ibom State had statistically significant relationship with the size of households, gender and location of a child, breastfeeding type, and the mothers' socioeconomic and education status. The findings supported the theories of SEM and HBM frameworks upon which this study was hinged. Therefore, determinant factors of malnutrition in children under five years of age in Akwa Ibom state were HHS, CG and location, breastfeeding type, as well as socioeconomic and education levels of mothers. Longitudinal studies using primary data, and considering mothers' nutrition status, underlying ailments of mothers or children, and micronutrient status of children were, amongst others, recommended.

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Appendix A: Letter of Introduction

[redacted]

Date: January 15, 2021

[redacted]

Dear Sir/Madam,

Letter of Introduction

The bearer, [redacted], is a student in the School of Health Sciences, Doctor of Public Health (DrPH) program at [redacted]. She is presently in the prospectus stage of her dissertation. Her dissertation will focus on malnutrition in children under five years of age. [redacted] has proposed conducting her research project in Akwa Ibom State, Nigeria, and she has indicated an interest in accessing existing data from your organization.

I recognize that obtaining data from a government agency could be quite a process; hence, any assistance your organization can provide to assist [redacted] to secure the data as smoothly as possible, will be greatly appreciated.

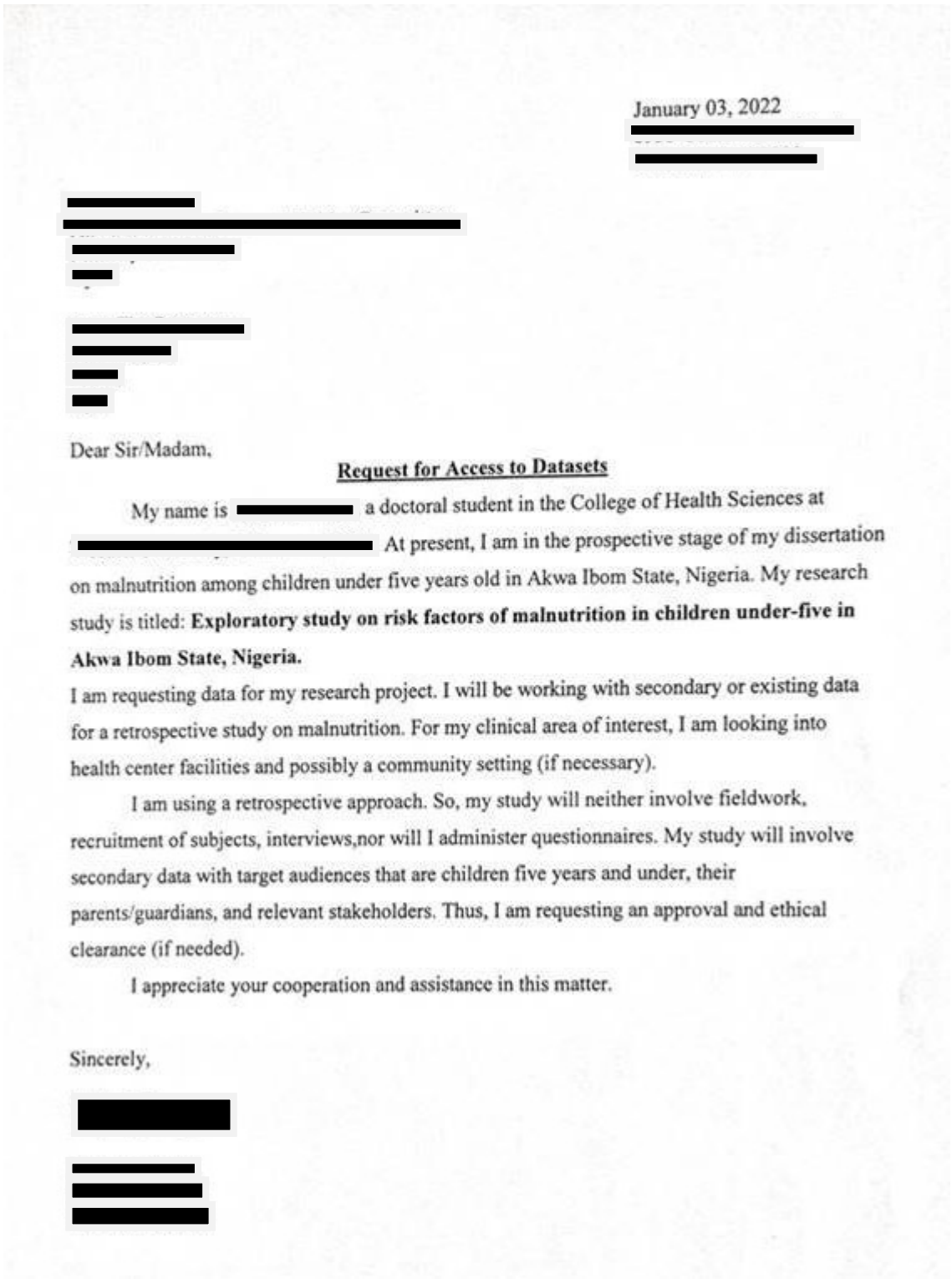
I appreciate your time and cooperation. Please let me know if you have any questions regarding this letter.

Sincerely,

[redacted]

[redacted]

Appendix B: Student's Application Letter for Access of Data



January 03, 2022

[redacted]

[redacted]

[redacted]

Dear Sir/Madam,

Request for Access to Datasets

My name is [redacted] a doctoral student in the College of Health Sciences at [redacted] At present, I am in the prospective stage of my dissertation on malnutrition among children under five years old in Akwa Ibom State, Nigeria. My research study is titled: **Exploratory study on risk factors of malnutrition in children under-five in Akwa Ibom State, Nigeria.**

I am requesting data for my research project. I will be working with secondary or existing data for a retrospective study on malnutrition. For my clinical area of interest, I am looking into health center facilities and possibly a community setting (if necessary).

I am using a retrospective approach. So, my study will neither involve fieldwork, recruitment of subjects, interviews,nor will I administer questionnaires. My study will involve secondary data with target audiences that are children five years and under, their parents/guardians, and relevant stakeholders. Thus, I am requesting an approval and ethical clearance (if needed).

I appreciate your cooperation and assistance in this matter.

Sincerely,

[redacted]

[redacted]

Appendix C: Ethical Clearance

Our Ref: MH/PRS/99/V.1/174

[redacted]

[redacted]

[redacted]

NHREC/21/6/2021

10th January, 2022

Corona, CA 92880

APPROVAL TO ACCESS DATA

This is to convey the approval of the Health Research Ethics Committee to you to access data from our data base for the purpose of your Doctor of Public Health (Dr.PH) dissertation project on the topic: **"Exploratory study on risk factors of malnutrition in children under-five in Akwa Ibom State, Nigeria."**

The review of your protocol falls under the exemption category as it will make use of basically secondary data and does not involve use of questionnaire or pose any risk to humans.

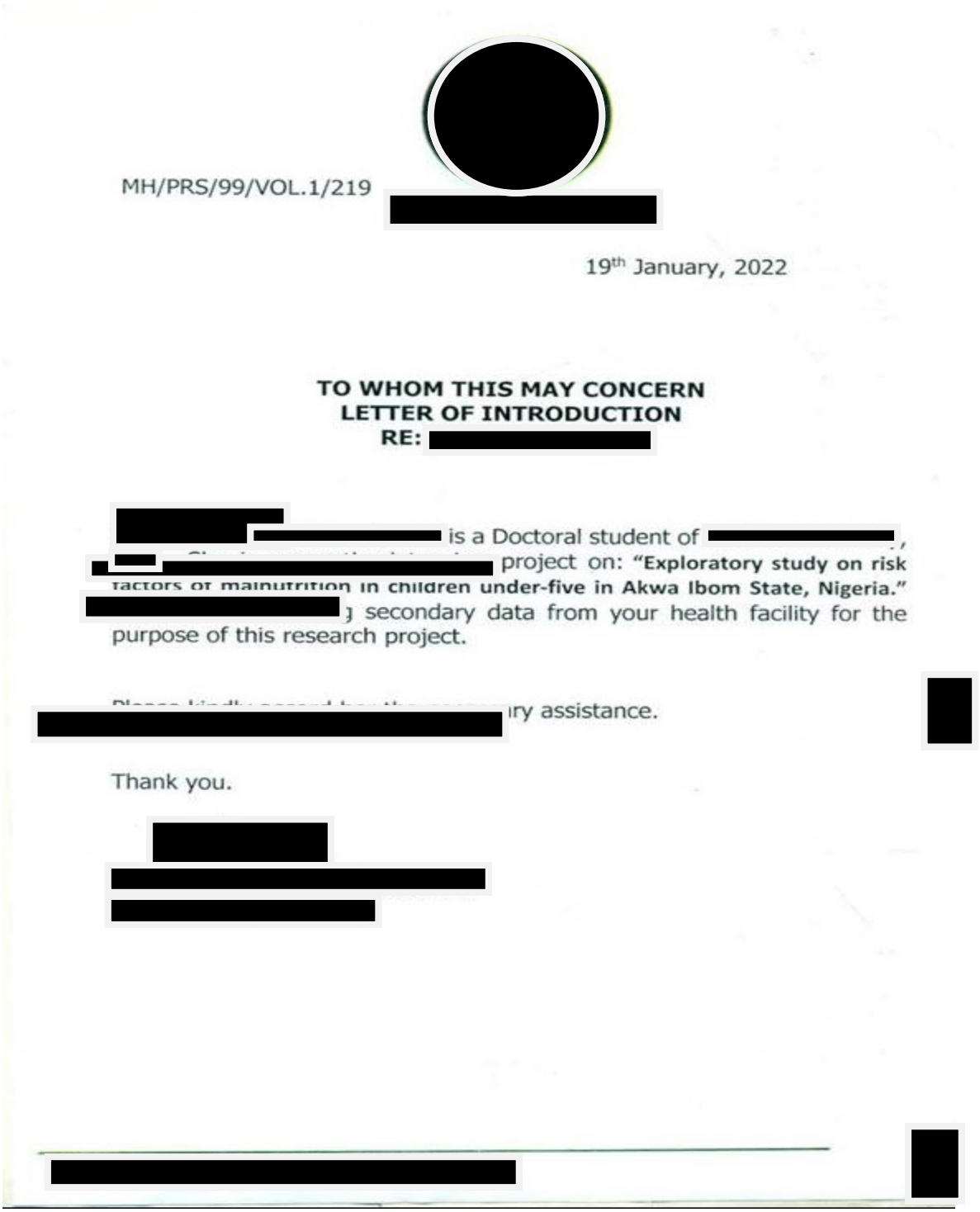
Please accept the assurances of our chairman's esteemed regards.

DR. IBORO E. UDOH, MPH(Essex),FRSPH

FOR: Chairman, HREC

[redacted]

Appendix D: Approval to Access Data



[redacted]

MH/PRS/99/VOL.1/219 [redacted]

19th January, 2022

TO WHOM THIS MAY CONCERN
LETTER OF INTRODUCTION
RE: [redacted]

[redacted] is a Doctoral student of [redacted], [redacted] project on: **"Exploratory study on risk factors of malnutrition in children under-five in Akwa Ibom State, Nigeria."** [redacted] secondary data from your health facility for the purpose of this research project.

[redacted] ıry assistance.

Thank you.

[redacted]