IMPACT OF NUTRITION POLICY AND FOOD INNOVATION IN MITIGATING MICRONUTRIENT MALNUTRITION IN NIGERIA

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ABSTRACT

Introduction – Malnutrition is still endemic in low-and middle-income countries (LMICs) despite several efforts to mitigate this. Triple-burden of malnutrition – undernutrition, overnutrition and micronutrient malnutrition are important issues of public health concern because it affects more than ten percent of the population. The nutrition policies governing an area play a significant role in providing guidelines for interventions and programs geared towards solving problems in health and nutrition among their population. The burden of malnutrition is high in Nigeria especially in the rural areas, but, also in urban areas as well.

Methods – Using a cross-sectional qualitative research method, we examined the lived experiences of members of the public – mothers and fathers of children under-five years old in Anambra and Ebonyi states in Nigeria, using focus group discussions segregated by gender. We also examined policymakers and implementer's perspectives on biofortification and baby friendly initiatives in Ebonyi state, Nigeria, using in-depth interview method. A policy document National Agriculture Technology Innovation Policy [NATIP] was reviewed using the critical discourse analysis method.

Results – The critical discourse analysis method revealed enablers and barriers to positive implementation of the policy document and recommendations were proffered. The in-depth interview method demonstrated the efficacy of baby friendly initiatives in the locations studied, and showed how improvements were necessary regarding acceptance and consumption of biofortified foods. Finally, the focus group discussions brought to limelight the depths of food insecurity among the population studied.

Conclusion – Research results will help guide policy. However, the government is the major player in terms of establishing appropriate and effective nutrition interventions and backing these up with political commitments.

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Table of Contents

List of Appendix

List of Tables

List of Figures

List of Abbreviations

SDGs – Sustainable Development Goals

NATIP – National Agriculture Technology Innovation Policy

LMICs – Low-and middle-income countries

CDA – Critical Discourse Analysis

FMARD – Federal Ministry of Agriculture and Rural Development

OECD – Organization for Economic Co-operation and Development

NNHS – National Nutrition and Health Survey

WHO – World Health Organization

SSA – sub-Saharan Africa

BFHI – Baby Friendly Hospital Initiative

IITA – International Institute of Tropical Agriculture

FGN – Federal Government of Nigeria

UNICEF – United Nations Children's Fund (United Nations International Children's Emergency Fund)

USAID – United States Agency for International Development

USDA – United States Department of Agriculture

Format of the thesis and the contribution of authors

This thesis followed an article-based format. It is comprised of two papers (with primary data), and a review paper (secondary data). There is some repetition because two papers were based on the same study setting/location. The reference list for all the studies is assembled at the end of the thesis.

I co-authored the review paper with my supervisor, Dr. Chibuike Udenigwe, and a collaborator Dr. Ogochukwu Udenigwe. I co-authored paper 2 and 3 with my supervisor, and two collaborators: Dr. Ogochukwu Udenigwe, and Dr. Chukwunonso Ejike in Nigeria.

With guidance from my supervisor, I wrote the thesis proposal and developed the research design including the theoretical framework for my research. I carried out data collection of two out of three papers. Also, I carried out data analysis and wrote the first draft of each manuscript. Our collaborator (OU) being an expert in qualitative research methods validated methodology and data analysis, results and discussion. Our collaborator from in Nigeria (CE) was responsible for data collection in Nigeria. I am the lead and corresponding author on all three papers.

Ethical Approval

A certificate of ethical approval was obtained from the University of Ottawa's Research Ethics Review Board with file number:H-09-23-9402; and from Alex Ekwueme Federal University Ethics Review Board with file number: AEFUNAI/FBMS-ECN/2310012.

Chapter 1: Introduction

1.1 Overview and Thesis outline

This thesis assesses the impact of nutrition policy and food innovation in mitigating micronutrient malnutrition in Nigeria. It highlights the effects of nutrition-sensitive, and nutrition-specific policies, and their impacts on the state of micronutrient malnutrition among varied populations including mothers and children less than five years old, fathers, adolescent girls, the elderly and generally members of the household in Nigeria. This thesis has three connected papers.

The first paper (Chapter 2) examines a specific Agri-innovation technology policy document namely National Agriculture Technology Innovation Policy (NATIP) document written by the government of Nigeria. This is a nutrition-sensitive policy document that emphasizes increasing the production and consumption of biofortified foods (provitamin A cassava, maize and orange fleshed sweet potatoes), to mitigate micronutrient deficiency among Nigerian households; and placing the responsibility on women. By utilizing a qualitative document review methodology, we discussed how the patriarchal structure of the household in Nigeria plays a significant role in their feeding practices, we considered other aspects of agriculture and its importance in improving nutrition generally, then we identified power imbalances, and social constructs used in the discourse that may impede, or otherwise enhance the implementation of the policies in mitigating micronutrient malnutrition in Nigeria. Recommendations were offered to change the social discourse as necessary.

The second paper (Chapter 3) is a cross-sectional qualitative study in which primary data was obtained using in-depth interviews. It goes into details of finding out what the experiences of food and nutrition policymakers and implementers are regarding biofortification, and baby

friendly initiatives in Ebonyi State, Nigeria. We took a dive analyzing some policies around these sub-topics and how these have impacted the nutritional status of residents of a southeastern state in Nigeria.

The third paper (Chapter 4) is a cross-sectional qualitative study as well; in which primary data were collected using focus group discussions in three communities: Umueje, Ndufu-Echara and Abakaliki metropolis. Our focus was on the household generally. We assessed the lived experiences of two rural communities, and one urban community. We organized separate focus group discussions among men and women who were parents of children under-five years old, discussing their experiences about food environment. Specifically, we considered the foods that were available to them, what they chose to consume as a household, and why, their knowledge of biofortified foods, and their age-appropriate feeding practices.

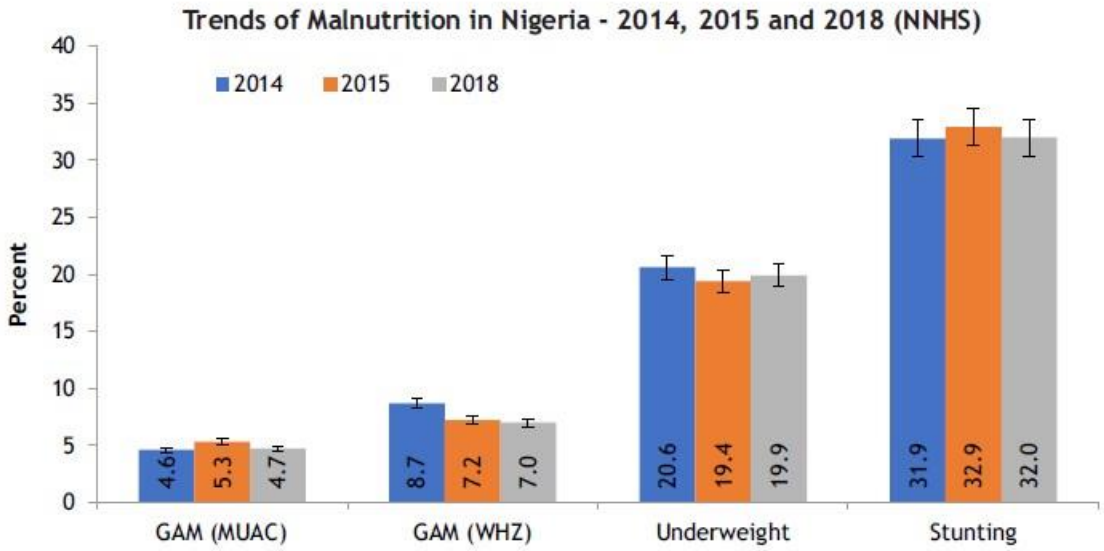
1.2 The Study Problem: Malnutrition in Nigeria

Globally, malnutrition is still a public health concern. The State of the World's Nutrition Report, UNICEF showed that in 2023, 2.33 billion people were moderately or severely food insecure, that is, one in eleven people worldwide, and one in five persons in Africa faced hunger (Arora, 2024). Nigeria is the most populous country in sub-Saharan Africa with a population of 233 million (UNICEF, 2023). According to UNICEF report, 2023, Nigeria is faced with several challenges that results in high level of malnutrition in the country (see figure 1.1). These are: rapid population growth, high level of poverty [about 60% children under-five live in poverty stricken conditions], high rates of domestic crimes and violence [with 12.8 million people affected by armed conflict and violence], high risks of exposure to climate and environmental shocks, 38 million people practice open defecation, one in four primary-age school children are not in schools and thirty-three percent under-five children are stunted – a chronic state of

malnutrition rooted in intergenerational malnutrition (UNICEF, 2023). Despite these challenges, some progress have been made – mortality rate among under-five children reduced from 120 (2016) to 102 per 1000 live births in 2021; the presence of a skilled birth attendant at birth increased to 56 percent from 43 % in 2016; access to improved drinking water increase to 76 % and the use of improved sanitation facilities increased from 36 percent in 2016 to 56 percent in 2021 (UNICEF, 2023).

Moreover, the National Food Consumption and Micronutrient Survey reported high levels of micronutrient deficiency among the population, that is, women of childbearing age, adolescent girls, and children under-five years of age. However, among children under-five, the levels of micronutrient deficiency was based on factors such as age (vitamin A deficiency was highest among 36 – 47 months old: 34%), sex (higher among males: 34%), residence (higher among children residing in rural areas), and highest among children whose caregivers had little or no education (UNICEF, 2024b).

Figure 1.1 Trends of Malnutrition in Nigeria - NNHS 2018



GAM – Global Acute Malnutrition
MUAC – Mid-Upper Arm Circumference
WHZ – Weight-for-Z scores

1.3 Nutrition Policy in Nigeria

The United States National Library of Medicine defines nutrition policy as "governmental guidelines and objectives pertaining to public food supply and nutrition; including recommendations for healthy diet, and changes in food habits to ensure healthy diet"(Ecker & Nene, 2012). A policy should provide guidance in: 1) identifying a problem and showing plans to address the problem; 2) clearly showing how the plans will be implemented and the expected outcome; 3) identifying the responsibilities and responsible persons for ensuring that the specific activities planned are carried out successfully (Ecker & Nene, 2012). In Nigeria, while there were more than ten policies with a focus on nutrition, the policies focus areas span from undernutrition, and micronutrient deficiencies to non-communicable diseases including overweight and health. Some nutrition-specific policies in Nigeria are: National Policy on Food and Nutrition within which we have Integrated Management of Acute Malnutrition policy; Policy Guidelines on Micronutrient Deficiency and Control; Maternal, Infant and Young Child Nutrition (The Baby Friendly Initiative policy is embedded here – discussed in Chapter 3 of this thesis). For Nutrition-sensitive policies, there are health and agriculture focused policies within which is the National Agriculture Technology Innovation Policy – discussed further in Chapter 2 of this thesis. The policies highlighted causes of nutrition problems to be poor diet, inadequate infant and young child feeding practices, social norms, inadequate health/nutrition services, limited physical and financial access to care, and insurgencies in parts of the country. Whereas the

consequences include mortality, morbidity, reduced economic, social, and cognitive development, and poor educational attainment (Vanderkooy et al., 2019).

Studies show that nutrition interventions are more effective when backed by nutrition-sensitive economic and social policies (Ecker & Nene, 2012). Many economic and social nutrition policies in Nigeria have a target to mitigate malnutrition. However, studies have reported ineffectiveness of these policies [that is the goals were not achieved]; incoherence between policies and interventions [that is, the population that received intervention was different from the target population when the policies were made (Onwujekwe et al., 2021; Vanderkooy et al., 2019). It is important to address the root causes of malnutrition in Nigeria so as to achieve a sustainable reduction in malnutrition (Ecker & Nene, 2012).

1.4 Food Innovation in Mitigating Micronutrient Malnutrition

Food innovation is the process of bringing new or pre-existing food into use for the first time, or in a specific context to enhance resilience to environmental shocks, effectiveness and contribute to food and nutrition security (FAO, 2018). Biofortification on the other hand is "the enhancement of micronutrient levels of staple crops through biological processes such as plant breeding and genetic engineering" (Kolapo & Kolapo, 2021). Biofortification of staple crops represents a major food innovation strategy to tackle the problem of some micronutrient deficiency and enhance the availability of vitamins and minerals (such as vitamin A, zinc, and iron) for people whose diets are dominated by less-dense nutrient food (Meenakshi et al., 2010). Micronutrient malnutrition is otherwise called hidden hunger because when essential vitamins and minerals are not adequately consumed over a long period, it is not easily noticed until the level of deficiency reaches a great depth, then some manifestations are seen such as reduced cognitive development, poor skin integrity, reduced vision, increased susceptibility to infection

to mention a few (Nair et al., 2015; UNICEF, 2024b). Food-based strategies such as food fortification, diet diversification and micronutrient supplementation have also been utilized to mitigate malnutrition, including micronutrient malnutrition in Nigeria (Bourassa et al., 2023; Nair et al., 2015). These food-based approaches are promoted because it is not possible to obtain all the nutrients required for adequate nutrition from one food group (Bourassa et al., 2023; Nair et al., 2015; Osendarp et al., 2018; Tam et al., 2020).

Innovative food-based approaches (that is, biofortification) is a preventive and therapeutic nutrition-specific intervention, targeting livelihoods, and can also potentially prevent and mitigate micronutrient malnutrition (Nankumbi et al., 2023).Biofortification in Nigeria began in 2011. Cassava was selected as the foremost crop, as it presented a feasible means for vitamin A delivery partly by reason of its well-known carotenoid content (Kolapo & Kolapo, 2021). In Nigeria, cassava, maize, sweet potato and sorghum are among the foods that have been biofortified using conventional methods. Cassava, maize and sweet potato were biofortified with beta-carotene and are known as vitamin A cassava, vitamin A maize, and orange-fleshed sweet potato. Cassava and sorghum were biofortified with iron (CGIAR, 2021). Biofortification in Nigeria was introduced by Harvest Plus in 2011; hence, it is more than a decade. Whilst there have been reports of small holder farmers planting the crop across the Nation, studies have also recorded some challenges that have been identified (Nc et al., 2017). Distribution of the product across the nation, and among farmers have not been very convenient, retention and bioavailability of nutrients have been a concern, especially with the traditional practice of displaying products in the sun in local markets. Consumer acceptability has also posed some challenges as there is reluctance among Nigerian consumers due to difference in characteristics from traditional varieties (Phorbee et al., 2023). Governmental registration was also identified as

a challenge. New and proper regulatory procedures have not been established. Unintended long-term consequences of growing and consuming biofortified foods is not yet properly investigated in Nigeria (Nc et al., 2017).

1.5 Baby Friendly Initiatives

The Baby-friendly Initiative is a key policy within the Maternal, Infant and Young Child Nutrition. In 1991, Nigeria launched the Baby Friendly Hospital Initiative (BFHI) in response to the 1990 Innocenti Declaration by the World Health Organization and United Nations Children's Fund: for the protection, promotion, and support of breastfeeding (Walsh et al., 2023). BFHI includes ten steps to successful breastfeeding, with specific interventions that facilities providing maternity and newborn services should implement to support breastfeeding (Pound et al., 2012; UNICEF, 2005). The ten steps are as follows:

Table 1.1 Integrated 10 Steps Practice Outcome Indicators for Baby Friendly Initiatives – Pound et al, 2012

Step 1:	Have a written breastfeeding policy that is routinely communicated to all health care providers and volunteers.
Step 2:	Ensure all health care providers have the knowledge and skills necessary to implement the breastfeeding policy.
Step 3:	Inform pregnant women and their families about the importance and process of breastfeeding.
Step 4:	Place babies in uninterrupted skin-to-skin contact with their mothers immediately following birth, for at least an hour, or until completion of the first feeding, or as long as the mother wishes. Encourage mothers to recognize when their babies are ready to feed,

	offering help as needed.
Step 5:	Assist mothers to breastfeed and maintain lactation, should they face challenges including separation from their infants.
Step 6:	Support mothers to exclusively breastfeed for the first six months, unless supplements are medically indicated.
Step 7:	Facilitate 24-hour rooming-in for all mother-infant dyads: mothers and infants remain together.
Step 8:	Encourage baby-led or cue-based breastfeeding. Encourage sustained breastfeeding beyond six months with appropriate introduction of complementary foods.
Step 9:	Support mothers to feed and care for their breastfeeding babies, without the use of artificial teats or pacifiers (dummies or soothers).
Step 10:	Provide a seamless transition among the services provided by the hospital, community health services and peer support programs. Apply principles of primary health care, and population health to support the continuum of care, and implement strategies that affect the broad determinations that will improve breastfeeding outcomes.

Breastmilk is the recommended essential and adequate source of food for infants in their first four - six months of life (WHO & UNICEF, 2023; World Health Organization, 2017). According to the Lancet series on Breastfeeding (2023), human infants and young children are most likely to survive, grow and develop to their full potential when breastfed (Pérez-Escamilla et al., 2023).

Recent scientific evidence show that the rate of breastfeeding have increased globally: forty-six percent of newborns initiated breastfeeding within one hour of birth and 48% of infants less than six months were breastfed exclusively in 2022 (UNICEF & World Health Organization, 2023). Breastfeeding has also been shown to be a double-duty action according to the World Health Organization, because when properly practiced, breastfeeding provides adequate nutrition for the young infant and supplements for the older infant, while it also may reduce the propensity of mother to develop obesity in later life (Hawkes et al., 2017; Victora et al., 2016; World Health Organization, 2017). Additionally, breastmilk transmits antibodies from the mother to her infant and protects the children, especially newborns from gastrointestinal infections; children and adolescents who are breastfed are less likely to be overweight or obese and they score higher on intelligent tests. Furthermore, mothers who breastfeed longer have reduces risk of ovarian or breast cancer; and it lowers the rate of type two diabetes (ACOG, 2020; WHO & UNICEF, 2023).

An estimated 341.3 billion US dollars per year is lost globally from unrealized benefits to health and human development, because of inadequate investment in protecting, promoting, and supporting breastfeeding (Pérez-Escamilla et al., 2023). According to the Lancet series (2016), the Code for marketing breastmilk substitutes in Nigeria was last updated in 2005 and enforcement has been weak. Health-worker training on breastfeeding practices has not been comprehensive, a media campaign has not been implemented, and the strategic use of advocacy for policy change has been absent. Furthermore, implementation of the Baby Friendly Hospital Initiative has slowed because of a shortage of funding. Whereas the retail value of the milk formula market in 2021 was projected to reach US$42·8 million, or 0·06% of the global market (the 58th largest consumer worldwide) (N. C. Rollins et al., 2016).

Although nearly all countries have maternity protection legislation, hundreds of millions of working women have no, or inadequate maternity protection, the overwhelming majority (80%) of whom live in Africa and Asia. For instance: Bangladesh has 6 months, while Nigeria has only 16 weeks. The reduction of barriers for working mothers to breastfeed by providing lactation rooms and nursing breaks are low-cost interventions that can reduce absenteeism [from work] and improve workforce performance, commitment, and retention. Enabling interventions operate by removing structural and societal barriers that interfere with women's ability to breastfeed optimally. Examples include maternity and workplace policies, or regulations to restrict marketing of breastmilk substitutes; health insurance, or other financing mechanisms for lactation support; and baby-friendly hospital certification (Baker et al., 2023; Pérez-Escamilla et al., 2023; N. C. Rollins et al., 2016).

1.6 Thesis design

This thesis is a cross-sectional qualitative study design in which primary and secondary data were utilized. Three papers were written in this thesis. The first paper is a document review (secondary data) in which policy documents currently being used in Nigeria were reviewed and gaps were identified. The other two papers utilized primary data: 1] data was collected utilizing in-depth interviews; 2] data was collected utilizing focus group discussions. For the policy document review paper, there were more than ten policies with a focus on nutrition, but we only focused on one document and used the remaining policy documents as background to understand the discourse used in the chosen document.

1.7 Rationale, Thesis aim, objectives and research questions

National Food and Nutrition Policy (NFPN) is a document that provides the framework for addressing the problems of food and nutrition insecurity in Nigeria, encompassing the individual,

household, community and nationwide. My thesis assessed two focus areas of the National Food and Nutrition Policy in Nigeria namely: Maternal, Infant and Young Child Nutrition, and Micronutrient Deficiency and Control; and their impacts on malnutrition in Ebonyi and Anambra States, Nigeria.

Reviews of policy documents showed that there was incoherence between policies and interventions. They also identified some causes of nutrition problems to include poor diet, inadequate infant and young child feeding practices, social norms, insufficient health/nutrition services, limited physical and financial access to care, and insurgencies in parts of the country resulting in mortality, morbidity, reduced economic, social, and cognitive development, and poor educational attainment (Vanderkooy et al., 2019).

The Nigerian government plays a crucial role in supporting and promoting healthy food environments towards the eradication of all forms of malnutrition. For instance, government should have the mandate for enforcing the policies on establishments, companies, corporations, or government entities, not on lay people. However, government action to date remains slow, inadequate, and uneven, especially in LMICs (Barlow & Thow, 2021). Whilst there have been many nutrition policies in Nigeria that aligns with the Millenium goals and Sustainable Development goals, the prevalence of malnutrition in Nigeria remains unacceptably high. This may be due to policy instability [policy changing with governing power], poor political commitment, and not targeting the interventions toward residents in the grassroot areas who require it the most (Akinyele, 2012; Baker et al., 2018; Barlow & Thow, 2021; Vanderkooy et al., 2019). There remains a need to identify the reason(s) for ineffective nutrition interventions and policies.

Moreover, information about impacts of nutrition-sensitive policies, and the sequential interventions or programmes have historically been driven by health indicators and performance measures (Vanderkooy et al., 2019), without considering the experiences of the beneficiaries of these interventions. This is a significant gap in research that needs to be filled. When the perception, opinions and experiences of the beneficiaries are sought, it will help to inform policies, improve impacts, and engender sustainable use of the interventions (Udenigwe et al., 2022). This thesis aims to bridge this gap by exploring the experiences of household members regarding food environments, and the perspectives of policymakers as it pertains to Baby Friendly Initiatives and consumption of biofortified foods to curb malnutrition.

Overall thesis objectives were to:

[1] Analyze words in context in a selected policy document that may prevent or enhance the full implementation of the policies over the next five years.

[2] Understand household members experiences with the food environment in selected communities in Anambra and Ebonyi, Nigeria.

[3] Examine the perspectives of key informants – policy makers and implementers – regarding biofortified foods, and Baby Friendly Initiatives.

My research questions are:

[1] What are the experiences of household members regarding the food environment in selected communities in Anambra and Ebonyi, Nigeria

[2] What are the perspectives of key informants – policymakers – regarding biofortified foods and Baby Friendly Initiatives in Nigeria.

Hypothesis

This research was centered around the hypothesis that analysis of the policy document, and results obtained from the in-depth interview and focus group discussions will enhance implementation of the policies towards mitigating micronutrient malnutrition in Nigeria.

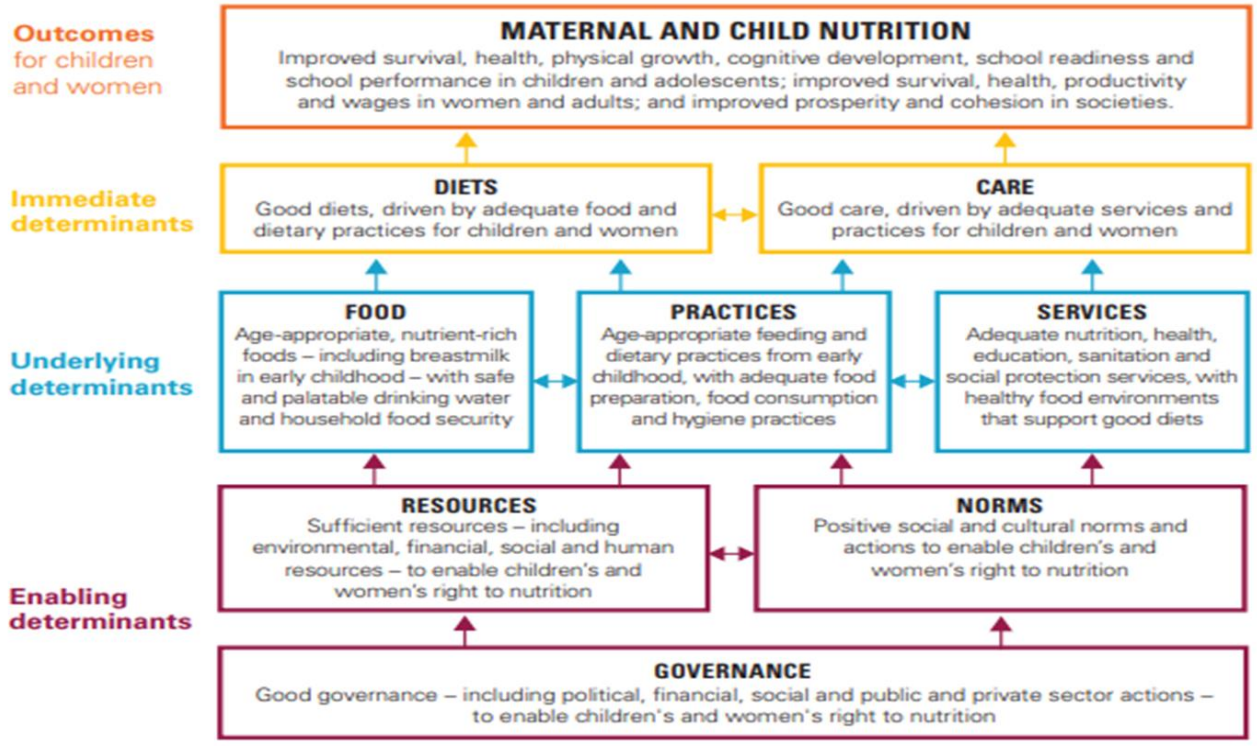
1.8 Theoretical Framework

This study is informed by UNICEF Conceptual Framework on Determinants of Maternal and Child Nutrition (2020) which describes a holistic approach to mitigating malnutrition and improving maternal and child nutrition within the population. This framework identifies determinants of maternal and child nutrition. It acknowledges that the triple burden of malnutrition – undernutrition, micronutrient deficiencies and overweight – are increasing and highlights the role of diets and care as immediate determinants of maternal and child nutrition. It uses a positive narrative about what contributes to good nutrition in children and women. Positive narrative here focuses on emphasizing what is done correctly or what right steps to take to enhance adequate nutrition of mothers and children. It also provides conceptual clarity on the interconnectedness among determinants of adequate nutrition, positive survival, growth, development, learning, economic and social outcomes resulting from improved maternal and child nutrition.

The framework identifies three levels of determinants of adequate nutrition of a population: *1] enabling determinants, 2] underlying determinants, and 3] immediate determinants*; and finally identifies the outcomes in childhood, adolescence, adulthood and societies at large. **Enabling** determinants focuses on good governance, resources, and norms. Good governance encompasses political, financial, social, public, and private sector actions, that enhance children's and women's right to nutrition. Resources include environmental, social, financial, and human resources necessary to enable adequate nutrition of mother and child. Norms include positive-

social and cultural norms, and actions that will encourage, or enable proper nutrition of women and children. The **underlying** determinants focus on age-appropriate foods, practices, and services. Age-appropriate nutritious food for children is breastmilk in early childhood, adequate nutritious complementary foods for the older infant along with breastfeeding, healthy diets through childhood and adolescence to obtain household food security. Practices as a construct focused on age-appropriate feeding practices including adequate food preparation, consumption, and hygiene practices. Services include health and nutrition education, sanitation, social protection services, healthy food environments to support good diets, and adequate nutrition. **Immediate** determinants focus on healthy diets and proper caregiving practices to engender healthy mental and emotional growth and development (UNICEF, 2021). This thesis will examine the constructs mentioned in the framework to assess participants' experiences in a retrospective way.

Figure 1.2. UNICEF Conceptual Framework on Determinants of Maternal and Child Nutrition - UNICEF 2021



UNICEF Conceptual Framework on the Determinants of Maternal and Child Nutrition, 2020.
A framework for the prevention of malnutrition in all its forms.

1.9 Methods

The methods are qualitative research methods. Phenomenological methods of qualitative research strategy were adopted in this thesis (Harris et al., 2009). Phenomenology attempts to understand people's emotions, attitudes, thoughts, meanings, perceptions, and bodily experiences as or after they have experienced the phenomenon (Harris et al., 2009). The phenomenon that we are considering here are the nutrition interventions that our participants have been exposed to; which is related to the implementation of nutrition policies and programs in their respective communities.

Firstly, a document review of Agri-innovation technology policy document in Nigeria, was analyzed utilizing the Critical Discourse Analysis methodology. Secondly, an in-depth interview with identified stakeholders, (policymakers of nutrition policy in Ebonyi state, Nigeria) was carried out to understand their perspectives with nutrition policies. Finally, we carried out a focus group discussion with members of the public (mothers and fathers of children under-five), who reside in three communities in Anambra and Ebonyi states, to examine their personal experiences with the food environment in their communities.

***Critical Discourse Analysis (CDA*)** is studying social phenomena which are necessarily complex and require a multidisciplinary and multi-methodical approach. The "critical" in critical discourse analysis does not mean 'negative' as in the commonsense usage. However, it does mean challenging the social phenomenon and not taking it for granted (Wodak & Meyer, 2009). "Critical implies specific ethical standards: an intention of researchers to make their position, research interests and values explicit and their criteria as transparent as possible; without feeling the need to apologize for the critical stance of their work (Wodak & Meyer, 2009). 'Discourse' in simple terms means 'language.' It means a policy, in a restricted or broad sense of the term, it means a narrative, text, talk, or topic related conversation (Wodak & Meyer, 2008, 2009). CDA sees language as social practice that is dependent on social structures and emphasizes the need for interdisciplinary work to gain a proper understanding of how language functions in constituting and transmitting knowledge, in organizing social institutions, or in exercising power (Mullet, 2018; Wodak & Meyer, 2009).

Fairclough defined ideology as representations of aspects of the world which contribute to establishing and maintaining relations of power, domination, and exploitation. Analysis of text is an important aspect of ideological analysis and critique (Pujolar, 2006). "Power" is central for

CDA as it often analyses the language use of those in power, who are responsible for the existence of inequalities. Therefore, CDA can be defined as being interested in analyzing opaque and transparent structural relationships of dominance, discrimination, power, and control manifested in language. In other words, CDA aims to investigate critically social inequality as it is expressed by language use (Wodak & Meyer, 2009).

In the analysis of NATIP we utilized two schools of thought in utilizing CDA as a methodology: Cummings et al., 2020; and Fairclough. This was further discussed in chapter two (paper one).

In-Depth Interviews (IDI) – Interviews are conducted with individuals, usually one-on-one. In-depth interviews involve asking an individual questions to explore an issue or a phenomenon, and follow-up questions are asked based on the answers provided by each participant (Harris et al., 2009). IDI has been considered to be the gold standard for qualitative research because data obtained are less biased, they are detailed, comprehensive and representative of the phenomenon being studied (Harris et al., 2009)**.** Key-informants who were policymakers and implementers, especially those who play a significant role in making and implementing nutrition-sensitive and nutrition-specific policies in Ebonyi state were target participants for in-depth interviews in this study and were identified through the help of our collaborator (CE) at Alex Ekwueme Federal University Ndufu-Alike Ikwo, Ebonyi State. C.E discussed with each of them, providing details about the study, after which, if they decided they were willing to participate, a time for the interview was scheduled and consent to share their contact with me (OI) was obtained. OI contacted them directly via telephone call to confirm the time of the interview, as well as to obtain verbal consent to participate in the study. Notes were taken as much as possible, because the interviews were not recorded, this was to avoid the possibility of fear of reprisal due to the current political environment in the country.

The in-depth interview guide for Policymakers and implementers included open-ended questions designed to evoke rich descriptions of policymakers' perspectives on the Baby Friendly Initiatives, and their thoughts regarding enriched foods, including fortified and biofortified foods. I designed the questions with reference to existing literature and covered topics related to policies or regulations in place to facilitate the Baby Friendly Initiatives, promote continuation of breastfeeding by working mothers, protect and promote breastfeeding at workplaces, institutionalize six months maternity leave, and encourage the consumption of enriched food to curb micronutrient deficiency (Phorbee et al., 2022; N. C. Rollins et al., 2016). I carefully constructed the questions to include neutral, non-biased, and non-leading questions to avoid influencing participant responses.

Focus Group Discussions (FGD) – Focus groups are useful for understanding meanings that individuals ascribe to interventions and programs they utilize or issues that concerns them, and it fosters participants learning from others in the group and sharing ideas and concerns. Interactions and group dynamics are essential to widen range of responses, activate forgotten details and release inhibitions (Harris et al., 2009).

The Research Assistants, under the guidance of our collaborator CE, facilitated the focus group discussions with mothers and fathers (in separate focus group discussions), to explore their experiences with respect to the food environment at the household level. These discussions highlighted any concerns regarding breastfeeding, infant and young child feeding, types of foods consumed, their awareness of, and consumption of any fortified or biofortified foods.

I designed qualitative FGD guides to capture contextual information related to the topic and elicit detailed discussions from women and men regarding their opinions and lived experiences as it

relates to food environment at the household level. Questions were designed with reference to the UNICEF conceptual framework which was used as the theoretical framework for this study as it describes enabling determinants, underlying determinants, and immediate determinants of maternal and child nutrition. Questions were carefully crafted to include neutral, non-biased, and non-leading questions to avoid influencing participant responses. FGD guides were modified where appropriate to suit the local language, literacy levels and cultural interpretations of participants (considering we examined urban and rural residents).

Chapter 2. Paper 1: Critical Discourse Analysis of Agri-Innovation Policy and its Impact on Food and Nutrition Security in Nigeria

2.0 Abstract

The Sustainable Development Goals (SDGs) seek to achieve sustainable food security, amongst other goals, by 2030 and many member nations are working towards achieving these goals by enacting policies that align with the goals. Nigeria, a low-and middle-income country in sub-Saharan Africa, aims to achieve sustainable food security by utilizing Agri-innovation policies. The National Agricultural Technology Innovation Policy (NATIP) is a 5-year (2022-2027) agricultural innovation policy of Nigeria, which includes strategies aimed at achieving sustainable development to increase food productivity using technology and innovation. Critical discourse analysis, a qualitative method of research that looks at how language can shape events, processes or people, was used to analyze text and discourse used in the policy document. We analyzed the text at individual levels, interpreted the discourse used and explained the social practice as it applies to the Nigerian context. Power imbalances and ideologies were discovered in themes and texts used. These were highlighted as potential barriers. We also identified some positive aspects of the policy that we named potential enablers to positive policy outcome. Altogether, we aimed at creating a new discourse by offering possible recommendations to enhance positive policy implementation.

Keywords: Agri-innovation, policy, food security, SDGs, Nigeria, critical discourse analysis

2.1 Introduction

The Sustainable Development Goals (SDGs) seeks to achieve a world where there is equitable and universal access to quality education; healthcare; social protection; safe drinking water; safe, sufficient, and nutritious food, and the environment is safe, resilient, and sustainable by 2030

(United Nations, 2015). Many countries adopted the goals and are enacting strategic policies to enable implementation of these goals in their respective countries (United Nations, 2015). Nigeria, like many other low- and middle-income countries (LMICs), enacted policies that align with SDGs 2 and 3, with the goals "to end hunger in all its forms" and "to improve the health and wellbeing of women of childbearing age, children, and adolescent girls", respectively (FMARD, 2022). In this paper, we aim to utilize critical discourse analysis (CDA) to identify patterns and themes, or language used in the policy document released by the government of Nigeria in coherent with the SDG goals.

2.2 SDGs and the need for Agriculture Innovation

SDG target 2.3 emphasizes doubling agriculture productivity and income of small-scale farmers through secure and equal access to land and other resources. These resources are non-farm employment, knowledge, financial services, value addition opportunities – for women, family farmers, indigenous farmers, pastoralists, and fishermen (United Nations, 2015). Farmers are an important cornerstone of food systems (OECD, 2021b). Family farmers manage about 90% of the world's farms while producing over 80% of the world's food; paradoxically, they are often poor and food insecure themselves (FAO, 2018). Agriculture productivity growth is essential to meet the rising demand for food sustainability and to generate income growth especially for family or small-scale farmers (OECD, 2021b).

The SDG target 2.4 aims to ensure a sustainable food production system and implement resilient agricultural practices. Such practices will increase production, maintain ecosystem, strengthen capacity for adaptation to climate change (extreme weather, drought, flooding, and other disasters), and progressively improve land and soil quality (United Nations, 2015). A resilient

agricultural system is one that absorbs the impact of adverse events (e.g., climate change), recovers from them, adapts, and transforms in response to new uncertainties (OECD, 2021b).

Agricultural innovation is the process of bringing new or existing products into use for the first time in a specific context to increase effectiveness, competitiveness, and resilience (FAO, 2018). Innovation is a complex process; however, it is fundamental to supporting family farmers, revitalizing rural areas, creating attractive job opportunities for youth and women, and bringing prosperity to communities (FAO, 2018). The goal of agricultural innovation is to achieve environmental sustainability, and contribute to food and nutrition security, economic development, and sustainable natural resource management (FAO, 2018). Hence, agricultural innovation is central to achieving sustainable food systems, towards ending hunger and improving nutrition outcomes (Nguyen & Neven, 2018). While actions to innovate agriculture are necessary to increase agricultural productivity, resources must be optimized locally to achieve sustainable food systems in different countries.

2.3 Nigeria and The National Agricultural Technology Innovation Policy

In Nigeria, agriculture is the mainstay of the economy (Akinyele, 2012). Agricultural sector contributed about 30% to Nigeria's GDP in the third quarter of 2021 and 34.6% of total employment in 2020 (FMARD, 2022). Agriculture provides employment for over 90% of rural dwellers, who constitute about 70% of the total population. Nigeria's strengths in this area include abundant arable land, labor, forestry, climate and water bodies (Akinyele, 2012). Agriculture is essential in fostering sustainable inclusive economic growth, particularly the provision of food, raw materials, income for farmers, employment, and as a source of foreign exchange (FMARD, 2022). In alignment to the sustainable development goals, Nigeria enacted agriculture innovation policies.

The National Agricultural Technology Innovation Policy (NATIP) is a 5-year (2022-2027) agricultural innovation policy of Nigeria. The mandate of the policy is to ensure food security in crop, livestock, and fisheries; generate agricultural employment and services; promote production and supply of raw materials for agro-industries; provide markets for the products; generate foreign exchange and promote rural socio-economic development (FMARD, 2022). The Federal Ministry of Agriculture and Rural Development is responsible for implementation of the policy nationwide. This policy includes strategies aimed at achieving sustainable development to increase food productivity using technology and innovation. FMARD worked with multi-sectoral stakeholders in the Nigeria's agriculture and allied services sector to develop the NATIP. The policy adopted short-term and medium-term multi-stakeholder approaches towards ensuring resilience, recovery, and growth, with the objectives to achieve: (1) a shift from subsistence farming to modern agriculture capable of ensuring national food security; and (2) contribute significantly to the national economic diversification drive and create at least 12 million jobs (FMARD, 2022). NATIP replaced the Agricultural Promotion Policy, which ended in 2020. Drawing from the National Development Plan (2021-2025), SDGs, and other global and regional frameworks, NATIP adopted a 5-year time frame to generate thrust and capabilities, as well as public and private sector investments for successful implementation and future development of agriculture.

The ten specific interventions of NATIP include synergy and ministry department and agency alignment; knowledge translation and transfer; rapid mechanization; establishment of agriculture development fund; revitalization of extension service delivery; fisheries, aquaculture, marine and inland fisheries development; livestock development; market development; strengthening value chains; and partnerships. The cross-cutting interventions include development of rural

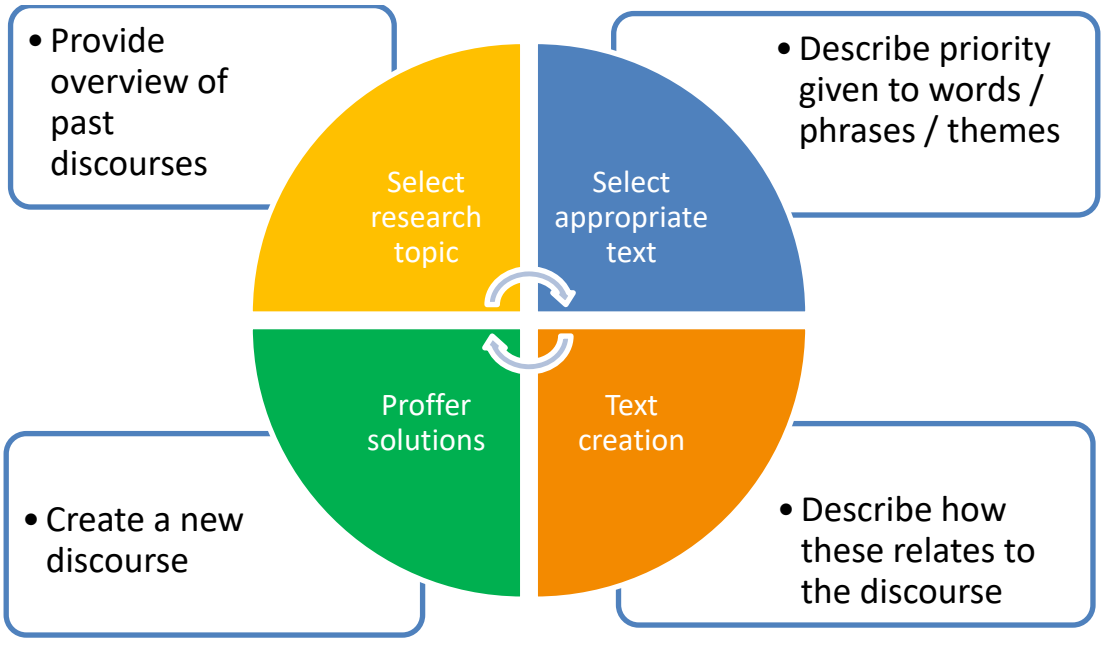
infrastructure; nutrition; standardization of exports; promoting digital and climate-smart agriculture; data information management; and access to quality agricultural input. NATIP is designed for food security, job and wealth creation, and is expected to leverage other policies, strategies, and programs in the agricultural sector. (FMARD, 2022). However, previous policies, programs, and projects have not achieved food security in Nigeria. The sector still grapples with numerous challenges including limited awareness and adoption of productivity-enhancing technology; low agricultural productivity and value addition mainly due to inadequate research; innovation and extension; low-quality inputs, limited access to finance and markets; widespread insecurity of agricultural land and investments; and institutional bottlenecks and weak policy implementation (FMARD, 2022).

Agricultural innovation can be utilized in promoting food security. However, the sustainability of this approach in LMICs including Nigeria remains uncertain. Furthermore, there is vast literature on policies and interventions targeted at curbing malnutrition in Nigeria, yet there is persistent high levels of chronic malnutrition among the vulnerable population in Nigeria (NNHS, 2018). This could be because of political instability; incoherence between policies and interventions; internal conflicts; interventions not being targeted to the grassroot where it is needed the most; and poor political commitment (Baker et al., 2018; Barlow & Thow, 2021); In addition, government action in many LMICs including Nigeria remains slow, inadequate, and uneven (WHO, 2020). Therefore, there is a need for critical studies to identify potential reasons for ineffective interventions and policies in specific contexts. The objective of this study was to use critical discourse analysis to identify discourses or factors that could influence the implementation of the agricultural technology and innovation policy (NATIP) in Nigeria.

2.4 Methodology

The analysis draws on tools and concepts of CDA to analyze NATIP. CDA is a form of qualitative critical linguistic analysis interested in how language can shape events, processes, and persons; and how these are represented in ways that serve particular ideological aims (Chen & Eriksson, 2022; Fairclough, 1992). In this study, the Cummings *et al.*, 4-Phase guidelines on using CDA to analyze policy documents were adopted (Cummings et al., 2020): *1) selection of research topic and providing an overview of past discourses; 2)selection of text appropriate to the object of the research and analysis of text at the level of individual words and phrases, how these words and phrases relate to each other in the test and the priority given to different themes; 3) description of how the text was created and how these relates to the discourses; 4) possible solutions to address the dominant discourse in terms of creating a new discourse.*

Figure 2.1 Cummings et al 2020 4-Phase model



In addition, Fairclough's 3-dimentional model of critical discourse analysis (Hoepfner, 2006) which entails: *1) text analysis or description; 2) discursive practice or interpretation and 3) social practice or explanation;* was utilized to enhance the analysis of the discourses identified in the policy document. (Hoepfner, 2006). The NATIP document was selected for review due to prior knowledge of the authors and a relevant research topic was selected. Then related discourses such as the SDG goals, and additional discourse about the state of Nutrition in Nigeria were obtained from 1. National Policy on Food and Nutrition document, 2. Integrated Management of Acute Malnutrition, and 3. Policy Guidelines on Micronutrient Deficiency and Control document for overview. Text appropriate to the object of research were selected for analysis. Some texts were already given priority in the NATIP document, other texts were created mainly in response to overview of related discourses and the adoption of the SDGs adopted by member states. One of the principles of CDA is its semiotic aspect which is a form of critical social science geared towards better understanding of the nature and sources of social wrongs, the obstacles to addressing them, and possible ways of overcoming those obstacles (Fairclough, 2012). Text analysis involved description of the individual words and phrases for the relationship and to identify power imbalances and priorities given to each theme. Interpretation of the themes (discursive practice) was done by reading other published literature; and explanation of the social practices was done similarly by considering published literature and how it applied to the Nigerian context. Where social wrongs or inequalities were identified, possible ways to overcome these were proffered. The results were presented in relation to the themes in the document and those created during the analysis process.

2.5 Results and Discussion

Taking a closer look at the concept of the policy documents (Cummings et al., 2020), it was discovered that there were power imbalances, inequalities, in the use of language in the policy document(s) and there have been inaccuracies or ideologies perpetuated through words which have been shown to be common with policies (Barlow & Thow, 2021; Mullet, 2018). The text and process analysis of key policy actions and intervention in the National Agricultural Technology Innovation Policy document revealed the following discourses as shown in Table 2.1.

Table 2.1 Specific Themes Identified in NATIP Policy Document

Themes	Discourse
The food system.	'To reverse the high prevalence of malnutrition in the country, measures will be taken to help transform the food systems,…'
Value chain	'Enhancing value-chains for improved nutrition'
Food diversification	'Diversify household food production and consumption'
Gender dimensions of nutrition	"Targeting women"
Responsibilization	Build resilience and social protection nets through food and nutrition systems for vulnerable groups'
Farm production	Mobilizing farmers to participate in the production of farm produce... '
Livestock production	'Facilitating the establishment of livestock centers and community-based shared livestock production and processing facilities.'
Seed sovereignty	'Promoting the adoption of certified seeds and Good Agronomic Practices (GAP)'

The Food System

First, there was a prevalent theme around the food system. The policy stated that "*to reverse the high prevalence of malnutrition and stunting (height-for-age z-score of children <5 years) in the*

country, measures will be taken to help transform the food systems, such as supporting mass media campaigns, social marketing campaigns, encouraging healthy eating at home and in schools as well as massive awareness creation on backyard sources of nutrition, especially in rural communities". Food systems refer to all the elements and activities related to producing and consuming food, and their effects on the economy, health and environment (OECD, 2021a b). The United Nations' Food and Agricultural Organization defined sustainable food system as one that delivers food security and nutrition for all without compromising the ability to generate food security and nutrition for future generations. Which means that it is profitable with economic sustainability, it has broad-based benefits for the society and has positive or neutral effect on the natural environment (Nguyen & Neven, 2018).

In general, measures have been taken to transform the food system. One of such measures is biofortification of staple crops like cassava in Nigeria (Kolapo & Kolapo, 2021). Biofortification of staple crops represents a major strategy to tackle the problem of micronutrient deficiency and enhance the availability of vitamins and minerals for people whose diets are dominated by less dense nutrient food (Meenakshi et al., 2010). Other measures include short-term supplementation, medium-term food fortification, and a long-term focus on dietary diversification (Nair et al., 2015). Supplementation is an effective short-term solution for preventing and addressing micronutrient deficiencies in specific at-risk groups (Bailey et al., 2015; Tam et al., 2020). Food fortification is the recommended strategy for increasing the dietary intake of certain micronutrients in the general population and may be particularly successful if mandated by the government with support from food industry (Bailey et al., 2015; Tam et al., 2020).

Social media and mass media campaigns are necessary in creating awareness to improve consumption of these crops. Targeted nutrition education can be incorporated in food-based programs to increase community knowledge on ways to improve health outcomes, including bioavailability and absorption of vitamin A from plant sources (Nair et al., 2015; Ruel & Levin, 2001). Education can include preparation methods that allow the addition of fat to increase bioavailability of vitamin A which is fat soluble and can be stored in the body (Nankumbi et al., 2023). On massive awareness creation of backyard farming in rural communities, studies have shown the effectiveness of home gardening interventions, especially when combined with promotional and education interventions, to improve vitamin A intake and nutrition. A review by Ruel & Levin (Ruel & Levin, 2001) also suggests a positive impact of interventions to promote small animal husbandry and fishponds, or increased intake of cheap sources of animal products for the control of iron deficiency.

Value Chain

A second theme in the policy document focused on value chains with the goal of "*Enhancing value-chains for improved nutrition*". A value chain is a series of consecutive steps that go into the creation of a finished product from its initial design to its arrival at the customers door (Tardi, 2022). Improving nutritional outcomes requires consideration in the way that food is produced, processed, distributed, marketed, and consumed; a process usually referred to as "Nutrition-sensitive value chain." (FAO, 2017a) Nutrition sensitive value chains leverage opportunities to enhance supply and /or demand for nutritious food, as well as add both economic value and nutritional value; or minimize food and nutrient loss at each step of the chain, thereby improving the availability, affordability, quality, and acceptability of nutritious foods (FAO, 2017a; Nutrition-Sensitive Value Chain - NSVC, 2022).

The approach to enhance value-chains to improve nutrition (FMARD, 2022) is therefore validated. However, the steps involved in this are not clearly stated. The policy states that attention would be given to value-chain development of maize, sorghum, rice, wheat, cassava, sesame, tomatoes, yam, cowpea, soybeans, cocoa, palm-oil, hibiscus, cashew, potatoes, cotton, ginger, groundnut, and sugarcane (FMARD, 2022). Nutrition-sensitive approaches to value chain development have emerged as a promising way to shape food systems for improved food security and nutrition outcomes (FAO, 2017a).

"*Improving food safety along the value chain*" is an important step going forward. Producers, processors and consumers have specific and different roles to play, likewise the government enforces compliance with legislative rules in place. Safe food is free from hazards, which are any biological, chemical, or physical agent in food with the potential to cause an adverse effect (FAO, 2017b b). For producers: many food safety risks–including harmful pathogens, pesticide residues, and mycotoxins–are introduced at the farm level. Such practices as the handling of farm animals, and their waste are major sources of microbiological hazards. The use of untreated household and commercial wastewater in agriculture,, is also a source of contamination (Hoffmann et al., 2019).

Food Diversification

The policy document analysis revealed a third theme of food diversification. This was brought to the forefront through measures to "*Diversify household food production and consumption*". Diversification approaches aim to increase availability and affordability of diverse foods (FAO, 2017b b). Diversification can take the form of improved agricultural production; development of vegetable plots; a good variety of foodstuffs; sound preparation methods within families; or multisector nutrition advice and training in schools. Globally, evidence supports dietary

diversification for optimal nutrition and health (Broga, 2017; Otunchieva et al., 2022; Scott, 2017).

Dietary diversification refers to the number of food groups consumed by an individual or a household over a reference period. It is usually calculated by using a recall method and counting the number of unique food groups consumed; hence, a higher score indicates better diversity and signifies adequate consumption of essential nutrients. Consumption of diverse diets is central to achieving and preserving nutrient adequacy throughout the life course (Otunchieva et al., 2022; Scott, 2017). Inadequate dietary quantity and quality result in deficiencies of essential nutrients, particularly during pregnancy and lactation (Bhandari et al., 2016; Nankumbi et al., 2023).

For people to diversify household food consumption, they must be food secure. Broga (Broga, 2017) argued that diversification of the diet to include foods from a range of sources, particularly from underutilized species or crops is an approach to alleviate hidden hunger. Underutilized crops are currently largely neglected by major research and funding bodies. These have the potential to contribute to food and nutrition security, provide micronutrients and bioactive compounds that are essential to health, and improve livelihoods for subsistence farmers: a large proportion of whom are women (Broga, 2017).

Food diversification on a large scale (e.g. implemented at regional or national level and/ or involving commercially oriented producers) can help enhance availability of diverse foods in markets and reduce prices of nutritious foods; likewise, diversification strategies on a small scale (e.g. implemented at home or at smallholder level, predominantly for consumption purposes) can help increase direct access to micronutrients and proteins, which might otherwise be expensive or difficult to acquire, particularly for poor people living in remote communities (FAO, 2017b b).

Therefore, access to assets, inputs (e.g., land, water, and seeds), and support for household food processing and preservation capacities are crucial requirements of these strategies (FAO, 2017b b).

Gender Dimensions of Nutrition

The analysis uncovered a fourth theme on the gendered dimensions of nutrition. The policy's approach to solely "*targeting women*" assumes that women can solely make the decision of what foods are eaten in the household. It fails to acknowledge gender imbalance in access to financial resources and decision-making power for food purchase, production, and consumption. Nigeria is generally patriarchal in nature (Makama, 2013). A patriarch is considered the head of the household, and within the family he controls productive resources, labor force, and reproductive capacities based on the notions of superiority and inferiority, legitimized by differences in gender and generation (Makama, 2013). Gender inequality causes, and is also a result of, food insecurity. Women play a significant role in food systems as producers, wage workers, processors, traders, entrepreneurs, and consumers. Women's role in agriculture is not fully recognized in Nigeria and many LMICs, resulting in lack of women empowerment (FMARD, 2022). Women empowerment refers to improving social, economic, political, and legal strength of women such that they gain power and control over their lives (FAO, 2017b b) especially in terms of decision making in the household.

In Nigeria, women farmers face a lot of challenges, including lack of access to land and funding, limited access to new practices and technological advancements in farming, and fewer market opportunities, among others (FMARD, 2022). This agrees with another study done in Ghana, Uganda, and Bangladesh by Jost and colleagues (Jost et al., 2016), which revealed that men were more likely to adopt new agricultural practices and attend trainings in neighboring villages on

how to improve productivity, whereas women could not do likewise due to limited access to land, childcare constraints, other responsibilities at home and cost of travel.

It is important that the policy document integrate ways to design nutrition education programs that are adapted to both men and women. Fathers should be encouraged to participate actively and share responsibilities with mothers in caring for their infants and young children. Involving all members of the household as well as community leaders and grandparents is an important factor for successfully ensuring sustainable behavioral change, build knowledge on nutrition and care, and achieve better nutrition outcomes for women (FAO, 2017b b).

Responsibilization

Furthermore, in the policy document, a fifth theme identified strategies of responsibilization in the plans to "*Build resilience and social protection nets through food and nutrition systems for vulnerable groups*". Responsibilization involves the transfer of responsibility from higher authorities to communities or individuals who are then called to take an active role in resolving their own problems. Building resilience among vulnerable groups, while a laudable and important step, risks individualizing issues related to malnutrition and obscuring the role of systems, governments, and institutions responsible for malnutrition. The discursive construct of building resilience demonstrates that the responsibility of improving malnutrition is, in some way, the responsibility of the individuals. This may result in responsibilizing vulnerable groups. It is the government's responsibility to provide social safety/protection nets for its vulnerable population (Juhila & Raitakari, 2019). Continuous monitoring and evaluation are necessary for sustaining systems established by the government. The government of Nigeria has a higher role to play in providing the necessary resources for its population to improve their nutritional status.

Farm production

A sixth theme from our analysis gave prominence to improving farm production by "*Mobilizing farmers to participate in the production of farm produce for feeding pupils in each geographical area*". School feeding programs are targeted social nets that provide both educational and health benefits to school children (Okolo-Obasi & Uduji, 2022). Malnutrition among children of school-going age is a challenge of serious concern in LMICs, especially sub-Saharan Africa and in Nigeria. Many programs focus on mothers and under-5-year-old children, leaving the school age unattended. It has been shown that school meals can reduce school absenteeism, improve concentration in class, and reduce early dropouts (Roothaert et al., 2021).

The National Home-Grown School Feeding Program (NHGSFP) in Nigeria was launched by the Federal Government of Nigeria in 2016 to achieve four objectives vis-à-vis school enrollment and completion; child nutrition and health; local agricultural production; create jobs and improve family and state economy (NHGSFSP, 2016). One of the guiding principles of the Nigerian Home-Grown School Feeding Strategic Plan was that produce will be sourced directly from local farmers (NHGSFSP, 2016). Whilst the implementation of the school feeding program was in phases across the nation since 2016, there is little to no literature identifying the participation of local farmers in the program or the impact of such participation on their livelihood. Okolo-Obasi and Uduji, (2022) also acknowledged that there is gap in literature with regards implementation of the program (Okolo-Obasi & Uduji, 2022).

Furthermore, the policy recommends "*Ensuring that agricultural produce meets quality and standard for local consumption and export*". The main factors undermining the acceptability of locally produced and processed products include low access to modern production and processing equipment; poor quality inputs and misapplication of inputs; poor post-harvest

handling; malpractices by middlemen; inadequate market information; weak enforcement of producer and consumer protection policies; and a weak agricultural extension system (FMARD, 2022). Food quality, hygiene, and safety standards are systematic preventive approaches to food safety that aim to protect public health and improve accessibility of nutritious and safe foods in ways that address modern food environments (FAO, 2017b b). Risks related to food safety and hygiene need to be controlled all along the food supply chain, from production to processing, trading, food preparation and consumption (FAO, 2017b b).

In developed countries, quality control measures to ensure that food meets certain safety, and quality standards play a key role in agriculture processing. These measures include testing for bacterial contamination; measuring the amount of fat, protein, and other nutrients; inspecting plants, livestock, and production facilities; which consequently poses a huge challenge in LMICs where most agriculture products is by smallholder farmers (Saak, 2016). In Nigeria, meeting quality and safety standards may be achieved by controlling risks at various points of the food supply chain, including through reduction of pesticide use in cultivation, and antibiotics in animal production; prevention of harvest contamination by animals; implementation of basic sanitation; air circulation and humidity control in storage and processing facilities; aflatoxin control; use of food grade containers and chlorination of water (FAO, 2017b b).

Livestock production

A seventh theme identified in the policy document emphasized livestock production in the statement: "*Facilitating the establishment of livestock centers and community-based shared livestock production and processing facilities*". The livestock sector in Nigeria (Uzonwanne et al., 2023) encompasses a large range of livelihoods (e.g., pastoralist; agro-pastoralist; urban farming) and activities ranging from extensive animal rearing (e.g., cattle rearing) to homestead

animal rearing (e.g., poultry or goats rearing) (FAO, 2017b b). A key intervention is the establishment of ranches, aimed at mitigating the escalating crisis between settled-farmers and pastoralists that could undermine the entire development of the livestock sector (FAO, 2020; FMARD, 2022). The Federal government of Nigeria proposes that project would be supported to improve animal genetic resources, support establishment of functional models of ranches, grazing reserves, promote the development of integrated meat and dairy processing facilities and mitigate herder-farmer conflicts (FMARD, 2022). Livestock ownership (e.g., cattle, chicken and other poultry, small ruminants such as goats and sheep) can contribute to dietary diversity and improved nutritional outcomes through home consumption and income generation, especially if accompanied with nutrition education aimed at promoting consumption of ASFs (Animal Source Foods) including for complementary feeding (FAO, 2017b b).

Seed sovereignty

Finally, issues around seed sovereignty are foregrounded in the approach to "*Promoting the adoption of certified seeds and Good Agronomic Practices (GAP)*"**.** This brings into question the 'seed capitalism vs. seed sovereignty' debate and how this disadvantages small-holder farmers and their reliance on, as well as knowledge of, traditional seeds. Four common imbalances emerge in seed programs aimed at smallholders: (i) seed quantities are increased, but sustainable delivery and marketing systems are not created; (ii) high quality seeds are produced but are too expensive for smallholders (iii) reliance on agro-input dealers for distribution limits access for poorer smallholders; and (iv) the informational needs of users (where to find the seed, how to compare costs, where to see demonstration plots, feedback systems) are not met (Moore, 2018). Failure to consider access and sustainable delivery is common (Moore, 2018). Seed certification is a quality assurance system whereby seed intended for marketing is subject to official control

and inspection. Hence, seeds that are classified as certified seeds are high in genetic purity, high in germination and vigor, and of good quality (i.e., free from disease and from damaged or immature seed) (Chimdi & Jibrin, 2022). Seed is an essential commodity in agricultural production. Whereas there are several controversies around seed governance across African countries (Takeshima et al., 2022), the Nigerian government aims to improve the provision of better-quality seed at lower costs to farmers through seed certification, seed subsidies, and promotion of private sector participation in foundation seed production and so forth; however, knowledge gaps still exist (Bankole, 2019; Chimdi & Jibrin, 2022).

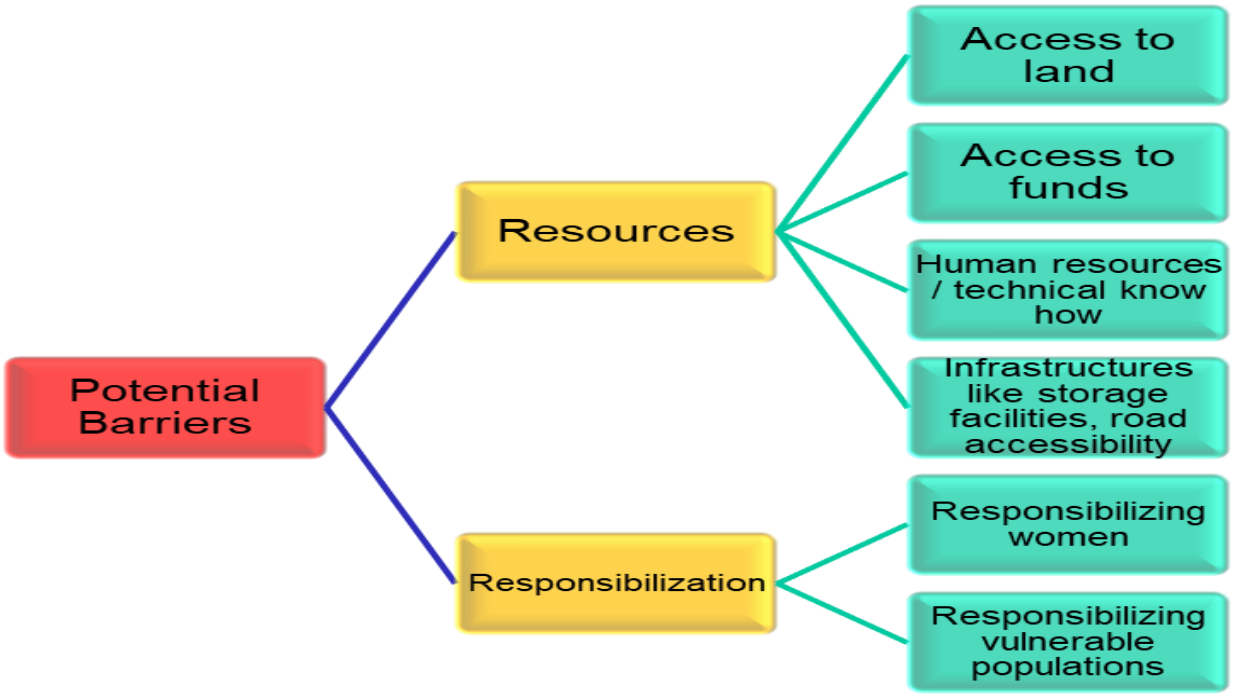
2.6 Prospects and Challenges

Investing in agriculture and food systems has been globally recognized for playing a key role in improving food security, dietary quality, and nutrition (Ruel et al., 2018). Climate change; globalization and trade; income growth and distribution; urbanization; politics and leadership; population growth and migration; and social-cultural context have been identified as external drivers of agricultural innovation (Nutrition-Sensitive Value Chain - NSVC, 2022).

After a thorough analysis of the NATIP document, some factors have been identified as potential enablers and barriers, and some of these factors overlap as both enablers and barriers depending on each specific situation. The potential barriers have been highlighted as shown in Figure 2.2. Some of the potential barriers are lack of, or limited resources and responsibilization. Resources could be in the form of human resources, funds or finances, capacity and capabilities, technical know-how, access to land, storage facilities, and infrastructure. Responsibilization, on the other hand, is transferring one's responsibilities to another who is incapable of carrying them out.

Responsibilization was seen in many instances in the document, first when the government expected women to diversify household food production and consumption. Studies have shown that women play a significant role in household food production; nevertheless, the consumption of foods in the household may be beyond their control and may be dependent on other factors such as a need to sell products for more income or a lack of access to adequate resources, which will affect household food security.

Figure 2.2 Potential Barriers Identified in the Policy Document.



It is the responsibility of the government of the region/ state to provide adequate safety nets including adequate food and nutrition, and other needs, thus providing an enabling environment for its people.

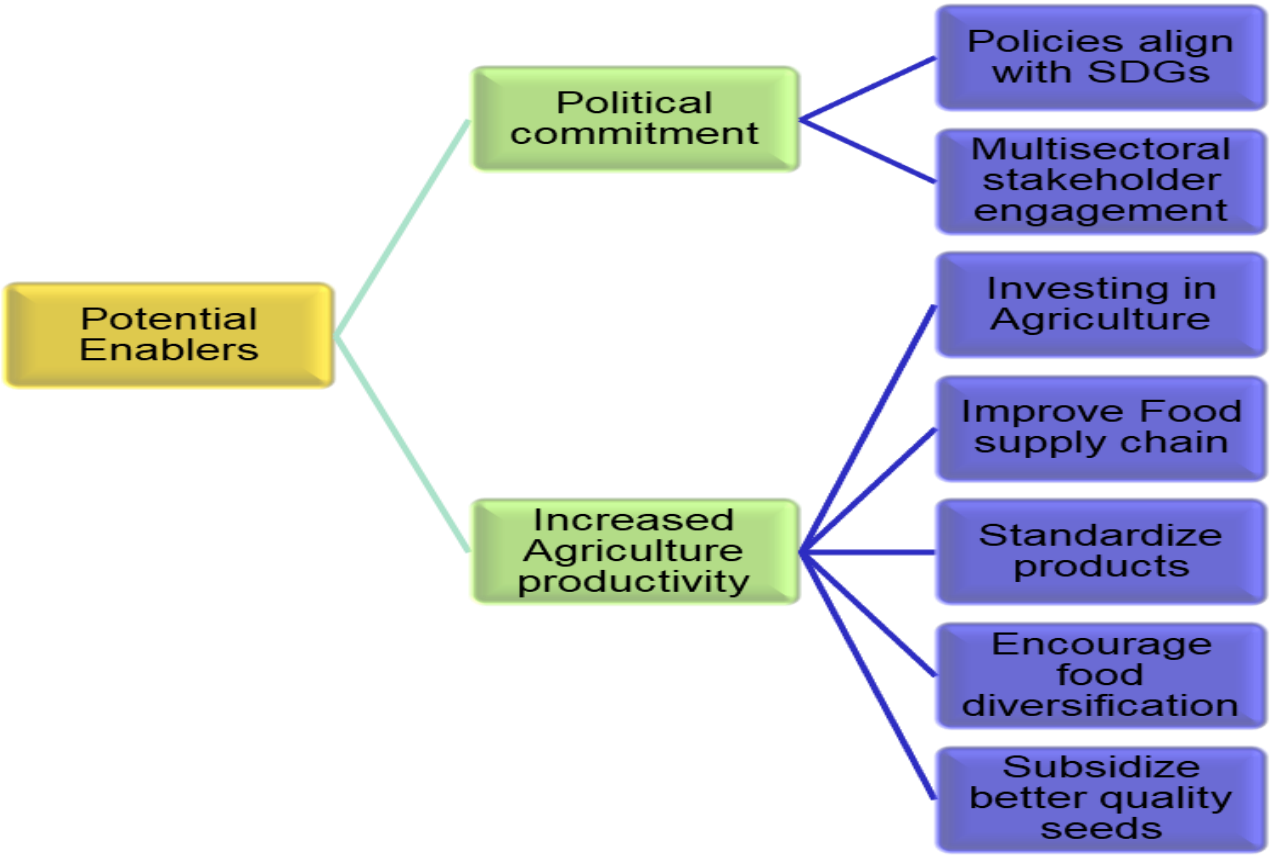
Some of the potential enablers as shown in Figure 2.3 for the implementation of the policy were political will and commitment; and improving agricultural productivity. Political commitment on the part of the government was shown by enacting policies that align with SDG 2. This will enhance sustainable food production to achieve food and nutrition security among the population.

Potential enablers to achieve the policy outcome also include the actions taken by the government to improve agricultural productivity, such as improving food supply value chain, standardization of products for local and export use, encouraging food diversification through increasing diverse food production, providing support and education regarding home gardening and backyard farming, and provision of better-quality seeds at lower cost to smallholder farmers. The multi-sectoral approach of implementing this policy is sustainable and worthy of note, because achieving food and nutrition security of a population requires multidisciplinary stakeholder engagement.

Modern food systems are often not driven by taste and nutritive value, but by factors such as consistency, predictability, low cost, and high yield (Kemp, 2016). Therefore, little attention has been given to selection of cultivars according to nutritional value (Dwivedi et al., 2017). This occurs to increase the profit margin of the food industry while providing ‘enough quantity’ of food to meet the needs of the population. The government of Nigeria is encouraging increase in consumption of biofortified foods (foods produced with increased quantity of certain micronutrients) to mitigate micronutrient deficiency, without considering the increased utilization of NUCs that are locally available. Underutilized crops can also be fortified to mitigate micronutrient deficiency.

The issue of finances to fund the policies cannot be overlooked as the policy emphasized creating millions of jobs and establishing agricultural funds for smallholder farmers; however, the policy document did not state the source of the funds. This is a gap that requires consideration to enhance positive implementation of the policies. While different committees were identified for specific functions or policy action areas, key indicators to measure these functions were not identified in the policy document. However, stating what policy actions to be carried out by a group of governing agencies without assigning the responsibility to specific

Figure 2.3. Potential Enablers Identified in the Policy Document



persons/organization might cause a delay in carrying out the assigned duty and provide a challenge with monitoring and evaluation.

2.7 Strength and Limitation and Conclusion

Strength and Limitation

One limitation of this study is that the methodology (critical discourse analysis) used is complex and time consuming, and because there was the limited time available as this was a master's study, only one policy document was focused on. One strength of this study is that by analyzing the policy document in a systematic and structured way, we identified the discourse used and were able to reveal the hidden biases in the language used. Additionally, with support from already published literature, we were able to suggest ways to counteract the social wrongs unknowingly implied in the policy document.

Conclusion and Recommendations

The SDGs were agreed upon by member countries to achieve sustainable development. SDG target 2.3 lays emphasis on actions to improve agricultural productivity as a sustainable approach to mitigate food and nutrition security worldwide. Nigeria, a LMIC in sub-Saharan Africa, showing its political commitment to improve nutrition through the agricultural sector, developed an agriculture technology innovation policy (NATIP), to be enacted over a five-year period.

Critical discourse analysis of the policy document identified eight themes that were emphasized and that showed forms of power imbalance. While acknowledging the political commitment of the federal government of Nigeria towards improving agricultural productivity, not much was said about how the programs and interventions would be implemented and funded.

Potential enablers such as showing political commitment and improving agriculture productivity through innovation and technology were identified that would enhance positive outcome of the policy. Whereas potential barriers such as limited or lack of resources and responsibilization could impede a fully positive policy outcome.

We therefore recommend:

1. Equal distribution of resources, including land, quality seeds, farm equipment, and storage facilities should be promoted. This can be better achieved by utilizing adequate monitoring and evaluation system whereby farmers are registered at the point of providing support. Providing viable markets for sale of farm produce and improving the value chain to maximize optimization of farm produce and limit losses.
2. Agriculture extension agents provide awareness about the availability of improved seeds; how to produce these to maximize yields; and the overall benefits of producing and consuming biofortified foods in a language they would understand. Involve both men and women in these awareness sessions.

In conclusion, the government of Nigeria has a significant role to play in ensuring that policies enacted should be implemented by assigning the responsibilities to those capable of carrying it out, and steps taken to maintain continuous monitoring and evaluation of implementation of the policies to achieve the set goals.

Chapter 3. Paper 2: Policymakers' Perspectives on Biofortified Foods and Baby Friendly Initiatives in Ebonyi State, Nigeria–A Qualitative Study

3.0 Abstract

Nigeria is one of the LMICs in sub-Saharan Africa (SSA) with a consistently high prevalence of malnutrition among its vulnerable populations. Biofortification of staple crops has been shown to be cost-effective in mitigating some micronutrient deficiencies. Although Nigeria began the production of biofortified crops more than a decade ago, studies show low production and consumption of its food products. Baby Friendly Hospital Initiatives was established by the World Health Organization (WHO) and United Nations Children's Fund to protect, promote and support breastfeeding practices. In support of this, Nigeria initiated this policy decades ago, however, studies show lack of political commitment toward maternal protection laws. Policymakers play a crucial role in determining the policies and practices in a nation, especially Nigeria; therefore, we assessed policymakers' perspectives. We utilized in-depth interview method of qualitative research to explore the perspectives and opinions of 10 policymakers who were members of the Ebonyi State Food and Nutrition Committee in Nigeria. Our findings revealed limited consumption of biofortified foods due to poor acceptance and individual preferences. Conversely, farmers continued producing biofortified foods because of increased yield and invariably more income. In addition, policymakers also highlighted the need to be consistent in informing the public in their respective language or dialect to enhance knowledge and awareness of the benefits of biofortified foods. Likewise, Baby Friendly Initiatives was shown to have improved maternal and newborn care in Nigeria, however, many factors impede the practice of exclusive and continued breastfeeding according to WHO's recommendations. Moreover, maternal protection laws have not been enforced nationwide. The government of

Nigeria has a significant role to play in providing funds to improve availability of resources for promoting accurate information dissemination and improve efforts to promote and protect breastfeeding practices and the nutritional status of its population.

Keywords: Biofortification, Baby Friendly Initiatives, policymakers, qualitative study, Nigeria.

3.1 Introduction

Globally, the three forms of malnutrition ─ undernutrition, overnutrition and micronutrient malnutrition ─ are public health issues especially in low- and middle-income countries (LMICs), despite continuous nutrition-sensitive interventions by governmental and non-governmental organizations (NNHS, 2018). More than 3 million preschool age children, and about 1 billion non-pregnant women of childbearing age are reported to lack one or more essential micronutrients globally (Stevens et al., 2022). In LMICs, practices like giving fluids such as sachet water, glucose water, coconut water, and other prelacteal feeds, other than breastmilk in the first three days of life reduces early initiation of, and continued breastfeeding. Indeed, it has been reported that one-third of babies received prelacteal feed in the first 3 days of life (Pérez-Escamilla et al., 2023). More than three billion US dollars is lost globally from unaccomplished profit to maternal health and child development due to insufficient investments in promoting, protecting and supporting breastfeeding (Pérez-Escamilla et al., 2023).

Nigeria is one of the LMICs in sub-Saharan Africa (SSA). It has 36 states and a federal capital territory which are grouped (for convenience) into 6 geopolitical zones. Nationally, the population of under-five children was 34, 831,000, out of which 32 percent were stunted, and 6.5 percent were wasted (Global Nutrition Report, 2022). Statistics show an alarming death rate of 102 deaths per 1000 live births among children under-five, though the Sustainable Development Goals (SDGs) aim is to reduce that number to 25 deaths per 1000 live births (NNHS, 2018;

UNICEF, 2023). The National Food Consumption and Micronutrient Survey showed high prevalence of anemia in adolescent girls and women of childbearing age nationwide (FGN & IITA, 2022; NNHS, 2018). There are concerted ongoing effort to attenuate micronutrient malnutrition among women of childbearing age, adolescent girls and under-five children, such as utilizing micronutrient supplementation for pregnant women, food fortification of staple crops for the population, diet diversification across different population groups, and biofortification. Biofortification is a globally recognized agricultural-based approach to addressing hidden hunger (also known as micronutrient malnutrition) and food insecurity, especially in the SSA (Phorbee et al., 2023). Biofortification is not to be confused with food enrichment, another common strategy for enhancing the nutrient status in a food product. Enriched foods, otherwise called food enrichment entails replacing nutrients that were lost during processing. In contrast, biofortification involves adding nutrients to food crops at the point of planting the crops which could be with fertilizers or other agronomic methods (Ofori et al., 2022). Several evidence-based published literature support the fact that food-based strategies such as food fortification and biofortification have positive impact in mitigating micronutrient deficiencies at the population level (Dwyer et al., 2015; Endevelt et al., 2023; Keats et al., 2019; Osendarp et al., 2018).

This study is a part of a group of studies in which policy documents currently being used in Nigeria were reviewed and gaps were identified. While there were more than ten policies with a focus on nutrition, there was incoherence between policies and interventions. This may be due to policy instability, poor political commitment, and not targeting the interventions toward residents in the grassroot areas who require it the most (Akinyele, 2012; Baker et al., 2018; Barlow & Thow, 2021; Vanderkooy et al., 2019). These policies identified some causes of nutrition problems to include poor diet, inadequate infant and young child feeding practices, social norms,

insufficient health/nutrition services, limited physical and financial access to care, and insurgencies in parts of the country resulting in mortality, morbidity, reduced economic, social, and cognitive development, and poor educational attainment (Vanderkooy et al., 2019). However, information about impacts of nutrition-sensitive policies, and the sequential interventions or programs have historically been driven by health indicators and performance measures (Vanderkooy et al., 2019), without considering the experiences of the beneficiaries of these interventions. This is a significant gap in research that needs to be filled. When the perception, opinions and experiences of the beneficiaries are sought, it will help to inform policies, improve impacts, and engender sustainable use of the interventions. Furthermore, policymakers and implementers play a significant role in how policies are made and implemented in a given area or geographical location (Reeve et al., 2021). Many components are necessary to enhance or inhibit implementation of nutrition policies in a sustainable manner. These include over-arching policies, political commitment by way of funding strategic plans and actions, knowledge, and collaborative efforts of multilevel teams. Food and nutrition policymakers at different levels of the government possess corporate knowledge and experience that are representative of their learned experiences and can inform practice-based strategies (Reeve et al., 2021).We assessed policymakers perspectives regarding biofortified foods and baby friendly initiatives in Nigeria using in-depth interviews.

3.2 Policy on Biofortification in Nigeria

Nigeria began the production of biofortified crops in 2011 (Kolapo & Kolapo, 2021), to increase the availability of essential micronutrients: vitamin A, zinc, and iron in locally consumed foods. A decade later, evidence shows that there is low availability of, access to, and consumption of biofortified foods to/by the public (FGN & IITA, 2022; Phorbee et al., 2017).

Biofortification of staple crops has been shown to be effective in mitigating some micronutrient deficiencies (Foley et al., 2021; Osendarp et al., 2018). However, its effectiveness is dependent on: 1) Coverage rate (that is, the proportion of biofortified staples in produced and consumed foods); (Meenakshi et al., 2010). 2) Content of micronutrients in a variety of biofortified crop; 3) Frequency of consumption of the biofortified crop by the target population; 4) Dose response of target population to avoid adverse effects; and 5) Processing losses (Meenakshi et al., 2010) ─ all factors which determine the magnitude of effectiveness. Another factor not common in the literature is bioavailability of the essential nutrients after consumption which may be affected by other nutrients consumed along with the biofortified crop (Ofori et al., 2022). Biofortification is also cost effective because the only major cost required is that of initial breeding and introduction; once biofortified crops are in the farmer food system, they can reach remote, rural populations that are difficult and expensive to reach with regular supplementation promotions (Phorbee et al., 2023). Nevertheless, reported evidence show there is low production (30.2%) of biofortified crops by farmers, as well as reduced support from donor and investors (Phorbee et al., 2022). One third of biofortified crops produced is sold while the rest is consumed by farmers family members(Phorbee et al., 2017). While biofortification has the potential to cause a shift in agricultural system by producing crops that are high in micronutrients, to help address micronutrient malnutrition, especially in the developing countries; some contributing factors to low support, or consumption of biofortified foods may be due to lack of awareness of its benefits, low education level, cultural beliefs, and individual preferences toward the final product (Phorbee et al., 2017, 2022, 2023).

3.3 Baby Friendly Initiatives and Maternity Protection Laws

The Baby Friendly Hospital Initiatives was established by the World Health Organization and United Nations Children's Fund to protect, promote and support breastfeeding practices (Walsh et al., 2023). Breastfeeding enhances growth, survival and development to full potential of human infants and young children, yet more infants are formular fed today than ever before (Pérez-Escamilla et al., 2023). Breastmilk is the recommended essential source of food for infants in their first four to six months of life. Breastfeeding has also been shown to be a double-duty action because when properly practiced, breastfeeding provides adequate nutrition for the young infant, and supplements for the older infant, while it also may reduce the propensity to develop obesity in later life (Hawkes et al., 2017; Victora et al., 2016; World Health Organization, 2017).

Many women would agree to having the desire to breastfeed their infants. Statistics show that 46% of newborns are breastfed within one hour of birth, while 48% of babies under six months were exclusively breastfed globally in 2022 (UNICEF & World Health Organization, 2023). However, some confounding factors such as: fear of insufficient breastmilk, underlying medical problems, limited or no support from family members, limited knowledge on posture and attachment leading to infants not latching properly to suckle, further causing sore nipples and uncomfortable breastfeeding experience (N. C. Rollins et al., 2016) may cause reduced breastfeeding practices. Other roles and limited time can be a burden on mothers, thus reducing their availability and capacity to breastfeed as desired. Recently it was reported that 649 million working women globally were not entitled to adequate maternity protection that would support breastfeeding (Baker et al., 2023).

Many factors are involved in initiating and maintaining breastfeeding practices: such as well-trained medical personnel, media campaign, adequate use of advocacy for policy change, time by way of maternity leave for mothers to bond when initiating breastfeeding and to continue breastfeeding exclusively, as well policy around marketing of breastmilk substitutes in a country. Sadly, an overwhelming majority of women living in Asia and Africa have limited maternity protection laws. (Baker et al., 2023; Pérez-Escamilla et al., 2023; N. C. Rollins et al., 2016).

Furthermore, implementation of the Baby Friendly Hospital Initiative has slowed because of a shortage of funding. The Code for marketing breastmilk substitutes in Nigeria was last updated in 2005 and enforcement has been weak (N. C. Rollins et al., 2016). The reduction of barriers for working mothers to breastfeed by providing lactation rooms and nursing breaks are low-cost interventions that can reduce absenteeism and improve workforce performance, commitment, and retention. Enabling interventions operate by removing structural and societal barriers that interfere with women's ability to breastfeed optimally. Examples include maternity and workplace policies or regulations to restrict marketing of breastmilk substitutes; health insurance or other financing mechanisms for lactation support; and baby-friendly hospital certification (Baker et al., 2023; Pérez-Escamilla et al., 2023; N. C. Rollins et al., 2016).

Theoretical Framework

This study is informed by ***UNICEF Conceptual Framework on Determinants of Maternal and Child Nutrition (2020)*** which describes a holistic approach to mitigating malnutrition and improving maternal and child nutrition within a population. This framework identifies determinants of maternal and child nutrition. It acknowledges the increasing triple burden of malnutrition – undernutrition, micronutrient deficiencies and overweight – and highlights the role of diets and care as immediate determinants of maternal and child nutrition. It uses a

positive narrative about what contributes to good nutrition in children and women. Positive narrative here focuses on emphasizing what is done correctly or what right steps to take to enhance adequate nutrition of mothers and children. It also provides conceptual clarity on the interconnectedness among determinants of adequate nutrition, positive survival, growth, development, learning, economic and social outcomes resulting from improved maternal and child nutrition.

The framework identifies three levels of determinants of adequate nutrition of a population: 1] enabling determinants, 2] underlying determinants, and 3] immediate determinants; and finally identifies the outcomes in childhood, adolescence, adulthood and for societies. ***Enabling determinants*** focuses on good governance, resources, and norms. *Good governance* encompasses political, financial, social, public, and private sector actions to enable children's and women's right to nutrition. *Resources* include environmental, social, financial, and human resources necessary to enable adequate nutrition of mother and child. *Norms* include positive social and cultural norms, and actions that will encourage or enable proper nutrition of women and children. ***Underlying determinants*** focus on age-appropriate foods, practices, and services. *Age-appropriate nutritious food* for children is breastmilk in early childhood, adequate nutritious complementary foods for the older infant, healthy diets through childhood and adolescence to obtain household food security. *Practices* as a construct focuses on age-appropriate feeding practices including adequate food preparation, consumption, and hygiene practices. *Services* include health and nutrition education, sanitation, social protection services, healthy food environments to support good diets, and adequate nutrition. ***Immediate determinants*** focused on healthy diets and proper caregiving practices to engender healthy mental and emotional growth

and development (UNICEF, 2021). This study will be examining the constructs mentioned in the framework to assess participants' experiences retrospectively.

3.4 Materials and Methods

Study Design

This is a cross-sectional, qualitative study designed to examine the perspectives of key informants – policymakers and implementers of food and nutrition policy regarding biofortified foods and Baby Friendly Initiatives in Ebonyi State, Nigeria. Published literature posits that policymakers and implementers played a significant roles in the actualization of policies and programs within a community (Reeve et al., 2021). Ebonyi State is the 4th poorest State in Nigeria (NBS, 2022a) so we decided to interview members of the State Committee on Food and Nutrition. We wanted to examine their perspectives regarding two specific areas of focus namely Maternal, Infant and Young Child Nutrition (Baby Friendly Initiatives), and Micronutrient Deficiency and Control (Biofortified foods), which are part of the National Food and Nutrition Policy (NFPN). NFPN is a document that provides the framework for addressing the problems of food and nutrition insecurity in Nigeria.

Participant Recruitment

Participants were recruited using purposeful criterion sampling technique and the purposeful snowballing sampling technique (Harris et al., 2009).The criterion for selection was that they were primarily food and nutrition policymakers and implementers. In Ebonyi, this category of people were members of the State Committee on Food and Nutrition (SCFN). It is a 24-member committee in Ebonyi State, Nigeria. CE, our collaborator in Nigeria is a member of the Ebonyi SCFN. The project was discussed in detail to obtain informed decisions from key members of the SCFN. Our goal was to recruit about 50% to participate as key informants in our study. A date

and time for the individual interviews was determined and OI, the Principal Investigator conducted individual virtual interviews with them. We required a targeted group of participants because of their position and the role they played. Our target participants were a mixed gendered group of policymakers comprising 5 men and 5 women to participate in the interviews. This study involved in-depth interviews with 10 policymakers and implementers.

Study Setting

The study was set in Ebonyi, a South-Eastern state in Nigeria. Nigeria's current population is 223 million. Nigeria has 36 states and a Federal Capital Territory within which are a total of 774 Local Government Areas (LGAs). Ebonyi State has an estimated population of 4,339,136 based on the 2005 census and the inhabitants are spread across 5,935 square kilometers with thirteen LGAs. The state is predominantly dominated by the Igbos with other minority ethnic groups from neighboring states (City Population, 2022; Ebonyi State Government, 2023; United Nations Population Division, 2023). Ebonyi state is a mix of urban and rural settlements. The proportion of children under five who were chronically undernourished rose from 16.2 to 20.6% between 2013 and 2015. The prevalence of stunting (20.6%) was the highest among the South-Eastern States of Nigeria (Umeokonkwo et al., 2020). The National Nutrition and Health Survey reported that Southeast geopolitical zone in Nigeria showed mild-to-moderate malnutrition: 96.7% of children 0-23 months (about 2 years) were ever breastfed [which means that they had been breastfed at some point from birth to 2years old]; 18.2 % were put to breast within first hour of birth; 74.0% were put to breast within the first day of birth; 22.4 % were exclusively breastfed for 5 months; and 60.5% continued receiving breastmilk at 12-15months (NNHS, 2018).

Data Collection

Between January – February 2024, 10 key-informant in-depth interviews (IDI) were conducted virtually by OI with some Ebonyi State Committee on Food and Nutrition members. OI interviewed five males and five female members. Consent was obtained at first contact by CE when he informed each participant about the project, and they decided to participate. Verbal consents were also obtained by OI at the beginning of each interview session. A summary of the interview guide was shared with each participant prior to the interview session and a text message was sent to confirm the interview session will proceed as scheduled. For in-depth interviews, data saturation could be attained with as little as six interviews depending on the diversity of data and the sample population. The key, therefore, was to attain thick and rich data which may also be thought of as quality, detailed and nuanced data (Fusch & Ness, 2015; Harris et al., 2009).

Data Analysis

Key informant interviews were conducted in English and were transcribed and documented verbatim. The data was analyzed using an iterative process of identifying, organizing, and reporting based on themes and patterns in relation to the research question and aim of the study. An integrated approach (A. J. Bingham, 2021), was utilized to analyze the data which involved both deductive (theoretical) process and inductive process of data analysis (A. Bingham, 2023; A. J. Bingham, 2021).

This approach produced a rich and thick description of the data set, as well as a detailed and nuanced account of any themes that correlate with preliminary literature (Braun & Clarke, 2006; Harris et al., 2009). The deductive process involved a theoretical thematic analysis whereby the constructs from the UNICEF conceptual framework were used to develop the interview guide;

they also informed the labelling of codes and categorizing the data. In addition, participants' experiences and responses were used to develop new themes (inductive process) for analysis.

The lead author (OI) analyzed the data using NVivo (version 14) and ran quality checks with the research team (co-authors). During quality checks, transcripts were chosen at random to review as a team. These reviews were compared to the lead author (OI)'s analysis to ensure accuracy. Following recommendations by Braun and Clarke (2006) for thematic analysis, the coding process involved: 1) *getting familiar with the data; 2) generating initial codes; 3) searching for themes; 4) reviewing themes; and 5) defining and naming themes.*

"A theme captures something important about the data in relation to the research question and represents some meaning in the data set." Therefore, thematic analysis is a method of identifying, analyzing, and reporting patterns or themes within data showing the experiences, meanings, and reality of participants (Braun & Clarke, 2006; Majumdar, 2018). Initial codes were developed using the constructs of the Theoretical framework selected when designing this study – UNICEF Conceptual Framework on Determinants of Maternal and Child Nutrition (2020). Subsequently, an iterative process of getting to know the data – the length and breadth of it – reading and re-reading it to become familiar with the data was done. This was to help with getting themes that were from the data and would still align with the constructs of the framework.

3.5 Ethical Approval

A certificate of ethical approval was obtained from the University of Ottawa's Research Ethics Review Board with file number:H-09-23-9402; and from Alex Ekwueme Federal University Ethics Review Board with file number: AEFUNAI/FBMS-ECN/2310012.

3.6 Results

Participant Characteristic

Demographic data showed that participants' ages ranged from 31 to 56 years, most (70%) had a household (Hhd) size of 6, and the majority (90%) had at least a bachelor's degree. Sixty percent of the participants were government workers, and almost all (90%) were married. This section explores perspectives of policy makers regarding biofortified foods and Baby Friendly Initiatives in Nigeria. See Table 3.2 for a summary of the findings.

Table 3.1 In-Depth Interview Participant Characteristics

Participants ID	Age (years)	Gender	Hhd size	Education level	Ethnicity	Married status	Employment status
PM1	38	Male	6	BSc	Igbo	Married	Civil servant
PM2	56	Male	6	PhD	Igbo	Married	Professor
PM3	48	Male	6	MSc	Igbo	Married	Civil servant
PM4	37	Male	4	PhD	Igbo	Married	Lecturer
PM5	53	Male	6	PhD	Igala	Married	Professor
PW1	51	Female	6	BNSc	Igbo	Married	Civil servant
PW2	40	Female	5	MSc	Igbo	Married	Nutrition Officer
PW3	31	Female	4	BSc	Igbo	Single	Civil servant
PW4	42	Female	6	BSc	Ogoni	Married	Civil servant
PW5	45	Female	6	Diploma	Igbo	Married	Civil servant

Perceptions of Biofortified Foods

In Nigeria, there is an ongoing push to increase the production and consumption of biofortified crops. Participants were generally concerned about the cost involved, particularly during the production phase, and highlighted the need for more government intervention in improving consumers' access to biofortified food.

"It involves a lot of money to add the nutrients before it is planted. I don't think it is easy to increase production unless the government uses a form of support for farmers." (Female participant 1)

"It is difficult for people to accept change; hence, they may resist it at first; with time, others will try it and accept it" (Female participant 2)

"The government has capacity, they need political will to make these foods available to the masses, which is why I believe that the state government are participating." (Male participant 5)

Furthermore, some participants demonstrated adequate knowledge about biofortified foods and their benefits. A commonly stated benefit of biofortified foods was their potential to reduce food insecurity in the form of micronutrient deficiency.

"*Biofortified foods are very essential. Vitamin A, iron, iodine – biofortified in salt, maize, cassava, potatoes, rice. If able to get biofortified stem, crops, seedlings, and plant them in your backyard. This will help reduce food insecurity and hidden hunger." (Male participant 3)*

"Biofortified foods are raw foods with increased nutrients. Biofortified vitamin A cassava, orange fleshed potatoes." (Female participant 2)

However, not all descriptions of biofortified foods were accurate. For example, participants used the term "enriched foods" and "biofortified foods" interchangeably in this study. As explained in the introduction, enriched foods, unlike biofortified foods, do not have additional micronutrients

added to them prior to processing. Participants did not seem knowledgeable about this subtle difference thereby hinting at their limited knowledge of biofortified food.

> *"Enriched foods must have the essential nutrients the body needs. Foods that contain animals, plants, legumes, vegetables, nuts, tubers and so on. Foods can be enriched by fortifying the content or composition of the food, thereby increasing the percentage of a particular nutrient in the food." (Male participant 1)*

> *"Enriched foods have to do with addition of extra nutrients to a particular food to make it more nutritious. Fortified foods: there is the addition of micronutrients, vitamins, and minerals to make the food more nutritious. When in the community, members are taught to add fruits to pap to make it more nourishing." (Female participant 3)*

Participants also described a general unwillingness to consume biofortified foods in their communities due to mixed beliefs about biofortified foods. Some considered it natural and good for consumption while others did not like the taste or aesthetics of the finished product made from biofortified foods. They also discussed some myths and misinformation about biofortified foods in the community for example, community members consider biofortified foods to cause reduced fertility and are therefore, not willing to consume these foods:

> *"I am enlightened, and I know the importance, hence, I will consume it. According to my mother in the village, the white specie of cassava stays longer in preservation while the yellow cassava ferments faster; she prefers thicker fufu than one made from yellow cassava." (Male participant 3)*

"Some people have said because of the chemical added to the seed, it will reduce production for them and so they do not take it. Also, because it is sweet, some people do not like it." (Female participant 5)

"Members of the community raised it that in some places, people's perception about biofortified foods which was because they were not aware of the importance of these foods. Some people think that certain drugs are meant to reduce the lifespan of the people. Enlightenment is necessary, be ready to tell them that there may be side effects." (Male participant 5)

Participants indicated that the unwillingness to consume biofortified foods did not deter its production. Farmers were excited about planting biofortified foods because of benefits such as high yields and reduced risk of infestation.

"From my experience, people only complain about the taste of the food. Cassava production from IITA (International Institute of Tropical Agriculture), Southeast of Ebonyi Ishieli area introduces TMS 419 which is biofortified with vitamin A, farmers were excited because it is high yielding and early maturation; it is planted and harvested twice a year (in 12 months). However, the color and taste differ from the old one, hence, the rejection. Likewise, maize is too sweet for them, younger people are getting used to it, but not the older members of the community." (Male participant 4)

"Salt is fortified with iodine, orange fleshed potatoes with vitamin A. Yes, they are available in most communities. They don't consume them; they harvest them and sell them in the marketplace." (Female participant 3)

Baby Friendly Initiatives in Nigeria

Beyond biofortified foods, this study also explored perspectives and experiences with Baby Friendly initiatives. Baby Friendly initiatives changed the way mothers and their newborns were cared for. Baby Friendly initiatives refer to different steps being taken to encourage initiation of breastfeeding of a newborn within 1 hour of birth and continuous breastfeeding according to the demands of the infant for six months before complementary foods are introduced. Some of the steps include mothers staying in the same room and on the same bed, side-by-side with their infant to engender bonding and nurturing. Participants voiced the fact that prior to this initiative, new mothers were separated from their newborns immediately after birth and would only see their babies after the nurse or doctor had attended to the child. However, with this initiative, this changed drastically:

> "*It is an initiative put together to help in managing newborns better. Before now, when mothers deliver, the baby will be taken to a different room until the nurses bring the babies to mothers. BFHI encourages mother-to-child bonding, staying in the same room, breastfeeding, latching and so on." (Female participant 2)*

> *"It introduced the concept of mothers lying with the baby so the baby can breastfeed anytime he/she wants. The bodies of the mother and child touch each other as they lie together on the same bed and in the same room. It is healthier and it's also called the rooming-in method. Exclusive b/feeding is encouraged for 6 months and complementary feeding for 2 years*." (*Male participant* 4)

Participants identified the initiative as necessary for nourishing mothers and children. It is free and easily accessible to mothers and their children in the community. Some participants also highlighted that mothers could make a call to a hotline indicating the need to go to a health

facility and a vehicle will be sent out to transport them: it is important to note however, that this information could not be verified by other participants or online sources.

> *"A child health program that entails free antenatal services which is given in most states, and it is free of charge, free vaginal birth or assisted delivery, emergency transport program – such that those in the villages will call the hotline and someone will go pick them up to transport them to the hospital. It also includes breastfeeding teaching and sensitization to enhance breastfeeding practices." (Male participant 2)*

Many health facilities were identified by participants as providing baby-friendly services within the communities. Participants emphasized that each local government area had at least a health facility and these had resources to provide Baby friendly services to mothers and their newborns:

> *"Yes, primary, secondary, tertiary hospitals. State Primary Health Care in Ebonyi state. One in each of the zones in Ebonyi is well supported by funders and partners, partnership primary healthcare development." (Male participant 4)*

> *"Before, the government will tag some hospitals as BFHs, now, there are some in the primary healthcare centers, and all other primary healthcare centers and health facilities are trying to implement BFH initiatives one way or another, so it is hard to tell how many." (Female participant 2)*

According to participants, baby Friendly interventions differed across work locations. Businesses and organizations with 80 or more staff had on-site creche for infants and older babies. However, this was not available to businesses and organizations with less than 80 staff. There was also a contrast in terms of the locations or organizations that provided these: banks, government institutions and markets in the city had creches, whereas villages and many small organizations

did not have these in place. Most organizations in urban areas provided private corners for breastfeeding or expressing breastmilk, however refrigerators for storage were not available.

> *"Many organizations now provide special places where mothers can go breastfeed their children. Only organizations with a high workforce have daycare, those in the villages do not have whereas those in the cities do. However, power supply is not consistent for the refrigerator to continue running." (Male participant 2)*

> *"In an organization with more than 80 people, it is compulsory to have creches. There is a creche in the market; mothers are advised to keep their babies close to them. The state secretariat where the staff comes to – also has a creche." (Male participant 4)*

Participants also revealed instances where there were policy provisions for creches in some organizations, but they were not implemented.

> "*It was captured in the strategic plan, but not yet implemented. Creating creches in offices – only in documents. There are no regulations in place. When policies are made in government offices, the private firms will want to emulate the government." (Female participant 2)*

Importance of Community Nutrition Support Programs

Participants discussed the importance of community nutrition support programmes. Community nutrition support programmes included one-on-one counselling sessions that encouraged mothers to breastfeed and programmes that aimed to improve the number of mothers attending ante-natal clinics and who receive health/ nutrition education. Participants attested to the benefits of such programmes because mothers who are struggling with breastfeeding might sometimes go

unnoticed. They, however, stated that while one-on-one counselling was greatly desired, it was not readily available due to limited human resources.

> *"One-on-one counselling is one of the ways to help mothers understand how to express breastmilk when it is found out that they are refusing to breastfeed and the reason for this." (Male participant 1)*

> *"Nurses may not notice that mothers are having difficulties because of their own workload – they might not notice those who need extra help with their infants to latch on to breastmilk." (Female participant 2)*

Participants highlighted the individualized nutrition support programs given by family members – mothers and mothers-in-law – which were rooted in the culture and norms of participants.

> *"There are many in the communities: older women doing omugwo (going to their daughter-in-law's house or daughter's house to help nurture and care for the infant and mother consistently for the first 3 months). Women societies, church groups, and well spirited individuals also sponsor these supports." (Male participants 2)*

Other community nutrition support programs like food demonstrations of locally available/ sourced foods were utilized to nourish infants.

> *"Yes, there are some community support programs, they are to help continuous breastfeeding, training health workers to be able to pass on the information to the mothers when they attend ANCs before giving birth." (Female participant 3t)*

> *"Nutritious foods are very expensive. Pawpaw, local beans, eddo, rice, cocoyam; vegetables and okra are very affordable. During immunization sessions, mothers are*

taught how to prepare enriched/fortified foods with available foods: fortified food contains the essential nutrients in adequate amounts. Garden egg and pawpaw are mashed with mango and added to pap to fortify it. Banana, avocado can also be mashed and fed to babies as complementary foods." (Female participant 5)

Multilateral governmental organizations like UNICEF and USAID, sponsored some nutrition programmes which could lead to behavioural change in health seeking behaviours among participants:

"UNICEF did something in line with this: role models were selected from rural health facilities to teach and encourage breastfeeding mothers. USAID sponsored Breakthrough Action Nigeria where community volunteers were scattered in all villages, and they held compound meetings to teach mothers. The program also targeted behavioral change by educating mothers on the importance of accessing health facilities, early seeking healthcare, early antenatal care, [mothers received] referral cards to refer mother or child to where they can access healthcare at low or no cost/ change. [the program covered] the Importance of breastfeeding, seeking healthcare services, ANC, PNC, social behavioral change." (Male participants 3,4)

Healthcare Professionals' Availability and Willingness to Teach New Mothers

In discussing their perspectives on baby friendly initiatives, participants' views centered on healthcare professionals' availability and willingness to teach new mothers to breastfeed, and care for their infants appropriately. Their views varied depending on several factors such as their gender, their level of involvement in the community and their personal experiences regarding this. One of the participants whose work was within a rural local government area stated that not

many nurses were willing to work in the rural settings, hence, many were visiting nurses who come to ante-natal clinics (ANCs) to health educate mothers as a group. One-on-one counselling was not done.

> *"Many of the nurses are program officers, not working in the facilities, during immunization session, they do attend the clinics or ANCs and give health education to mothers. In General hospitals, the matron in charge encourages mother who are working and will be away from their babies to express breast milk; whereas mothers who do not work and will be with their babies do not need to express their milk." (Female participant 5)*

The visiting nurses were willing to teach or give group health education sessions. However, some participants were concerned that breastfeeding education was thwarted for nurses' personal gain. For example, some nurses focused on solely marketing breastfeeding alternatives in lieu of breastfeeding education.

> "*Very willing. They hardly attend ANCs without hearing about it, it is done frequently. I don't think it is an issue. It is a group classroom education." (Female participant 4)*

> *"Some are willing while some will want to sell off the infant formular they have for sale. They hide to sell the infant formular. Yes, it has come up as a reason. Some ANCs don't even teach mothers at all because they are busy and claim they have too much work. To a good extent they are competent, they have the time to give mothers teaching, they might see it as a need. Some are nonchalant about teaching mothers to express breastmilk." (Female participant 3)*

"Awareness: most health workers do not practice exclusive breastfeeding. Consistent education is necessary. They need to be mentored, educated, shown the way forward, they will practice, it also needs to be taught to mothers. (Male participant 3)

One-on-one counselling was rarely given as this will require more human resources, which are currently limited. Only group education is going to continue to be given.

Policy Regarding the Code and Maternity Leave

A final theme among participants was centered on policy regarding the Code for marketing breastmilk substitutes and maternity leave. This refers to policies enacted by a nation; the steps taken to implement the policy about how breastmilk substitutes are marketed to mothers; steps taken to prevent marketing and maternal protection laws in that nation. Participants unanimously highlighted the fact that there was a policy in place to increase maternity leave from 3 months to 6 months and initiate paternity leave. However, these were not yet implemented across the nation:

"The maternity law of 6 months leave for mothers has already been enacted, yet to be implemented. Paternity leave of 14 days has been enacted, yet to be implemented in Ebonyi state. Nigerian Governors are discussing these to implement them." (Male participant 3)

Conversely, one participant mentioned that 2 or 3 states had already implemented 6-months maternity leave for mothers, but the other states including Ebonyi state was yet to implement this:

"*Yes, Kaduna is the first, and Lagos. 2 or 3 states have implemented 6 months maternity leave and 14 days of Paternity leave. Ebonyi state is yet to implement this. Only 3 months*

maternity leave is allowed here. Federal institutions in Ebonyi state have implanted it." (Male participant 4)

While there was some level of awareness regarding the Code for marketing breastfeeding substitutes, participants revealed that this was not common knowledge; in addition, participants made statements that were somewhat contradictory:

"The Code is a policy document enacted by NAFDAC to inhibit the sale of breastmilk substitutes across the nation/ state. These companies are gradually being banned… NAFDAC'S telephone numbers were shared abroad. They are being enforced within the hospital or anywhere the commodity is being lodged to mothers, it is well enforced." (Male participant 3)

"*There are NAFDAC regulations at the federal level. At our last training, these were emphasized at NAFDAC to enforce this, but only at the federal level. In Primary Health Centers and state level, these are not enforced. Breast Milk Substitute Code Committee was established but not implemented toward enforcing the code." (Female participant, Nutrition Officer 2)*

Two participants outrightly said they were not aware of the Code, however, after explaining to one of them, the following statement was made:

"Nurses were seizing infant formulars. Mothers were being taught how to put their babies to breast so they can feed directly, taught mothers how to sit (in a comfortable position) so that they do not get tired while breastfeeding. Few days after mothers put to bed, they are also encouraged to put the baby to breast…using the analogy of not giving

infant formular or cow's milk, but breast milk so their babies do not act like animals." (Female participant 4)

Participants also emphasized that the code was monitored majorly at the federal level. At other levels of government, more work is required.

"Taskforce were established to go round the market to sensitize those selling infant formulas that it is not good to sell these, so that mothers are aware." (Female participant 5)

"The Ministry of health does that. The State Committee are responsible for this: they visit the establishment and monitor their actions and give feedback. NAFDAC is also involved." (Male participant 2)

Summary Table showing the Themes, the case counts, code counts and the empirical indication (that is, the evidence extracted from participants).

3.7 Discussion

Findings from this study showed that participants' perspectives of Baby Friendly Initiatives and Biofortified foods were mixed. Findings showed that participants' thoughts, opinions, knowledge of and willingness to consume any biofortified food was influenced by their understanding of biofortified foods, their cultural norms and personal preferences. This agreed with the enabling determinants of the conceptual framework that norms can influence maternal nutrition (UNICEF, 2021). This also agreed with the study done by Phorbee and colleagues stating that lack of awareness of the benefits of biofortified foods, low education level, cultural beliefs, and individual preferences toward the product are factors that contribute to low consumption of biofortified foods (Phorbee et al., 2017, 2022).

Table 3.2. Summary Table

Themes	Definition (What it represents)	Cases (No of participants)	Code Counts (No of Empirical indication)	Empirical Indication (Evidence - Quotes)
Baby Friendly Initiatives in Nigeria	It refers to different steps being taken to encourage initiation of breastfeeding of the newborn within 1 hour of birth and continuous breastfeeding according to the demands of the infant for six months before complementary foods are introduced.	10	39	*"BFHI is all about infant and young child nutrition which involves initiation of breastmilk within the first hour of birth. Exclusive breastfeeding and gradual introduction of complementary foods along with breastfeeding until 2 years of age"*
Importance of Community Nutrition support programs	This refers to a measure of how important nutrition support programs were.	10	30	*"One-on-one counselling is one of the ways to help mothers understand how to express b/milk when it is found out that they are refusing to b/feed and the reason for this." (Male participant, Civil Servant)*
Healthcare Professionals' availability and willingness to teach new mothers	Healthcare professionals' availability and willingness to teach new mothers to breastfeed, and care for their infants appropriately. It considered the workforce availability to teach mothers; whether one-on-one counselling are being given or group teaching; and healthcare professionals willingness to teach new mothers to breastfeed.	10	30	*"Not enough workforce compared with the standard. In rural facilities, 1 or 2 extension health workers are doing all the work. On immunization days, there's not enough time to provide counselling except health education, human resources are scarce." (Male participant, Civil Servant)*
Perspectives on Biofortified foods	It refers to their thoughts, opinion, knowledge of biofortified foods and their willingness to consume these foods.	10	46	*"I am enlightened, and I know the importance, hence, I will consume it. According to my mother in the village, the white specie of cassava stays longer in preservation while the yellow cassava ferments faster; she prefers thicker fufu than one made from yellow cassava." (Male participant, Civil Servant)*
Policy regarding the Code and Maternity leave	This refers to policies enacted by a nation; the steps taken to implement the policy about how breastmilk substitutes are marketed to mothers; steps taken to prevent marketing and maternal protection laws in that nation.	10	32	*"The maternity law of 6 months leave for mothers has already been enacted, yet to be implemented. Paternity leave of 14 days has been enacted, yet to be implemented in Ebonyi state. Nigerian Governors are discussing these to implement them." (Male participant, Civil Servant)*

Our finding suggests that accepting and consuming biofortified foods requires accepting change, and this takes time. It is necessary to mention that the principle of biofortification was to nutritionally improve staples foods consumed without altering the physical texture or consistency of the finished product. However, significant modification occurred in texture, colour and taste of biofortified maize, cassava and sweet potatoes (Phorbee et al., 2023). Breeders are working on this to improve consumer acceptance (Phorbee et al., 2023), and behavioural change education might be necessary in the interim to encourage consumption despite these changes. In Nigeria, the current hike in prices of foods generally, including biofortified foods, have invariable limited access to healthy foods nationwide. This has resulted in increased food insecurity, especially among the poor. With increased cost of biofortified foods, leading to reduced access further drives the need for government interventions to make these foods more available locally. Our findings also revealed that the general unwillingness to access biofortified crops by residents did not deter its production by farmers, because of the added advantage of increased yield. It had been argued that to improve consumption of biofortified foods by consumers; all hands must be on deck: food product developers, dietitians, educators, farmers, citizens and the government need to work collaboratively to impact the population's eating habits (Ofori et al., 2022).

Our second major focus in the study was Baby Friendly Initiatives in Nigeria. Results showed participants acknowledged that Baby Friendly Hospital Initiatives had been very helpful in improving the care and support given to new mothers and children. This is in congruence with the underlying determinants of maternal and child nutrition where different services [nutrition education and programmes, healthcare services, social protection services, and sanitation], play important roles in enhancing maternal and child nutrition at grassroot level (UNICEF, 2021). Groleau and colleagues posits that implementing Baby Friendly Initiatives in a flexible, and

family-centered way is highly effective at reducing barriers to breastfeeding faced by mothers (Groleau et al., 2017). Our findings highlighted the continued cultural practice of providing nutrition and wellness support to new mothers and infants by their own mothers or mothers-in-law – a commendable practice supported by evidence that regular and consistent visits to mothers via support groups accelerates improvements in maternal nutrition and may improve breastfeeding or complementary feeding practices (Kavle et al., 2019). Food demonstrations of locally sourced foods were done within the community to encourage adequate, healthy complementary food preparation by mothers. Multilateral government organizations also sponsored community nutrition support programmes; however, these were limited to specific regions and were not sustained in a long term. For sustainable community nutrition support programmes, the government at all levels needs to allocate funds consistently to promote the nutritional status of its populace. Limited governance and resources in terms of limited nutrition support programmes and government support negatively affects maternal and child nutrition (UNICEF, 2021). Failure, to develop, implement, and enforce policies and programmes have negative effects on populations' health and environment especially in LMICs (Agurs-Collins et al., 2024). On achieving government support, Baker and colleagues wrote that it involves the mobilization of political systems and institutions, adopting policies, allocating resources, and coordinating responses to ensure results (Baker et al., 2018). High-level political will, constraints on industry lobbying, accountability measures, monitoring and enforcement mechanisms, education on the Code, and investment in human and financial resources are desperately needed across Africa to accelerate progress in protecting the health of mothers and babies through breastfeeding (WHO, 2022).

Furthermore, our findings revealed that healthcare professionals were willing to teach once they were competent to do so. Walsh and colleagues demonstrated that antenatal education for women was found to be a very important factor for exclusive breastfeeding duration; while, a lack of health professionals' education was found to be a barrier to Baby Friendly Initiatives implementation (Walsh et al., 2023). Updating and strengthening undergraduate, pre-service, and in-service breastfeeding support capacity and Baby Friendly Initiative education and training for healthcare practitioners will ensure changes in practices over the long-term (Walsh et al., 2023). One-on-one nutrition counselling could not be given even when necessary; but only group sessions were mostly done due to the limited workforce. Walsh and colleagues posit that staff shortages were found to affect the implementation of Baby Friendly initiatives steps, and, the more Baby-Friendly hospital practices mothers met, the better their breastfeeding outcomes; in fact, to promote breastfeeding, interventions should be delivered in a combination of settings by involving health systems, home and family and the community environment concurrently (Walsh et al., 2023)

In Nigeria our findings suggest that the Code for marketing breastmilk substitutes is enforced at the federal level only, this is not sufficient in promoting breastfeeding practices among the larger population. Paid (adequate) maternity leave, breastfeeding breaks, and facilities at work are associated with improved breastfeeding practices, lower infant mortality, and improved maternal physical and mental health (N. Rollins et al., 2023). Therefore, more efforts need to be geared toward raising awareness regarding reducing the marketing of breastmilk substitutes at the state and local / community level. To achieve a world where parents and families are genuinely supported in the care of infants, and for breastfeeding to be robustly promoted, protected, and supported: high-level political commitment, increased financial investment, and concerted

support from civil society for mothers and families so that breastfeeding becomes a collective responsibility, fully adopting the Code with sufficient monitoring and enforcing by government funds that are free of commercial influence (N. Rollins et al., 2023; WHO, 2022).

Study Implications and Future area of study

This study explores the experiences of policymakers on the impacts of nutrition-sensitive policies and the sequential interventions or programmes in Nigeria. Given the abundance of evidence on the potential for food fortification and Baby-Friendly Initiatives to reduce micronutrient deficiencies, findings from this study are pertinent to the development, implementation and evaluation of nutrition policies in Nigeria. This study highlights the need for culturally sensitive education and awareness-raising efforts on the benefits of biofortified foods. Baby-friendly initiatives were generally seen to be effective, however, there is still the need to strengthen specific policy measures including improved access to healthcare providers, community nutrition support programmes, favourable maternity leave and breastfeeding policies, and policies to increase enforcement of the code for marketing breastmilk substitutes.

A future area of study could be to carry out a pilot intervention study to analyze the impact of nutrition education on the consumption of biofortified foods. Another could be to carry out an intervention study to scale up the Baby Friendly Hospital Initiative to community level.

Strengths and Limitations

One limitation of this study is that the interviews were done virtually, which may have impacted communication flow, as there were rare occasions when receipt of message was impeded due to poor or limited internet connection. The strength of this study was that the interview sessions were not recorded due to tacit fear of reprisal by participants which may have impacted on their

willingness to participate. Hence, the interviewer documented simultaneously as the interview session proceeded. By respecting participants' wishes, and ensuring anonymity, we built rapport with them and improved their trust in the research process. Additionally, in-depth interview method used allowed full exploration of the topics of discussion, thus producing a detailed, comprehensive and less biased data. Likewise, we implemented an integrated approach in data analysis: which means that we were not limited to the constructs of the conceptual framework (deductive), we also employed an inductive approach, this further enhanced the thickness and richness of the data produced.

3.8 Conclusion

This qualitative study utilized UNICEF conceptual framework to examine the experiences of policymakers and implementers regarding biofortified foods and Baby Friendly Hospital Initiative in Ebonyi State, Nigeria. Findings revealed limited knowledge and access to biofortified foods and a general unwillingness to consume these foods despite the understanding that it may help alleviate micronutrient malnutrition. The findings also revealed how Baby Friendly Initiatives have positively impacted maternal and child nutrition; however, there is still room for improvement. Limited workforce affected availability of some services; in addition, more work needs be done to mitigate marketing of breastfeeding substitutes in Nigeria. Government interventions and support are necessary to improve the availability of resources in the area.

Chapter 4. Paper 3 – Community members Experiences about Food Environment in two Southeastern States in Nigeria – A Qualitative Study.

4.1 Introduction

Food environment considers the element of the social and physical environment that impacts food choices. It influences the types of food available, the accessibility to food, and the exposure to food and nutrition information, including through marketing and advertising (Smolin et al., 2020). Experiences of food environments encompass daily interactions with food, how and why decisions are made regarding what is eaten in the household, choice of foods, how these are prepared, and how it is distributed among each member of the family. This research inquiry stemmed from the researcher's prior knowledge and experience of the level of food insecurity in Nigeria. Nigeria as a country in West Africa is rich in resources: human resources, natural resources, and wealth. However, these are not evenly distributed among the population. There is a vast difference in individual and household access to healthy foods predicated on: 1] residence; rural or urban, 2] socio-economic status, 3] buying power otherwise considered as financial access, 4] gender and 5] societal norms (Downs et al., 2020; Herforth & Ahmed, 2015). This research seeks to understand how food environments vary across urban and rural settings from the perspective of families. It also considers the influence of other factors such as gender, socio-economic status, and employment status which determines the buying power of households.

4.2 *The Food Environment and Nutrition*

The food environment includes features of the community, such as the number and kinds of food outlets in people's neighbourhoods (geographical access) and consumer experience, such as the kinds of foods that are available, affordable, and of good quality; and these features are associated with residents' diet-related outcomes (Canada, 2013). Food environment encompass

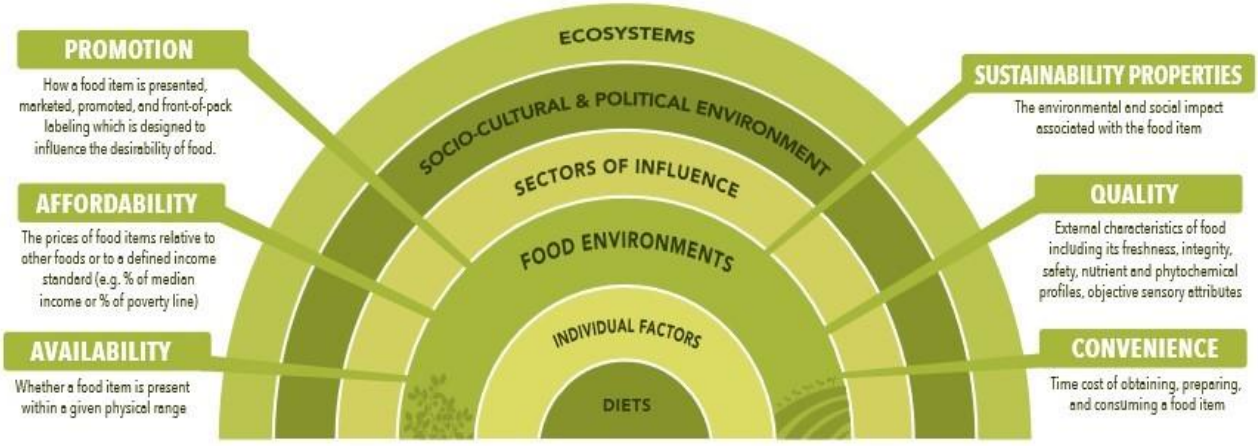
both natural and built spaces, and it is influenced by the socio-cultural and political environment, and ecosystems within which they are embedded (Downs et al., 2020; Herforth & Ahmed, 2015). There's an interrelationship between food environments, and food consumption at individual and household levels; and some factors have been identified to play significant roles in this interrelationship. These are convenience, affordability, availability, desirability (preference), and advertisement or marketing (Herforth & Ahmed, 2015). In addition, the quality of the food determines the dietary value obtained when it is consumed. It has been argued that healthy diets cost more than unhealthy diets. Conversely, unhealthy food environments such as fast foods from convenience stores will lead to unhealthy food consumption (Herforth & Ahmed, 2015).

Food supply chains in low-and middle-income countries (LMICs) have undergone rapid transformations in recent years, with the globalization of food trade including foreign direct investment, there has been shifts in the availability and type of food, and food outlets; leading to marked changes in the foods (and beverages) that consumers have access to within their food environments (Downs et al., 2020). This means that the food environment in markets will determine the nutritional status of nearby residents. Although increase in household income, will increase household spending capacity, this may not result in healthier food choices if there is lack of knowledge, and if the foods available locally are not healthy options (Herforth & Ahmed, 2015).

To improve individual food choices, food and nutrition education leading to behavioural changes is inevitable. Policies and political commitments in improving food environments will play a significant role in making available more healthy choices of foods in each geographical area. (Downs et al., 2020; Herforth & Ahmed, 2015). Parents play an important role in developing food skills (such as cooking foods, shopping for food, planning meals, reading food labels and

packaging); creating a healthy food environment (providing access to healthy food and information about how to make healthy food choices); supporting children's interest in healthy food; and in shaping children's eating habits and behaviours (Smolin et al., 2020).

Figure 4.1: Description of food environment key elements - Downs et al, 2020



The key elements of food environments have also been identified as factors that show food security or lack of it. According to the United States Department of Agriculture (USDA)**, food security** ("access by all people at all times to enough food for an active, healthy life") is one of the several conditions necessary for a population to be healthy and well nourished (Odoms-Young et al., 2024). At the household level, food security implies adequate access to food over time. Several factors such as income, educational level, and household sizes are known to affect household food security, as they directly affect economic access and the sustenance of such access (Akinyele, 2012). Whereas **nutrition security** highlights having consistent and equitable access to healthy, safe, affordable foods essential to optimal health and wellbeing (Odoms-Young et al., 2024). Conversely, food insecurity is lack of access to affordable, healthy and age appropriate food at all time (FAO & WHO, 2014). Indeed, recent statistics show that 2.8 billion

people could not afford a healthy diet in 2022, 71.5 of which reside in LMICs (UNICEF, 2024a). Diet is strongly influenced by the social determinants of health (SDOH), that is, the conditions in which people are born, grow, work, live, and age; and determines the socioeconomic status, educational level, household income and employment status, which further interact with cultural norms, traditions, beliefs, and values to shape what people eat (Odoms-Young et al., 2024). Studies have shown that nutritional status of a group of people or population is influenced by the SDOH that is prevalent within the community in which they reside. Yet direct nutrition interventions are substantially more effective when supported by nutrition-sensitive economic and social policies (Ecker & Nene, 2012).

Nigeria is Africa's most populous country. Nationally, the population of children under-five is 34, 831,000 out of which 32 percent are stunted and 6.5 percent are wasted (Global Nutrition Report, 2022). Nigeria has 36 states and 6 geopolitical zones: 6 million children under-five within the Northeast and Northwest geopolitical zones were reported to be suffering from severe acute malnutrition, whereas 47% and 35% were stunted respectively (FGN & IITA, 2022). Likewise, the National Food Consumption and Micronutrient Survey showed high prevalence of anemia in adolescent girls and women of childbearing age nationwide (FGN & IITA, 2022).

In Nigeria, the concept of food environment and its relationship with food consumption and social determinants of health is not different. There has been an increase in income, development and affluence because of economic development and utilization of available natural resources. However, these are not evenly distributed nationwide. There is a large disparity in socioeconomic status among urban and rural residents; and further difference in nutritional status and access to healthy foods among rural residents who have home gardens or backyard farms and those who do not (Akinyele, 2012; Baker et al., 2018; CGIAR, 2020; Odoms-Young et al., 2024). The food

environment in Nigeria was not left out of globalization of food trade. There is an increased preference for western diet as compared to locally sourced indigenous foods especially in urban areas. There is high level of food insecurity shown by consistent increasing food prices nationwide, thus causing reduced affordability, and access to adequate food by those with lower income, and who reside mainly in rural locations where development is not at the same level as in urban areas (CGIAR, 2020; FMARD, 2022; NBS, 2022b). Addressing the root causes of malnutrition (such as food insecurity, poverty, poor education, lack of women's empowerment, population growth control, macroeconomic instability, and inefficient public services) is imperative for achieving sustained reductions in malnutrition (Ecker & Nene, 2012). We carried out focus group discussions among community members in rural and urban residences, to assess the impacts of their food environment and how it affects their nutritional status.

4.3 *Theoretical Framework*

This study is informed by ***UNICEF Conceptual Framework on Determinants of Maternal and Child Nutrition (2020)*** which describes a holistic approach to mitigating malnutrition and improving maternal and child nutrition within the population. This framework identifies determinants of maternal and child nutrition. It acknowledges that the triple burden of malnutrition – undernutrition, micronutrient deficiencies and overweight – are increasing and highlights the role of diets and care as immediate determinants of maternal and child nutrition. It uses a positive narrative about what contributes to good nutrition in children and women. Positive narrative here focuses on emphasizing what is done correctly or what right steps to take to enhance adequate nutrition of mothers and children. It also provides conceptual clarity on the interconnectedness among determinants of adequate nutrition, positive survival, growth,

development, learning, economic and social outcomes resulting from improved maternal and child nutrition.

The framework identifies three levels of determinants of adequate nutrition of a population: 1] enabling determinants, 2] underlying determinants, and 3] immediate determinants; and finally identifies the outcomes in childhood, adolescence, adulthood and societies at large. ***Enabling determinants*** focuses on good governance, resources, and norms. *Good governance* encompasses political, financial, social, public, and private sector actions that enhance children's and women's right to nutrition. *Resources* include environmental, social, financial, and human resources necessary to enable adequate nutrition of mother and child. *Norms* include positive social and cultural norms, and actions that will encourage or enable proper nutrition of women and children. ***Underlying determinants*** focus on age-appropriate foods, practices, and services. Age-appropriate nutritious food for children is breastmilk in early childhood, adequate nutritious complementary foods for the older infant, healthy diets through childhood and adolescence to obtain household food security. *Practices* as a construct focused on age-appropriate feeding practices including adequate food preparation, consumption, and hygiene practices. *Services* include health and nutrition education, sanitation, social protection services, healthy food environments to support good diets, and adequate nutrition. ***Immediate determinants*** focus on healthy diets and proper caregiving practices to engender healthy mental and emotional growth and development (UNICEF, 2021). This thesis will be examining the constructs mentioned in the framework to assess participants' experiences in a retrospective way.

4.4 *Materials and Methods*

Study design

This study uses a qualitative cross-sectional study design to investigate households' experiences of food environments in selected communities in Anambra and Ebonyi states, Nigeria. Ebonyi State is the 4th poorest State in Nigeria with reports of mortality rates among infants and children under-five to be 1% and 24% respectively, whereas Anambra state had a rate of mortality among infants and children under-five to be 6% and 22% respectively. Early initiation of breastfeeding in Ebonyi was recorded to be 33% and 23.8% in Anambra state. There were disparities regarding healthcare access between rural and urban geographical areas. National statistics reported more than 80% of women of childbearing age in urban residents accessed antenatal care as compared to only about 40% of those in rural residents. Likewise, 81% of urban residents had access to postnatal care in terms of maternal and newborn postnatal check within 2 days, as compared to 50% of rural residents (NBS & UNICEF, 2022).We wanted to understand the experiences of mothers and/or fathers of children under-five residing in rural and urban communities in these states.

Participant Recruitment

Participants were recruited using purposeful homogenous criterion sampling technique (Harris et al., 2009).The criterion for selection was that they were parents of children under-five years living in the selected communities and were available and willing to participate in the study. Target participants for the focus group discussion were women and men from a rural community in Anambra state (Umueje community), a rural community in Ebonyi state (Ndufu-Echara community), and an urban community in Ebonyi state (Abakaliki metropolis). Participation in the study was entirely voluntary. We recruited mothers and fathers of children under-five because the experiences of male parents are likely to differ from that of female parents. We recruited 10 male parents in each community, and 10 – 14 female parents in each community. We held three

male focus group discussions in three communities with 10 males each giving a total of 30 male parents. We held three female focus group discussions in three communities with 10, 12 and 14 females giving a total of 36 female parents each in Abakaliki metropolis, Ndufu-Echara community and Umueje community respectively. We had 66 participants altogether. Refer to Table 1 for details.

Study Setting

The study was set in Ebonyi and Anambra states, which are South-Eastern states in Nigeria. Nigeria's current population is 223 million. Nigeria has 36 states and a Federal Capital Territory within which are a total of 774 Local Government Areas (LGAs). Ebonyi State has an estimated population of 4,339,136 based on the 2005 census and the inhabitants are spread across 5,935 square kilometers with thirteen LGAs. Anambra state also has an estimated population of 5,527,809 based on the 2005 census, and the inhabitants spread across 4, 865 square kilometers with twenty-one LGAs. The two states are predominantly dominated by the Igbos with other minority ethnic groups from neighboring states. (ANSG, 2022; City Population, 2022; Ebonyi State Government, 2023; United Nations Population Division, 2023). Ebonyi and Anambra states are a mix of urban and rural settlements. The proportion of children under five who were chronically undernourished in Ebonyi state rose from 16.2 to 20.6% between 2013 and 2015. The prevalence of stunting (20.6%) was the highest among the South-Eastern States of Nigeria (Umeokonkwo et al., 2020). The National Nutrition and Health Survey reported that Southeast geopolitical zone in Nigeria showed mild-to-moderate malnutrition: 96.7% of children 0-23 months (about 2 years) were ever breastfed [which means that they had been breastfed at some point from birth to 2years old]; 18.2 % were put to breast within first hour of birth; 74.0% were

put to breast within the first day of birth; 22.4 % were exclusively breastfed for 5 months; and 60.5% continued receiving breastmilk at 12-15months (NNHS, 2018).

Data Collection

Between December 2023 and January 2024, six focus group discussions were carried out. Three women focus group discussions and three male focus group discussions. Consent forms were shared with participants ‘after obtaining a verbal indication of willingness to join the study. Our Research Assistants in Nigeria (with the guidance of our collaborator in Nigeria – CE) met with members of the community, through household visits, to obtain their willingness to participate in the study. Participants were asked to answer questions from the discussion guides which were designed to capture contextual information related to the topic. The focus group guides were designed to elicit detailed discussions from parents, both men and women, regarding their experiences of the food environment at the household level. FGD guides were modified where appropriate to suit the local language, literacy levels and cultural interpretations. Focus groups participants were asked to participate once in one focus group session that was estimated to last about 60 minutes. Studies recommend that in choosing sample size, researchers focus on what has the best opportunity to reach data saturation as that constitutes the gold standard by which purposeful sample size are determined in health research (Harris et al., 2009). Fusch and Ness recommend that focus groups consist of six to twelve participants so that they are small enough for members to talk and share their opinions, yet large enough to create a diverse group (Fusch & Ness, 2015; Harris et al., 2009).

Data Analysis

Data was transcribed verbatim and translated to English. It was analyzed using an iterative process of identifying, organizing, and reporting based on themes and patterns in relation to the

focus group discussion guide. An integrated approach (A. J. Bingham, 2021) involving the deductive (theoretical), and inductive processes of data analysis was used. For the theoretical thematic analysis, the constructs from the UNICEF conceptual framework were used to develop the focus group discussion guide served as themes used to code or categorize the data. Then, participants' experiences and responses were used to develop new themes (inductive process) for analysis. An integrated approach enabled us to have a rich and thick description of the data set as well as a detailed and nuanced account of any themes that correlate with preliminary literature (A. Bingham, 2023; A. J. Bingham, 2021; Braun & Clarke, 2006; Harris et al., 2009). Data was coded using the NVivo software version 14. The quality of data analysis was ensured by running quality checks with my supervisor. For example, transcripts were chosen at random for us to review as a team. These reviews were compared to mine to ensure accuracy, and any discrepancies were resolved. Data findings will be discussed, and summary given.

The data was cleaned and prepared before transferring into NVivo (version 14) for analysis. Thematic analysis according to Braun and Clarke (2006) was used to analyze the data. The steps are to 1) *familiarize yourself with the data, 2) generate initial codes, 3) search for themes, 4) reviewing themes, 5) defining and naming themes, and 6) producing the report* (Braun & Clarke, 2006).

"A theme captures something important about the data in relation to the research question and represents some meaning in the data set." Therefore, thematic analysis is a method of identifying, analyzing, and reporting patterns or themes within data showing the experiences, meanings, and reality of participants (Braun & Clarke, 2006; Majumdar, 2018). Initial codes were developed using the constructs of the Theoretical framework selected when designing this study – UNICEF Conceptual Framework on Determinants of Maternal and Child Nutrition (2020). Subsequently,

an iterative process of getting to know the data – the length and breadth of it – reading and re-reading it to become familiar with the data was done. This was to help with getting themes that were from the data and would still align with the constructs of the framework. The themes were reviewed and amended by another colleague to ensure validity of the data analysis process.

Altogether, five broad themes were created with 10 sub-themes. The themes included limited food security, experiences with biofortified food or new food, feeding practices, inadequate nutrition programs, and finally, information inadequacy on biofortified foods. These themes are further expanded upon in the results section.

4.5 Ethical Approval

A certificate of ethical approval was obtained from the University of Ottawa's Research Ethics Review Board with file number:H-09-23-9402; and from Alex Ekwueme Federal University Ethics Review Board with file number: AEFUNAI/FBMS-ECN/2310012.

4.6 Results

Participants Characteristics

Thirty men participated in three FGDs in three communities; and 36 women took part in another three FGDs in three communities (Table 4.1). Participants characteristics were presented as grouped data in Table 4.2. Participants were predominantly of low socioeconomic status (SES) with about half (45%) having less than a high school diploma and many (36%) were farmers. There was a higher number of those who had furthered their studies among urban residents. The age range also differed in that there were more participants less than 40 years who participated in the focus group discussion among urban dwellers. Likewise, the household size was higher among rural dwellers.

Table 4.1. Details of Participants in Focus Group Discussions (FGD)

FGD No	Participants (n)	Gender	Age group
1	10	Men	34 – 65
2	12	Women	28 – 60
3	10	Men	26 – 49
4	10	Women	20 – 33
5	10	Men	31 – 50
6	14	Women	23 – 40

Findings from focus group discussions

Results were presented thematically, and data are reported in alignment with the themes that emerged during data analysis: 1] *limited food security* 2] *feeding practices* 3] *experiences with biofortified or new foods* 4] *information inadequacy on biofortified foods* 5] *inadequate community nutrition support programmes.* The results are supported by participants' statements in quotation marks. Table 6 gives a summary of the themes and quotes.

Table 4.2. Demographics of FGD Participants

Grouped Data	Ndufu-Echara Community	Abakaliki Metropolis	Umueje Community
Age group			
<40 years	5	18	14
40 - 60 years	15	2	10
> 60 years	2	0	0
Household Size grouped			
2 - 5 members	3	13	10
6 - 9 members	15	5	14
10 and above	4	2	0
Education Level grouped			
Less than high school	10	4	16
High School Diploma	9	6	7

College Diploma	2	2	1
University Degree	1	8	0
Occupation			
Farmer	4	3	17
Teacher	1	1	1
Corp Member	0	1	0
Civil Servant	1	5	1
Petty trader /Trader	2	3	3
Business	9	3	0
Others	5	4	3
Female	12	10	14
Male	10	10	10
Total	22	20	24

Limited Food Security

A prevalent theme among participants centered on limited food security which was determined by access to foods and the types of foods eaten within their households. Food access, which refers to the availability of adequate, nourishing, and appropriate food for each member of the household, was generally low. Low access to food meant that participants and their households did not have enough food to eat, and they had to ration available food. Participants attributed limited food access to the high prices of food:

> *"Food prices are terribly high. We increasingly find it difficult to provide sufficient food for our family, we often do not have as much as we should which often leads to quarrels at home." (Male group, rural resident, Umueje town)*

Interestingly, food access was higher for rural dwellers due to subsistence farming. Rural participants who cultivated food such as vegetables, fruits, tubers, and grains were less impacted by the rising food costs since they relied heavily on these subsistence crops produced in their home-gardens and fields. However, other foods remained inaccessible due to high food prices.

There was still the subtle sense of inadequacy due to the high costs of food, a ripple effect of hike in prices of fuel to transport goods. Household members experienced lack because they wanted to sell some of their produce to buy other types of food desired for consumption:

> *"We access fruits from our homesteads or from the wild. We sometimes buy fruits from hawkers. Our husbands buy fish, (and sometimes meat) from the market". (Female group, rural resident, Umueje town).*

> *"Vegetables and animals, like goats are being grown and reared in my family respectively, so I won't buy them. Other foods which are not cultivated in my family are bought in the market. We buy some of these foods from the market." (Male group, urban resident, Abakaliki metropolis)*

> *"We buy from the market. Fruits and vegetables are plucked from the farm or garden during their season. Fish, are gotten from fishermen and meat from hunters or the market." (Male group, rural resident, Ndufu-Echara town)*

Feeding Practices

A second theme among participants centered on feeding practices which involve actions or behaviors, or steps taken to feed all members of the household appropriately depending on their age, state of development, including hygiene practices. Some participants breastfed their infants according to the standard recommended by the World Health Organization. Participants breastfed exclusively for 6-8 months and then introduced complementary foods and continued breastfeeding until the child was 18 months (about one and a half years) to 2 years old. Participants breastfed on demand as often as the baby cried for it:

"*Yes, immediately after birth, and almost every time for 1 year and six months." (Female group, rural resident, Ndufu-Echara town)*

"Yes, my wife does that immediately after birth and it is in accordance with the demand of the baby for two years. We start giving the baby other fluids after 6 or 8 months. This is because breastmilk alone can no longer sustain or satisfy the baby, and he/she cry so much until when given such." (Male group, urban resident, Abakaliki metropolis)

Despite supposed common knowledge about breastfeeding, some participants did not feed their children according to the standard recommendations. Some reasons were that it makes the mother hungry, outright refusal of the infant to suckle, the presence of disease conditions, and cultural practices within the community:

"Yes, but I have seen a child who refused to breastfeed from the date of birth until the child grew. Breastfeeding is not practiced by some mothers who are in disease condition like breast cancer." (Female group, urban resident, Abakaliki metropolis)

"We give water and coconut water first before introducing breastmilk. This helps to prevent or reduce stomach cramps suffered by babies. We give water because culturally, it is not good to eat food without water. We introduce complementary foods because breastmilk is usually not enough especially for male children. Exclusive breastfeeding also makes us hungry all the time." (Female group, rural resident, Umueje town)

"Yes, from the day of birth until 2 years…and at every time the child cries for it. After 2 years, because at that time, breastmilk is no longer satisfactory to the child." (Male group, rural resident, Ndufu-Echara town)

Furthermore, participants demonstrated knowledge of good hygiene practices. This agreed with the recommendations given by United Nations in terms of washing hands regularly with soap and water, especially before eating and after using the restroom:

> *"It is important to wash our hands. We wash our hands before cooking, eating, or feeding our children. We wash our hands after defecating or cleaning our children; and after eating. We use soap most of the time and only use water when there is no soap." (Female group, rural resident, Umueje town)*

> *"We wash our hands after urinating or defecating or after touching dirty things. It is also advisable to wash your hands or even take a bath after returning from different places of work. Children should do so after returning from school. We wash our hands before and after eating." (Male group, urban resident, Abakaliki metropolis)*

Experiences with Biofortified or new food

A third theme among participants was centered on their experiences with biofortified or new food. Participants described their thoughts and concerns around consuming biofortified foods and how that impacts their decision to consume or not to consume biofortified foods. We introduced the concept of new foods after carrying out a mini pilot study to validate the questions, we were informed that biofortified food might be considered new or different from the norm in those communities we selected. Biofortified food production and consumption has been shown to be effective in mitigating micronutrient deficiency among the population when consumed. However, the experiences of the members of this population were different. Participants categorized biofortified foods as foreign, new, not satisfactory, and with the conclusion that biofortified foods will not meet their energy needs:

"*We see them as foreign foods and they are not satisfactory to us. They are foods taken first before the main food.* They are foods made for people *that are highly placed in society who are used to eating less owing to the less work they do." (Female group, rural resident, Ndufu-Echara town).*

Participants generally had negative thoughts or experiences about biofortified foods, some even mentioned experiencing negative side effects associated with consuming them thereby leading to their refusal to consume biofortified foods.

"I feel good about them, and my children are always happy when they see me cooking them because they have a sweet smell and are delicious, (however), I feel like vomiting after eating them." (Female group, urban resident, Abakaliki metropolis)

"I am afraid to eat them because it can cause a runny stomach." (Female group, rural resident, Ndufu-Echara town)

"We prefer our local foods. All we need is to get help to produce more." (Male group, rural resident, Umueje town)

"Yes, I don't eat potato because it causes stomach upset immediately after eating. Yes, I don't eat Garri because it causes stomach upset immediately after eating. It does not give energy like other commonly available foods eaten here, not satisfactory because the type of work we do here requires energy-giving food. I feel bad because they are not satisfactory" (Male group, rural resident, Ndufu-Echara town)

"We think it is food manufactured by Oyibo [foreign] people and sent to poor people like us. Since you say they are good for the body, we have no problem. We will buy them only

if they are cheaper than our local foods. If it is affordable, we have no problem trying new foods" (Female group, rural resident, Umueje town)

Participants offered contradictory statements whereby they insisted that cultural values do not impact what they eat but pointed to lack trust and belief systems as reasons for not consuming biofortified foods.

"I don't eat cassava-fufu because I was trained and nurtured by people who don't do so. Religious beliefs or cultural values do not impact any food we eat. We do not eat cassava or yam flakes." (Male group, urban resident, Abakaliki metropolis)

"The food must be for city dwellers who do not cultivate the land like we do. We do not trust Oyibo people and the things they bring to us. We don't need Oyibo foods; our forebears didn't eat them." (Male group, rural resident, Umueje town)

Information Inadequacy on Biofortified foods

A fourth theme among participants centered around information inadequacy on biofortified foods. This can be defined as a situation in which there is lack of information, or the source of the information is not consistent or accurate regarding a subject matter. The focus here was to find out about their prior knowledge (if any) about biofortified foods and how this knowledge was attained. The current mode of sharing and receiving information about biofortified foods in the communities we sampled was inadequate. There was limited access to information: little or no supply of electricity to watch television or listen to the radio regularly, and buying a newspaper to read the news was not an option because of the cost. While some communities had received some information from others (friends or relatives) who had consumed biofortified foods at some point, some had no information at all:

"*We only heard about them from you. We did not know there was enriched or biofortified foods available…normally we get information from the radio or from relatives, this is our first time of getting some information about the existence of these kinds of foods." (Female group, rural resident, Umueje town)*

Participants in one of the rural communities had only heard about 'biofortified foods' through the researcher during the focus group discussions, therefore, could not be engaged in the discussions about it. This shows that more efforts need to be geared towards knowledge transfer and enlightenment.

"We receive that information when we go to the hospital for ante-natal clinic and post-natal care. The distributors organize promotion programs to educate the public about the food." (Female group, urban resident, Abakaliki metropolis)

When considering the level of information received about biofortified foods, it is an understatement to say that the quality of information may be subpar:

"*I got informed from others who had eaten them. We receive such from the radio, television, food sellers among others."* (Male group, urban resident, Abakaliki metropolis)

"Other people who have eaten them." (Male group, rural resident, Ndufu-Echara town)

Although some information is presented by some community members, there was still some misinformation about fortified or biofortified foods vis-à-vis:

"They are delicious foods, but only rich people can afford them because they are costly. The distributors organize promotion programs to educate the public about them." (Female group, urban resident, Abakaliki metropolis)

"They are English man's food. They are foods that make one strong." (Male group, rural resident, Ndufu-Echara town)

Participants also showed misunderstanding in that they considered "indomie" a Nestle Foods brand of pasta with individually wrapped seasonings as a biofortified food:

"*Yes, my positive thought is that they are delicious, and have a good smell when cooked, while their high costs and unsatisfying nature makes me feel bad about it. I do eat indomie noodles because it weakens me after eating. It does not give me strength like other usual foods I eat with my family. I feel very bad and sometimes vomit after eating." (Male group, urban resident, Abakaliki metropolis)*

It is worthy to note that majority of those who had received some information about biofortified foods were residing in 'urban' areas.

Inadequate Community Nutrition Support Programs

A fifth theme among participants centered around inadequate community nutrition support programs. This can be defined as lack, or substandard nutrition-sensitive or nutrition-specific programs within the community along with government support. It is the role of the government to provide an enabling environment that encourages adequate nutrition of members of the household; mitigate underlying problems by ensuring good programs and services are available; and try to meet immediate needs by making funds available to put in place the appropriate infrastructures to support members of the community. Participants acknowledged receiving

nutrition education during ante-natal, post-natal and immunization clinics. However, these were the only nutrition programs available to them:

> *"No nutrition programs except the ones we receive during ante-natal care and immunization." (Female group, rural resident, Ndufu-Echara town)*

Nutrition education was sparse and limited to urban areas, which means rural residents had to travel to urban areas to have access to any nutrition program or healthcare providers travel to rural residents:

> *"Some health workers came and spoke to us about hygiene and caring for our children. The information they gave us was very useful. We need more of it and will appreciate it if they give us free baby food." (Female group, rural resident, Umueje town)*

There were complaints and dissatisfaction with the action or inaction of the current government regarding support for farmers and hike in prices of food products:

> *"The government is not doing very well for the rural dwellers." (Female group, rural resident, Ndufu-Echara)*

> *"The government should reduce the prices of petrol because it contributes to the rise in the prices of foods in the market." (Female group, urban resident, Abakaliki metropolis)*

We also received some form of advice or suggestions as to what they needed the government to do for them:

> *"The government should establish companies to reduce the rate of unemployment in our societies. Community disputes should be settled by the government because some of these*

communities are good in agriculture, hence, ensuring food security. The prices of fuel should be reduced." (Female group, urban resident, Abakaliki metropolis)

"The government can help the rural dwellers by providing farming equipment and chemicals like fertilizers, herbicides, and pesticides; to improve the yield of farm crops." (Female group, rural resident, Umueje town)

"They should pay us some money monthly. They should help us with farm input and machinery to improve our output. They should also repair the irrigation canals so we can farm during the dry season." (Male participant, rural resident, Umueje town)

These recommendations will be proposed as part of the recommendations obtained during the study as they are directly from members of the community, and it relays their daily experiences.

Table 4.3. Summary Table for FGDs

Themes	**Definition (What it represents)**	**Cases (No of participants)**	**Code Counts (No of Empirical indication)**	**Empirical Indication (Evidence - Quotes)**
Limited Food Supply	A situation in which household members do not have enough food to eat at a given time.	6	33	"Food prices are terribly high. We increasingly find it difficult to provide sufficient food for our family, we often do not have as much as we should which often leads to quarrels at home".

Feeding Practices	All the actions or behaviors, or steps taken to feed all members of the household appropriately depending on their age or state of development and cater for their needs including hygiene practices.	6	17	"It is important to wash our hands. We wash our hands before cooking, eating, or feeding our children. We wash our hands after defecating or cleaning our children; and after eating. We use soap most of the time and use only water when there is no soap."
Information Inadequacy on Biofortified foods	A situation in which there is lack of information, or the source of the information is not consistent or accurate or inadequate regarding a subject.	6	20	“We did not know there was enriched or biofortified foods available…normally we get information from the radio or from relatives, this is our first time of getting some information about the existence of these kinds of foods.”
Experiences about Biofortified or New foods	Day-to-day feelings, thoughts, and concerns around consuming biofortified foods that plays a role in the decision to consume or not to consume.	6	19	"We see them as foreign foods and they are not satisfactory to us." "They are foods taken first before the main food." "They are foods made for people that are highly placed in society who are used to eating less owing to the less work they do."

Inadequate Nutrition Programs and Government Support	Lack, or substandard nutrition-sensitive or nutrition-specific programs within the community along with government support.	6	20	"The government is not doing very well for the rural dwellers." "No nutrition programs except the ones we receive during ante-natal care and immunization." "Government can help the rural dwellers by providing farming equipment and chemicals like fertilizers, herbicides, and pesticides; to improve the yield of farm crops."

4.7 Discussion

This study was very significant because it assessed the lived experiences of residents in rural and urban communities in two southeastern states in Nigeria which revealed the state of the food environment in these communities. Our findings revealed a high level of food insecurity, partly because of high food prices among these communities; and maybe because of low level of income or purchase power to access the foods. While our results suggest hike in food prices, this

is not limited to these communities, it cuts across Nigeria as a nation. The National Bureau of Statistics report shows that there has been a continuous increase in prices of food among other items since 2022 (NBS, 2022b). The implication of hike in food prices invariably means reduced buying power of food items by those with limited resources, resulting in increased food insecurity. Indeed, when staple prices rise, diet quality among the poor tends to decline (Herforth & Ahmed, 2015). The ripple effect of not having enough food to eat results in acute malnutrition, especially among the vulnerable population. While Food environments represents the collective physical, economic, policy and socio-cultural surroundings, opportunities and conditions that influence people's food and beverage choices and nutritional status, it also includes food composition, food labelling, food promotion, food prices, food provision in schools and other settings (Herforth & Ahmed, 2015). Thus, emphasizing that the food policy and socio-political structures in an environment will impact the food supply and nutritional status of its population (Serra Majem et al., 2018). Rural farmers who had vegetable gardens and reared livestock in their compounds were more food secure than rural residents who did not. This agrees with a study that showed the importance of home gardening (Joseph et al., 2020). Our findings also raised an important question: how might the government of Nigeria improve the food environment at the community, local, state and federal level? A multidimensional, multidisciplinary and multilevel approach might be a necessary approach.

The education of mothers and all members of the household cannot be overemphasized; as we saw that feeding practices, specifically hygiene practices in the communities we studied, were according to WHO recommendations. This can be related to the information and consistent training received at the antenatal clinics, and perhaps during the pandemic where washing hands with soap and water was emphasized to minimize the spread of pathogens. Conversely,

breastfeeding practices were not consistent as per WHO recommendations. While some mothers breastfed exclusively and reported to be giving appropriate complementary feedings; we had some reports of mothers who, because of cultural practices and lack of awareness, introduced their infants to other fluids at a very early stage before introducing breastfeeding. Hence, not all members of the household were fed appropriate foods for their age. This still points to food access, which is an aspect of food security (UNICEF, 2021).

Food access is a factor of food security, along with food availability and affordability (Blesh et al., 2019; FAO, IFAD, UNICEF, WFP, and WHO, 2021). Currently in Nigeria, food is available, but not affordable. The State of the world's nutrition (2024) reported that in 2023, one in five persons in Africa were hungry, 864 million were severely food insecure and 71.5 percent in LMICs could not afford a healthy diet (UNICEF, 2024a). These numbers need to be brought down. Little wonder, the community members we interacted with hoped that the government would give them money, some form of cash transfer to allay the burden they were experiencing.

Another major area of concern our findings revealed was regarding biofortified foods or "new foods" as considered by some community members who had not heard about biofortified foods prior to our interaction with them. Our findings showed their thoughts, concerns, and actions towards biofortified foods. Thoughts of fear, worry, concerns and negative feelings regarding consuming biofortified foods were voiced by our participants. For some, these feelings were premised on prior negative experiences when biofortified foods were consumed, such as vomiting, and stomach upset. For others, no cogent reason was given other than "what they were brought up with," culture and norms, preference for certain taste, texture and consistency of the final product. And these feelings played a significant role in their decision to consume, or not to consume biofortified foods. Nutritionally, improving the existing regular staple crops without

altering the traditionally known identities of the crop was the principle of conventional biofortification. However, biofortified cassava, maize and sweet potato have been reported to have less dry matter, and more moisture content, with a softer texture than the non-biofortified varieties (Phorbee et al., 2022, 2023). This agrees with another study that assessed Nigerian consumers preference for biofortified foods. The study showed that some consumers, especially urban residents preferred biofortified food (gari obtained from biofortified maize), because of its higher vitamin A content and were willing to pay more to obtain the product; whereas, some consumers did not select biofortified foods, their reasons were related to perception of traditional food qualities like texture, colour, size and some organoleptic attributes (Kolapo, 2023). Innovative approaches, and advocacy will be helpful to promote acceptance of biofortified foods in Nigeria (Phorbee et al., 2022).

Our findings further revealed that there was misinformation about biofortified foods among some of the residents whom we studied. The sources of information identified were health education during ante-natal or postnatal clinic, and media via television and radio. This mode of sharing information is inadequate because only mothers who attend ante-natal or postnatal clinics will receive this information. Another study carried out in Nigeria that had assessed pre-knowledge of biofortified foods found that there was low knowledge: 48 percents of participants of that study were urban dwellers, however, only 36 percent of them had pre-knowledge of biofortified foods (Kolapo, 2023).

Furthermore, our findings revealed a lack of community nutrition support programs especially in the rural communities. The participants who had reported receiving nutrition education from clinics were essentially urban residents, buttressing the fact that rural residents did not have this support system readily available to them. Hence, there was limited nutrition support/ promotion

programs compounded by poor political commitment. Nutrition interventions should be delivered in a combinations of settings including hospitals, home, family and the community environment to enhance utilization and efficacy (Walsh et al., 2023). The government along with the private-public sector, civil society and other stakeholders must work together to establish this.

4.8 *Strengths and Limitations*

Strengths - One strength of this study was that incentives were not given to research participants, except for a token that was given to them to compensate for their time. This was done to avoid any form of cohesion into participating in the study, so participants made an informed decision to participate in the study voluntarily. Secondly, focus group discussions were conducted based on participants' gender: focus group discussions for men were separated from focus group discussions for women in each of the three communities. This was done to encourage freedom of expression without any concerns of backlash from either gender. Finally, using UNICEF conceptual framework of Determinants of Maternal and Child nutrition helped to highlight constructs of focus for the study. Likewise, using an integrated approach in analysis of the data allowed for deeper exploration of the data.

Limitations – We carried out cross-sectional qualitative research, that is, focus group discussions among parents of children under five years, in three communities only. Perhaps, assessing varied members of the community, utilizing mixed methods research, and in more communities would have produced more generalizable data of communities' experiences of the food environment.

4.9 *Conclusion*

Being a qualitative study in which the lived experiences of community members were assessed, we were able to identify what the pressing need of the community members were; their thoughts, concerns and experiences regarding consumption of biofortified foods, community nutrition support programs available to them, their food environment experiences and the part the governments plays in improving food availability, accessibility and affordability in Nigeria. There are high levels of food insecurity demonstrated by participants rationing food in the households. Although there was ongoing malnutrition among vulnerable members of the population, this increased because of a consistent rise in food prices. Biofortification, or biofortified foods, a food-based food innovation approach to mitigate micronutrient deficiency nationwide had not been accepted or consumed largely among the community residents we examined. The government has a huge role to play in allaying the burden of malnutrition among its population by providing supports such as cash transfers, social safety nets, farm equipment, subsidized seeds and training to increase awareness of the types and benefits of biofortified foods in rural locations.

Chapter 5. Conclusion

5.1 Summary of Research Findings

This thesis assessed the impact of nutrition policy and food innovation in mitigating micronutrient malnutrition in Nigeria. It examined the lived experiences of selected community members, and the perspectives of policymakers regarding nutrition-sensitive and nutrition-specific policies in Nigeria; to assess the impacts of these policies and related interventions among selected communities in Nigeria.

The critical discourse analysis revealed power imbalances in the discourse of the document that will impede the implementation of the policies, these were named barriers. Positive social constructs were also identified that we named enablers. Altogether, we proffered recommendations to enhance the positive outcome of the policies implementation. Indeed, more insight were obtained as to reasons for patterns of consumption of biofortified foods in Nigeria and finally, we also received insight into the experiences of the public residing in those areas. This will be geared towards improving nutrition support and interventions given to rural populations [interventions: education, awareness in the community or benefits of biofortified foods].

This study is significant in that we took a dive into utilizing qualitative research methods to review policy documents in use in Nigeria currently and we identified enablers and barriers to policy implementations. We also interviewed policymakers and discussed with members of selected communities to find out what their perspectives and experiences as beneficiaries were respectively. This gave us more understanding in terms of utilization of interventions by beneficiaries and areas that may be improved. Specifically, taste, preference, cultural norms, misinformation and lack of adequate information impedes acceptance and consumption of

biofortified foods among the communities we studied. Hence, to improve effectiveness of policies related to consumption of biofortified foods, consistent and correct information in the language they understand, improving final product of biofortified foods with the help of food industries, behavioural change communication and education may be necessary.

5.2 Significance of the Study

Results from this study could provide evidence of a potentially effective private-public sector partnership that will improve the food environment in terms of availability, affordability, and access to more healthy variable diets within the community. It may increase the political commitment of the local governments to provide resources to implement and /or improve the already established interventions that are providing nutrition care and services to household members in the community, it could increase the awareness and importance of enriched foods, food-to-food fortification and biofortified foods. As well, the Baby Friendly initiatives could be improved to promote and support breastfeeding and appropriate care practices. In collaboration with stakeholders and policy makers, results from this study could support scale up efforts and be useful to better understand and improve the food environment, increase availability, and access to social safety nets, and reduce malnutrition in rural Nigeria. Ultimately, results from this study will improve household members' health outcomes in rural communities.

5.3 Strengths, Limitations and Future Research

Future Research – A future area of study could be to carry out at first a pilot intervention study to analyze the impact of nutrition education on consumption of biofortified foods. Another could be to carry out an intervention study to scale up Baby Friendly Hospital Initiative to community level. A mixed study of qualitative and quantitative research methods could be undertaken to

assess at a larger proportion the implications of different food environments and their impacts on residents' nutritional status.

Limitations – One limitation of this study was that the interviews were done virtually, which may have impacted communication flow, as there were rare occasions when receipt of message was impeded due to poor or limited internet connection.

Strengths – A strength of this study was that the interview sessions were not recorded due to tacit fear of reprisal by participants which may have impacted on their willingness to participate. Hence, the interviewer documented simultaneously as the interview session proceeded. By respecting participants' wishes, and ensuring anonymity, we built rapport with them and improved their trust in the research process. Additionally, the in-depth interview method used allowed full exploration of the topics of discussion, thus producing detailed, comprehensive and less biased data. Likewise, we employed three different methods of qualitative research methods: document review, focus group discussions and in-depth interviews to enhance data validation.

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APPENDIX A

Université d'Ottawa
Bureau d'éthique et d'intégrité de la recherche

University of Ottawa
Office of Research Ethics and Integrity

CERTIFICAT D'APPROBATION ÉTHIQUE | CERTIFICATE OF ETHICS APPROVAL

Numéro du dossier / Ethics File Number H-09-23-9402
Titre du projet / Project Title Impact of Nutrition Policy and Food Innovation in Mitigating Micronutrient Malnutrition
Type de projet / Project Type Thèse de maîtrise / Master's thesis
Statut du projet / Project Status Approuvé / Approved
Date d'approbation (jj/mm/aaaa) / Approval Date (dd/mm/yyyy) 02/10/2023
Date d'expiration (jj/mm/aaaa) / Expiry Date (dd/mm/yyyy) 01/10/2024

Équipe de recherche / Research Team

Chercheur / Researcher
Affiliation Role
Oluwayemisi IHEDIWA École des sciences de la nutrition / School of Nutrition Sciences
Chercheur Principal / Principal Investigator
Chibuike UDENIGWE École des sciences de la nutrition / School of Nutrition Sciences
Superviseur / Supervisor

Conditions spéciales ou commentaires / Special conditions or comments

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APPENDIX B – INTERVIEW GUIDE

Interview Guide for Key Informants' In-depth interviews

1. What do you know about Baby Friendly initiatives?
2. Are you aware of any health facilities within your community/ local government area that provide Baby Friendly Initiatives services to mothers and children?
3. Are you aware of the International Code for Marketing Breastmilk substitutes?
4. What steps are being taken to monitor and enforce this code within health facilities?
5. Do you know if any states in Nigeria have maternity protection laws and regulations to allow for six months maternity leave for working mothers? Probe: how many? Are steps being taken to increase this number?
6. Are you aware of workplace Baby Friendly interventions to encourage continued breastfeeding while at work? Probe: lactation rooms/ breastfeeding corners, refrigerators to store expressed breastmilk?
7. Are there any steps or regulations in place to allow organizations and private firms to voluntarily operationalize baby friendly interventions? Probe: would incentives for compliance with these regulations be necessary?
8. Are there any community support programs for breastfeeding or new mothers within the community?
9. How would you improve the number of mothers who attend and receive nutrition education at antenatal clinics?
10. How can the number of mothers willing and able to breastfeed increase?
11. What do you know about enriched foods? Probe: fortified food, biofortified food?
12. What are some foods in your community that are enriched with essential nutrients? Probe: how affordable are these foods? Are they readily available on the market?
13. What comes to mind when you hear biofortified foods?
14. What are your thoughts about increasing the production of biofortified foods?
15. How do you feel about consuming these foods? Probe: cultural values, religious beliefs?
16. How willing are midwives/ healthcare professionals to teach mothers to breastfeed? Pump milk?
17. Is it considered too much work? Probe: not enough time? Too many clients to attend to?

18. To what extent are healthcare practitioners working in mother and child health facilities competent to teach mothers to express milk and store prior to delivery (Caesarean section)?

Sociodemographic questions

19. Age /range_____
20. Gender_____
21. Highest Level of Education_____
22. Household size_____
23. Ethnicity_____
24. Marital Status_____
25. Occupation/ Employment Status_____

APPENDIX C – FOCUS GROUP DISCUSSIONS GUIDE

Introductory questions

1. What are examples of foods eaten in your home? Probe: does every member of the household eat the same meal each time?
2. Are there any foods readily available in your community that you do not eat at home? Probe: why is this so? Cultural values? Religious beliefs?
3. Who decides what to eat at home (for example portion sizes, how many meals are there each day)? Probe: does the price of food have a role to play in this decision?

Knowledge questions

4. What do you know about enriched foods? Probe: fortified foods, biofortified foods?
5. What comes to mind when you hear biofortified foods? Probe: cultural meaning?
6. Do you have positive or negative thoughts or feelings about biofortified foods? Why?
7. How do you feel about eating foods you are not used to eating, new foods? Probe: fear, concerns, values, norms.
8. What are your sources of information about these foods? Probe: new foods, enriched foods.

Resources

9. How are you able to access these foods? Probe: Fortified/biofortified foods, fruits, and vegetables/ animal protein.
10. Does the taste of these foods influence your decision to eat them?
11. Do you need to spend more time cooking these foods than usual?
12. Does cooking or eating these foods have any environmental impacts?

Governance questions

13. What do you feel about the role of government in your community?
14. What type of nutrition programs have been brought to your community by the government? Probe: was it relevant, appropriate, meet a specific need, would you like it to continue?
15. How do feel about food prices? Probe: does it affect how much food you buy, how much you eat? Or how often you did eat at home?

16. What do you feel the government can do to improve this?

Care, Practice and Service questions

17. Did you give your child(ren) breastmilk? Probe: this started when, how often, for how long?
18. When did you first give your child(ren) other fluids/ foods? Probe: why?
19. What do you feel about washing your hands? Probe: when?
20. What do you know about nutrition education? Healthy diets?
21. Have you ever received any form of education/counselling from healthcare workers?

Sociodemographic questions

22. Age/ age range_____
23. Gender_____
24. Highest Level of Education_____
25. Household size_____
26. Ethnicity_____
27. Marital Status_____
28. Occupation/ Employment Status_____

APPENDIX D – CONSENT FORMS FGD MEN

Consent Forms for Men Participants
Focused Group Discussions
School: School of Nutrition Sciences
University: University of Ottawa
Researcher: Oluwayemisi Carol Ihediwa
Supervisor: Dr. Chibuike Udenigwe
Title of Study: Impact of Nutrition Policy and Food Innovation in Mitigating Micronutrient Malnutrition

Good morning/ Afternoon Sir/Madam,

My name is Carol Ihediwa, and I am a master student conducting research at School of Nutrition Sciences, at the University of Ottawa, Canada. This study is also affiliated with Prof. Chukwunonso Ejike, our collaborator at (Alex Ekwueme Federal University Ndufu-Alike Ikwo, Ebonyi state, Nigeria).

This is my master's thesis project.

Introduction

We want to learn about your experiences with food and feeding practices in your household and your community. Topics will cover breastfeeding practices, infant and young child feeding and care practices, appropriate complementary feeding, and overall care and feeding practices of members of your household. We would also like to know your perception about consuming enriched foods (fortified foods and biofortified foods), locally produced (endemic/indigenous foods). We would also like to find out about your experiences with food prices, availability of foods, food preparation, and consumption and how these might be improved.

Procedure

Your participation is entirely voluntary, and you may withdraw from the study at any time with no consequences to you. We are talking in a group setting so we cannot guarantee confidentiality, other participants will hear your responses. Please do not share information that you do not feel comfortable sharing. We ask that you please respect the privacy of other participants by not repeating anything we discuss here outside of this meeting. Questions will be read to you in pidgin English; however, questions can be translated in the local dialect should you prefer this option. The discussion should take about one hour to complete. Verbal consent will be obtained at the point of being recruited to participate in this study and consent forms will be distributed prior to commencing each focused group discussion, once you are given the consent forms, please read through and append your signature or verbally consent if you prefer, if you consent to participating in the focused group discussion. Your responses will only be used for the purpose of this study.

Possible Risk

There is no risk to you in participating in this study. Rest assured that you do not have to answer any questions that make you uncomfortable, and you may discontinue participation at any time. Please be aware that the information you willingly share during the focus group discussions will be used for the purpose of research only.

Participation and Possible Benefits

There is little compensation for your time shared with us during the data collection process. However, this is by no means a form of coercion to make you participate in the study. Your decision to participate is entirely voluntary. Your responses will influence the planning of health and social services, as well as nutrition-sensitive and nutrition-specific programs within your community. Nutrition status and health in your community may also be improved. You will be provided with a summary of the findings when the study is completed.

Confidentiality

Please be informed that for focus group discussions, confidentiality of information shared is limited, because it is a group setting and other members of the group will hear what is being discussed. Please, do not give any information you do not feel comfortable to share. Also, for the sake of other group participants, information shared by members of group within the focus groups should not be discussed outside the group discussion. If you require any support, please let us know and we will help, or refer you to those who can help.

Focused group discussion will be audio taped (recorded) and transcribed, at which point all identifying information will be removed. If you decide to withdraw your data after participating, please let us know, and we will discard it accordingly. However, please note that focus group data are collective in nature because they are highly dependent on the discussions of a group, therefore, data collected will be used. Rest assured that all data presented will be anonymized.

All transcriptions will be stored on a password-protected computer and only the researcher and her supervisor will have access to the data from the focus group discussions.

The Federal University Ndufu Alike Ikwo representative(s) will only have access to the coded data which will have all identifying information such as names, and address, removed. Information collected will be held safely and destroyed after 5 years. The researcher will share results from this study in her dissertation, as scholarly publications, and at conference meetings. No identifying information will be included in reports or presentations. Participants will be assigned a pseudonym as an example: PM1 (male participant, number) or PW1 (female participant, number). Your confidentiality will always be respected. The research team will try to prevent any problems that may arise, and we will help within our jurisdiction. Please let us know if any problems arise and we will help you.

Contact

Should you have any questions about the research study, you may contact the researcher, Carol Ihediwa at ____ or via email _____ and Dr. Chibuike Udenigwe at _____ or via email ____

You will be given a copy of this signed and dated informed consent form to keep. In addition, you may verify the ethical approval of this study or raise any concerns you might have by contacting the Office of Research Ethics and Integrity at the University of Ottawa at 1-613-562-5380 or via email ethics@uottawa.ca or by mail at: uOttawa.ca |

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The Research Ethics Committee
Alex Ekwueme Federal University Ndufu-Alike,
PMP 1010 Abakaliki,
Ebonyi, Nigeria.

By signing below, or by giving a verbal consent which will be indicated below by ticking the box; you confirm that you have read this document. Your verbal consent and /or signature confirms your voluntary participation in this research project.

Signature of Volunteer: _____Date:

Signature of Researcher: _____Date:

Do you agree to being audio taped during the focus group session? Please indicate your preference by checking the applicable box below:

☐I consent to participating in the focus groups, and to being audio taped during the focus group session, and to the recordings used to aid the researcher's thesis work.

☐ I do not consent to being recorded during this session.

APPENDIX E – CONSENT FORMS FGD WOMEN

Consent Forms for Women Participants
Focused Group Discussions
School: School of Nutrition Sciences
University: University of Ottawa
Researcher: Oluwayemisi Carol Ihediwa
Supervisor: Dr. Chibuike Udenigwe

Title of Study: Impact of Nutrition Policy and Food Innovation in Mitigating Micronutrient Malnutrition

Good morning/ Afternoon Sir/Madam,

My name is Carol Ihediwa, and I am a master student conducting research at School of Nutrition Sciences, at the University of Ottawa, Canada. This study is also affiliated with Prof. Chukwunonso Ejike, our collaborator at (Alex Ekwueme Federal University Ndufu-Alike Ikwo, Ebonyi state, Nigeria).

This is my master's thesis project.

Introduction

We want to learn about your experiences with food and feeding practices in your household and your community. Topics will cover breastfeeding practices, infant and young child feeding and care practices, appropriate complementary feeding, and overall care and feeding practices of members of your household. We would also like to know your perception about consuming enriched foods (fortified foods and biofortified foods), locally produced (endemic/indigenous foods). We would also like to find out about your experiences with food prices, availability of foods, food preparation, and consumption and how these might be improved.

Procedure

Your participation is entirely voluntary, and you may withdraw from the study at any time with no consequences to you. We are talking in a group setting so we cannot guarantee confidentiality, other participants will hear your responses. Please do not share information that you do not feel comfortable sharing. We ask that you please respect the privacy of other participants by not repeating anything we discuss here outside of this meeting. Questions will be read to you in pidgin English; however, questions can be translated in the local dialect should you prefer this option. The discussion should take about one hour to complete. Verbal consent will be obtained at the point of being recruited to participate in this study, and written consent forms will be distributed prior to commencing each focused group discussion. Once you are given
the written consent forms, please read through and append your signature if you consent to participating in the focused group discussion. Your responses will only be used for the purpose of this study.

Possible Risk

You may experience psychological or emotional discomfort while discussing difficult experiences. Rest assured that you do not have to answer any questions that make you uncomfortable and you may discontinue participation at any time. Please be aware that the information you willingly share during the focus group discussions will be used for the purpose of research only. Should you require assistance in dealing with difficult experiences, please seek assistance from your community support primary healthcare staff.

Participation and Possible Benefits

There is little compensation for your time shared with us during the data collection process. However, this is by no means a form of coercion to make you participate in the study. Your decision to participate is entirely voluntary. Your responses will influence the planning of health and social services, as well as nutrition-sensitive and nutrition-specific programs within your community. Nutrition status and health in your community may also be improved. You will be provided with a summary of the findings when the study is completed.

Confidentiality

Please be informed that for focus group discussions, confidentiality of information shared is limited, because it is a group setting and other members of the group will hear what is being discussed. Please, do not give any information you do not feel comfortable to share. Also, for the sake of other group participants, information shared by members of group within the focus groups should not be discussed outside the group discussion. If you require any support, please let us know and we will help, or refer you to those who can help.

Focus group discussion will be audio taped (recorded) and transcribed, at which point all identifying information will be removed. If you decide to withdraw your data after participating, please let us know and we will discard it accordingly. However, please note that focus group data are collective in nature, because they are highly dependent on the discussions of a group, therefore, data collected will be used. Rest assured that all data presented will be anonymized.

All transcriptions will be stored on a password-protected computer, and only the researcher and her supervisor will have access to the data from the focus group discussions. The Federal University Ndufu Alike Ikwo representative(s) will only have access to the coded data which will have all identifying information such as names, and addresses removed. Information collected will be held safely and destroyed after 5 years. The researcher will share results from this study in her dissertation, as scholarly publications, and at conference meetings. No identifying information will be included in reports or presentations. Participants will be assigned a pseudonym as an example: PM1 (male participant, number) and PW1 (female participant, number). Your confidentiality will always be respected. The research team will try to prevent any

problems that may arise, and we will help within our jurisdiction. Please let us know if any problems arise and we will help you.

Contact

Should you have any questions about the research study, you may contact the researcher, Carol Ihediwa at _____ or via email _____ and Dr. Chibuike Udenigwe at _____ or via email _____

You will be given a copy of this signed and dated informed consent form to keep. In addition, you may verify the ethical approval of this study or raise any concerns you might have by contacting the Office of Research Ethics and Integrity at the University of Ottawa at 1-613-562-5380 or via email ethics@uottawa.ca or by mail at: uOttawa.ca |

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The Research Ethics Committee
Alex Ekwueme Federal University Ndufu-Alike,
PMP 1010 Abakaliki,
Ebonyi, Nigeria.

By signing below, or by giving a verbal consent which will be indicated below by ticking the box; you confirm that you have read this document. Your verbal consent and /or signature confirms your voluntary participation in this research project.

Signature of Volunteer: _____Date:

Signature of Researcher: _____Date:

Do you agree to being audio taped during the focus group session? Please indicate your preference by checking the applicable box below:

☐I consent to participating in the focus groups, and to being audio taped during the focus group session, and to the recordings being used to aid the researcher's thesis work.

☐I do not consent to being recorded during this session.

APPENDIX F – CONSENT FORM FOR IN-DEPTH INTERVIEWS

Consent Forms for Participants – Key Informants
In-depth Interviews with Key Informants
School: School of Nutrition Sciences
University: University of Ottawa
Researcher: Oluwayemisi Carol Ihediwa
Supervisor: Dr. Chibuike Udenigwe
Title of Study: Impact of Nutrition Policy and Food Innovation in Mitigating Micronutrient Malnutrition

Good morning/ Afternoon Sir/Madam,

My name is Carol Ihediwa, and I am a master student conducting research at School of Nutrition Sciences, at the University of Ottawa, Canada. This study is also affiliated with Prof. Chukwunonso Ejike at (Alex Ekwueme Federal University Ndufu-Alike Ikwo, Ebonyi state, Nigeria).

This is my master's thesis project.

Introduction

We want to learn about your perspectives and opinion around Baby Friendly Initiatives as well as the state of micronutrient deficiency in Nigeria. Topics will cover breastfeeding practices, baby friendly initiatives and practices within health facilities, any regulations or law in place to improve baby friendly initiatives and how baby friendly initiatives are implemented with regards to working mothers and mothers in informal employment. We will also ask about enriched foods (biofortified and fortified foods) and consumption patterns and how these may be improved.

Procedure

Your participation is entirely voluntary, and you may withdraw from the study at any time with no consequences to you. It is a qualitative research study using focused group discussions and in-depth interviews of key informants. The interview will be virtual, through telephone calls, and notes will be taken as much as possible, although the telephone conversation will not be audio-recorded. The researcher will introduce the procedure briefly at the beginning of the interview to each participant and obtain verbal consent after which any questions from the participant will be answered and then the researcher will inform you that the consent forms will be sent to you by email for your e-signatures and to have a copy for yourselves. The interview should take about 60 minutes and it will be done virtually. Your responses will be used only for the purpose of this study.

Possible Risk

There are no costs or risks to you for participating. Rest assured that you do not have to answer any questions that make you uncomfortable, and you may discontinue participation at any time. Please be aware that the information you willingly share during the interview will be used for the purpose of research only.

Participation and Possible Benefits

There will be little compensation for your time taken during data collection. However, this is by no means a form of coercion to participate in the study. Your decision to participate in the study is entirely voluntary. Your responses will influence the planning of health and social services, as well as nutrition-sensitive and nutrition-specific programs within your community. You will be provided with a summary of the findings when the study is completed.

Confidentiality

The interview questions are not sensitive or specific to lead to identifying any specific person. They are general questions aimed at improving the situation in the country and created to be answered by policymakers because of their experiences and expertise regarding the topic of interest. The key informants are not likely to be identified from answers provided during the interview. At the time of presentation of results at conferences for knowledge dissemination, it will be mentioned that interview took place with policymakers; however, no identifying information will be collected, and none will be shared to ensure anonymity. We are not legally required to disclose the identity of research participants. If participants choose to be identified, that will not be based on the data we collected, as it will not be recorded, only notes will be taken for the purpose of answering the research questions.

The one-on-one in-depth interview will not be recorded, this is due to the political environment of the participants as there is underlying fear of retribution. However, notes will be taken by the researcher during the interview. If you decide to withdraw your data after participating, please let us know and we will discard it accordingly. Rest assured that all data presented will be anonymized.

All information collected will be stored on a password-protected computer, and only the researcher and her supervisor will have access to the data from the interview. The Federal University Ndufu Alike Ikwo representative(s) will only have access to the coded data which will have all identifying information removed. Information collected will be held safely and destroyed after 5 years.

The researcher will share results from this study in her dissertation, as scholarly publications, and at conference meetings. No identifying information will be included in reports or presentations. Participants will be assigned a pseudonym as an example: PM1 (male participant, number) or PW1 (female participant, number). Your confidentiality will always be respected. The research team will try to prevent any problems that may arise, and we will help within our jurisdiction.

Contact

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You will be given a copy of this signed and dated informed consent form (online) to keep. In addition, you may verify the ethical approval of this study or raise any concerns you might have by contacting the Office of Research Ethics and Integrity at the University of Ottawa at 1-613-562-5380 or via email ethics@uottawa.ca or by mail at:
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PMP 1010 Abakaliki,
Ebonyi, Nigeria.

By signing below, you confirm that you have read this document. Your signature confirms your voluntary participation in this research project.

Signature of Volunteer: _____Date:

Signature of Researcher: _____Date:

Do you agree to participate in the one-on-one interview session and the data obtained is being documented? Please indicate your preference by checking the applicable box below:

☐I consent to participating in the interview session and the information given being documented and the documented data being used to aid the researcher's Thesis work.

☐I do not consent to documentation of data obtained during this session.