



The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

EVALUATION OF FOOD AND NUTRITION SECURITY STATUS OF NIGERIA PRESCHOOL CHILDREN TOWARDS ACHIEVING THE SUSTAINABLE DEVELOPMENT GOALS 1,2,3 - A REVIEW

Omachi BA^{1*}, Van Onselen A² and U Kolanisi³



Alice Omachi

*Corresponding author email: omalice80@gmail.com

¹Department of Dietetics and Human Nutrition, University of Kwazulu-Natal, South Africa

²Department of Human Nutrition and Dietetics, Sefako Makgatho Health Sciences University, Pretoria, South Africa

³Department of Consumer Services, University of Zululand, Kwazulu-Natal, South Africa

ABSTRACT

Child nutrition is essential to any country's food and nutrition security status. It goes beyond food security to encompass all the components of child well-being and cognitive development. It includes infant and young child feeding practices, care practices, and hygiene. Africa accounts for the highest prevalence of child malnutrition and mortality worldwide. The complexity and interconnectedness of the components of child nutrition in developing countries are yet to be well conceptualized. Due to a high poverty rate, economic shock, and conflicts in many sub-Sahara countries like Nigeria. Nigeria, the most populated country in this region, records a high prevalence of child malnutrition, morbidity, and mortality. High poverty, poor policies, poor dietary intake, and care practices among households have become a significant concern and a public health issue, especially as the country navigates toward achieving the Sustainable Development Goals (SDGs) 2030 and the Africa agenda 2063. This review brings home the contributions of the multidimensional drivers of child nutrition to Nigerian children's overall health outcomes and food security status. In addition, it proffers possible solutions to these challenges to ensure the attainment of both the SDGs and Africa agenda indicators that address hunger, poverty, and the overall well-being of children. The study also emphasizes the importance of optimal nutrition to ensure that children reach their full potential, reduce the risk of childhood illness and chronic diseases in adulthood, and ultimately contribute significantly to the nation's labour force, productivity, and gross domestic product (GDP). Therefore, the study explores available online resources, peer-reviewed articles, books, and relevant reports from official websites that identify the drivers of children's food and nutrition security status from Nigeria's perspective. Overall, in Nigeria, most preschool children do not consume sufficiently safe and nutritious diets for optimal growth and development; hence, they are just surviving but not thriving.

Key words: Childhood, nutrition, preschool, components, pandemic, children, SDGs, Nigeria

INTRODUCTION

Food is an essential component of human existence for proper growth, development, and prevention of nutrition-related disorders and diseases, especially among children. It is anything consumed and utilized by the body for its proper function. Access to healthy, nutritious food during fetal development and the first 1000 days of a child's life is an essential determinant of the overall well-being of any child [1]. This access to nutritious food forms a vital indicator of the food and nutrition security status of any Nation [2].

The optimal nutrient intake of children impacts significantly on their overall health outcomes and their food security status. Hence, the state of food and nutrition status of children in any nation determines the national preparedness towards achieving no poverty, zero hunger, and good health and well-being, which are important indicators of sustainable development goals (SDGs) 2030 and Africa agenda 2063 [3].

Africa and Asia account for the highest prevalence of malnourished children, especially among under-fives. For instance, UNICEF/ WHO/WB-JME 2019 reported that more than one-third of under-five children are stunted, about one-quarter are overweight, and more than one-quarter are wasted in Africa compared to Europe and Oceania [4].

A child is well-nourished and food secure when there is sufficient physical and economic access to safe and nutritious food [5]. Children's food and nutrition security status is affected by household food basket, socioeconomic status of the parents, demographic/environmental factors, and the nutrition knowledge of their parents or caregivers [6]. Of these factors, household food environment and food acquisition are the primary determinants of children's nutritional status and health outcomes in many low- and middle-income countries (LMICs) [7].

Several interconnected factors determine children's dietary intake and nutritional status in developing countries. These factors include socioeconomic, feeding practices, care or hygiene, behavioural, environmental or geographical, affordability of quality health care services, and policy and social support systems for women and children. The factors are highlighted in the 2020 United Nations Children's Fund (UNICEF) conceptual framework on determinants of maternal and child nutrition.

Globally, the prevalence of chronic malnutrition among under-five children has been alarming. For instance, in 2017, about 155 million, 41 million, and 55 million under-five children were stunted, overweight, and wasted, respectively [8]. Approximately 60 million and 13 million children are affected by moderate and severe acute malnutrition, respectively, with about 8 to 11 million under-five children's yearly deaths. Malnutrition accounts for half of these deaths; hence, food insecurity and undernutrition among children account for one-third of the global estimate of food and nutrition insecure people [9].

Poor food intake, both in quality and quantity, is often due to food insecurity and accounts for the increased risk of susceptibility to various forms of malnutrition, infections, and mortality among children [5]. The prevalence of under-five stunting has continued to reduce globally over the past decades, Africa has not recorded any significant reduction in the cases of stunting over the past years [5].

According to UNICEF, Africa and Asia had the highest prevalence of malnourished children in 2020 [10]. In 2019, about 59 million under-five children were stunted in Africa; despite this alarming rate, overweight and obesity among children have continued to rise. The prevalence of undernourishment (PoU) in Sub-Saharan Africa is high and a significant public health concern in the region, especially in countries like Nigeria [11].

Nigeria is ranked 159th out of 162 countries progressing toward meeting Sustainable development goals (SDGs) [10]. The estimated proportion of poor people who cannot afford healthy diets in 2017 was 69% and is attributed to the high level of poverty and food insecurity rate. Nigeria's high poverty and food insecurity affect children's nutritional status [11]. Recently, malnutrition presented as a triple burden (which is the coexistence of undernutrition, micronutrient deficiencies, and over-nutrition) and accounts for about 50% of child mortality in developing countries [12].

Scholarly articles have reported that children's food insecurity (FI) results in adverse health outcomes such as diet-related non-communicable diseases and mortality [13]. Hence, this study explores relevant materials, online resources, books, and journal articles on the drivers and challenges of child nutrition and identifies the impacts of a pandemic, civic unrest, and economic shock on Nigerian children's nutritional health.

Determinants of Food and Nutrition Insecurity among Nigerian Children

Good nutrition among children is beyond food security; it includes proper care practices such as breastfeeding, infant and young child feeding practices (IYCFPs), a hygienic environment, and healthy, nutritious diet intake. Therefore, good nutrition entails a child being healthy enough to absorb all the essential nutrients needed to support optimal growth and development throughout the developmental stages [14].

Food instability can affect child nutrition security. When children experience insufficient access to adequate, safe, and nutritious food periodically, it negatively impacts their nutritional status and results in infant/ child morbidity and mortality [7]. The determinants of childhood malnutrition and food insecurity are multifaceted and intertwined, as summarized in Fig.1.[42]

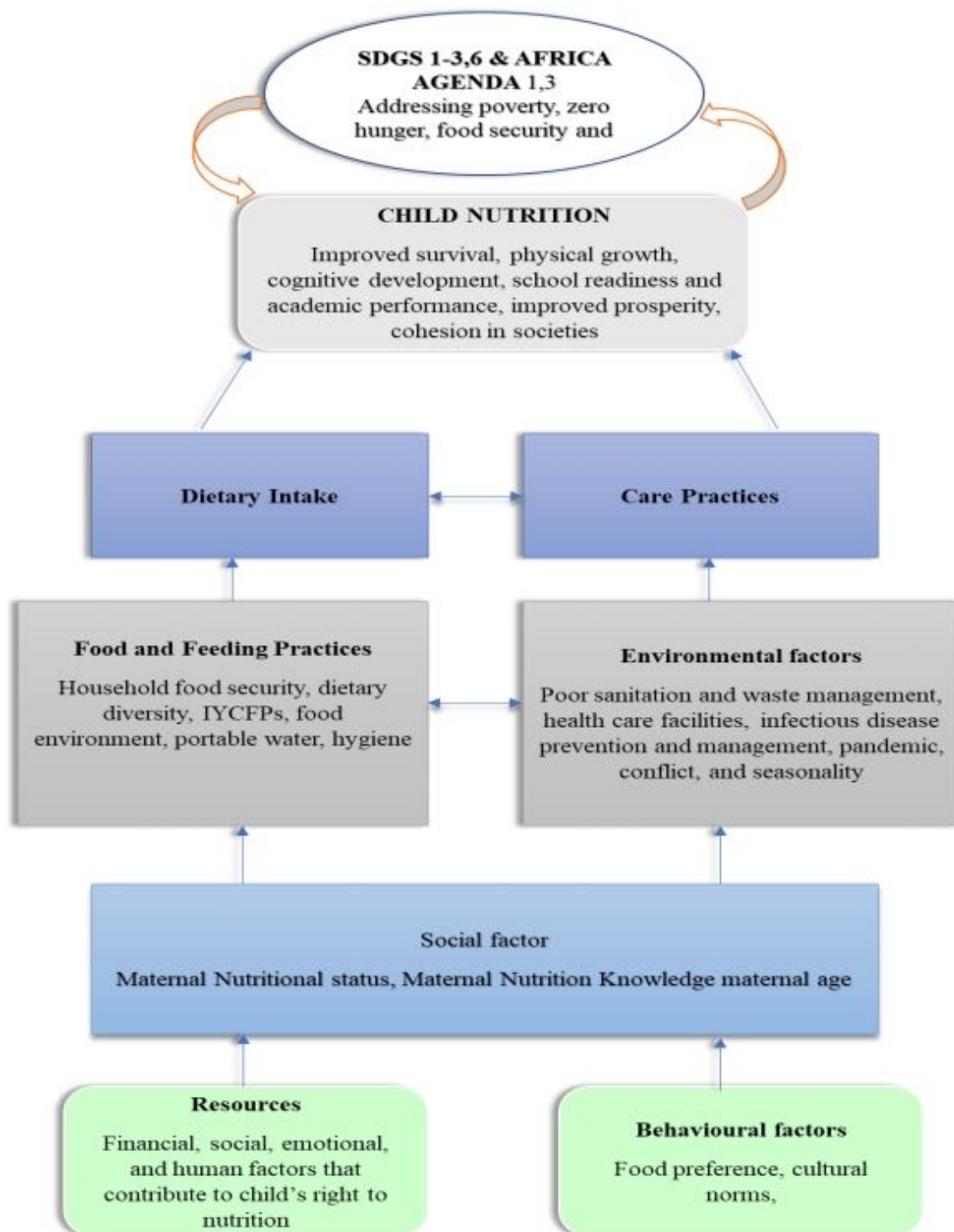


Figure1: Determinants of Child Nutrition and Well-being in relation to Sustainable Development Goals (SDG 2030) and Africa Agenda 2063
Source: Adapted and Modified from 2020 UNICEF conceptual framework on determinants of maternal and child nutrition

Infant and Young Child Feeding Practices (IYCFP)

Infant and young child feeding practices are essential for proper child development. The components of infant and young child feeding practices entail exclusive breastfeeding (EBF) for the first sixth month of life, gradual introduction of appropriate complementary feeding from six months while continuing to breastfeed for twenty-four months and beyond, and then adequate consumption of healthy food among preschoolers and school-age children [15]. It is important to note that early breastfeeding initiation (BF) within the first 30 minutes to 1 hour after birth is beneficial to the newborn and prevents susceptibility to neonatal infections and mortality [16].

Exclusive breastfeeding, which entails breast milk only (without water except for medications where otherwise indicated), is beneficial to the overall health of infants 0- 6 months because it supplies the needed energy, nutrient, and immunity for a healthy child. It also protects against gastrointestinal infections and prolongs better intelligence quotient (IQ) among well-breastfed infants. Similarly, breastfed children are less likely to be overweight and obese than those fed on breast milk substitutes (BMS) [15].

In Nigeria, the prevalence of early breastfeeding initiation decreased from 38% in 2008 to 33% in 2013, which could have contributed to the high infant morbidity and mortality rate [17]. Recent studies show that more than 80% of newborns in Nigeria do not receive breast milk and colostrum within one hour of birth; only 27% of 0-6 months old infants are breastfed exclusively, and most are introduced to complementary foods before six months of age, earlier than the WHO/UNICEF's recommendation [15]. Low proportion of mothers practicing exclusive breastfeeding in Nigeria predisposes children to unhygienic feeding conditions, stunting, and vulnerability to illness [6]. A study in Ethiopia showed that an increased risk of under-five stunting among children was associated with a short duration of breastfeeding and insufficient minimum dietary diversity [18]. Also, the proportion of breastfed children between 6 to 23 months receiving a minimum acceptable diet decreased from 9% in 2008 to 4% in 2013. Nearly two-thirds of children between 6-23 months are not meeting their recommended minimum nutrient intake [11].

Factors that influence infant and young child feeding practices (IYCFP) and dietary diversity among children in Nigeria are predominantly seasonality, socioeconomic status, food, illiteracy of caregivers, maternal nutrition, maternal education, and environmental factors [19,20].

Maternal Nutrition

Maternal nutrition impacts directly a child's nutrition, especially in-utero and during lactation. It often determines a child's food preference during the preschool and school-age periods of the life cycle [21].

The State of Food Insecurity and Nutrition in the World (SOFI 2019) reported that about 20.5 million newborns had low birth weight (birthweight <2.5kg) because of poor gestational maternal nutrition [22]. Globally, the nutritional status of women is affected by economic shocks due to loss of means of livelihood and directly impacts their children's nutrient intake.

In 2020, almost 455 million women and girls lived below the poverty line of USD1.90 per day, while 47 million women were pushed into abject poverty due to covid-19. The consequence is severely felt among under-five children from low- and middle-income households, thereby increasing the risk of malnutrition, food insecurity, and mortality among children [20,21].

Maternal Education

Maternal education and nutrition knowledge positively impact household food acquisition and consumption patterns, especially for children [23]. For instance, in Nigeria, more than half of women living in rural areas never had formal education, and a higher percentage of girls dropped out of school before the age of fifteen, which has contributed to poor health and nutrition literacy among these women [17]. Many women who had the privilege of acquiring primary education were not taught the concept of nutrition-related to maternal and child well-being [23].

Maternal nutrition illiteracy reduces the capacity to make informed choices on food, especially for the dependent members of the households, which also contributes to the prevalence of food insecurity, child malnutrition, and mortality across the nation [24].

Several studies have also established a significant association between maternal education, food literacy, and the nutritional status of children. A mother's food literacy and education are inversely associated with under-five stunting, underweight, wasting, and childhood mortality [25]. Likewise, a report by Obayelu *et al.* [26] showed that household education, especially among the caregivers, impacts children's dietary quality intake at their developmental stages.

Environmental Factors

Food insecurity and steady rise in food prices across the nation can be attributed mainly to seasonal vulnerability, climatic change, and communal conflict because

these affect farming activities and livestock production, eventually impacting food acquisition among households with under-five children [26]. Seasonal vulnerability and climate change significantly influence household food baskets and the dietary diversity of children in Nigeria. Similarly, the impact of ethnicity, geographical location, and hygiene practices on the quality, frequency, and type of food made available and consumed by children in various households cannot be overemphasized [20].

Children from southern Nigeria often consume cereals and legumes than fruit and vegetables. On the other hand, children from the northern region predominantly consume starchy grains as staple diets; hence, protein-energy malnutrition and hidden hunger are more prevalent among children from the north than those from the south [26].

The impact of conflicts on food and nutrition security status in Nigerians is severe and of great concern, as it affects more children than adults. Children are a significant percentage of internally displaced persons (IDPs) resulting from losing either or both parents [27]. For instance, about 1.7 million people, mostly children, have been displaced in northeastern Nigeria, worsening the risk of severe malnutrition, infection, and death among these children [28].

Household Wealth Index

World Bank reported that more than 69% of Nigerians, including children, live below the poverty line [29]. Hence, Nigeria is among the poorest nations with the most undernourished populations [5]. The poverty rate is reflected in households' wealth index, which varies significantly across the different social-economic classes. For instance, about 98 million Nigerians (40%- 47%) live in multidimensional poverty (poor wealth index), the majority of which are women and children [29]. A recent report by the National Bureau of Statistics (NBS) states that about 63% (133 million) of Nigerians are poor, with majority residing in the northern region and rural communities across the country [30].

A study by Matemilola & Elegbede in 2017 reported that the dwindling effect of economic recession and starvation had put many Nigerians at risk of poor nutrition [20, 31]. Currently, more than 70% of the disposable income in homes is spent on cheap non-nutritious foods, which is inadequate for optimal well-being and positive health outcomes for children [20, 32].

Many studies have reported a strong association between household wealth index and the health outcome of under-five children. For instance, it is reported that

children from the poorest households are three times more likely to be stunted than children from the wealthiest households [17]. A study has reported that less than 40% of children can meet their minimum dietary diversity in seven out of eleven sub-regions of Africa due to the economic downturn rampant in these regions [33].

Policies and Price Volatility

Nigeria had floated several national strategic nutrition development plans and policies between 2009-2015 in her commitment to improving nutrition. These include the National Policy on Food and Nutrition (2013) and the National Strategic Action Plan for Nutrition (2014-2019). In April 2016, it launched a "zero hunger initiative" to eliminate undernutrition by 2025, ahead of the 2030 SDGs deadline. However, the continuous rise in food insecurity indicates that the country is far behind its targets [7]. Despite the robustness of these numerous programs, they are often not followed through to actualization [34]. Another loophole in these policies is that they often do not address the drivers of food and nutrition security at the grassroots [5, 7].

Price volatility is also a factor that negatively impacts child nutrition and food security, especially among low-income earning households in the nation [35]. The rise in food prices by about 22% has driven 7 million more people into poverty [29]. This increase has contributed about 60% to the national inflation rate, which is currently at 18%. However, the recent inflation rate based on the new Consumer Price Index (CPI) is about 20.8%. Thus impairing household purchasing power for quality food, thereby significantly impacting children's food intake across the nation [30, 35, 37, 38]. The prices of food commodities are affected by several factors and policies that fail to address healthy food production and distribution, such as transactional costs from intermediaries and armed conflict attacks [6].

Programs can be floated to address indiscriminate price fluctuation and enhance agricultural output at a subsidized rate. These programs can be in the form of the provision of hybrid and draught-resistant crops, modernized irrigation systems, input subsidies, and processing companies to create jobs and provide a sustainable enabling environment for easy access and affordability of nutritious and healthy food [34].

It is imperative that the government inter-phase between farmers and consumers to reduce the impact of transaction costs on farm produce, which often creates artificial scarcity, and increase the cost of food items. This intervention would impact food insecurity and malnutrition across the six geopolitical zones of Nigeria [33, 39].

The State of Food Security and Nutrition in the World (SOFI 2020) has reported that healthy diets are about five times more expensive than energy-sufficient diets and 60% higher than adequate nutrient diets [7]. The overall cost of this food exceeds the poverty line of USD 1.9 per day and the average food expenditure in sub-Saharan Africa and Asia. At the same time, Nigerians spend more than 60% of their total household budgets solely on food [26].

Dynamics of Food Intake and Nutrition Security among Nigerian Children

World Health Organization states that a healthy diet is a diet that contains a balanced, diverse, and appropriate selection of foods eaten over a period, consequently protecting against all forms of malnutrition and non-communicable diet-related diseases (NCDs) [36]. Therefore, it is expedient that children consume healthy diets concerning their body requirements to ensure optimal growth and development [7, 17]. However, several factors interfere with the quality and quantity of a child's intake with respect to the nutritional demand for proper health outcomes.

Antenatal care contributes significantly to a child's nutrition and well-being. It helps mothers be aware of the essentials of favourable birth outcomes for both mother and child. Nigeria National Health Survey in 2018 reported that children whose mothers had no antenatal care were about three times more likely to be stunted than mothers who had antenatal visits [6, 34].

Care and hygiene practices like sanitation and waste disposal systems in the nation are suboptimal and contribute immensely to the prevalence of infectious diseases, poor health outcomes, and well-being among children, especially those from rural and urban slums. For example, only 47.0 % of households have access to improved sanitation facilities, and 53.0 % of the children aged 0 to 3 years have their faeces disposed of safely using toilets, or burying. Therefore, the risk of childhood infections and mortality, especially in rural communities and urban slums across the nation, is high [35, 37].

Inadequate consumption of fruits and vegetables and over-dependence on 'fast foods and carbonated soft drinks laden with trans fats, salts, and refined sugars, coupled with physical inactivity, play a significant role in the continuous rise in the prevalence of overweight and obesity among children. The over-dependence on fast foods has also impacted the high prevalence of micronutrient deficiency disorders, childhood mortality, and risk of NCDs among children in later years [18].

Nigerian children consume more foods rich in carbohydrates (grains, roots and tubers, plantains) either as gruel or other forms with few or no fleshy foods from animal sources and minimal fruit and vegetable intake. Hence, a more significant proportion of children do not meet the minimum dietary diversity for their age, which predisposes them to poor growth, undernourishment, and micronutrient deficiency disorders. However, this can be salvaged through small-scale animal husbandry and home gardening [7, 18].

Hence, the overall dietary patterns of children within a household are a vital indicator of the health status and food security of households, communities, and the developmental state of Nigeria as it relates to the indicators of Sustainable Development Goals and the Africa Agenda [18].

It is pertinent to note that nutrient metabolism also plays a vital role in child nutrition and well-being because adequate absorption and utilization of ingested healthy food helps to meet the dietary needs of children in relation to their physiological state, age, sex, and health status [38].

Pre-pandemic Trends of Childhood Food Insecurity and Malnutrition in Nigeria

Despite the fundamental right of every child to adequate, nutritious, and safe food, good health care services and practices that promote and support good nutritional outcomes among children have always been inadequate in Nigeria [4,39].

Overweight and obesity among children are 'skyrocketing', affecting more children from resource-limited households. Hence, the triple burden of malnutrition is currently ravaging developing countries, thereby increasing the trend of food insecurity (FI) and malnutrition [34]. In 2015, two billion people worldwide, including children, were undernourished due to a lack of regular access to safe and nutritious food [5, 8].

In Nigeria, the trend shows that 37% of under-five (U-5) children are stunted. This prevalence, unfortunately, increases with age. For instance, the proportion of children between 24-35 months who are stunted is 46%. Similarly, the proportion of wasting is increasing, with a more significant proportion found among poor households and rural communities [17, 26, 40]. Another trend is that young boys suffer malnutrition more than young girls [38].

Furthermore, children from rural communities are more susceptible to stunting (43%) than those in urban centres (26%). Similarly, about half of all children

younger than five years in the country's Northeast and Northwest geopolitical zones were estimated to be stunted in their growth compared to 22% of children in the southern region [17, 44].

Lastly, the variations in the prevalence of the triple burden of malnutrition and FI among children in Nigeria cut across the various geopolitical zones [26]. For instance, the Northwestern (NW) zone has the highest proportion (55%) of stunted children, Northeastern (NE) has about 42%, while the North-central (NC) has 29%. At the state level, Kebbi state has the highest (61%) proportion of stunting while Enugu state had the least (12%) [4,11,18,41].

This proportion is greatly affected by many factors like conflict, household socioeconomic status, maternal marital age at first conception, maternal nutritional status during pregnancy and lactation, maternal education and food literacy, and climate vulnerability.

Impact of Pandemic, Economic Shock and Insurgence on Child's Nutrition and Well-being in Nigeria

The Global Report on Food Crises (GRFC) 2021 indicated that more people worldwide are experiencing severe and acute food crises attributed to conflicts, the COVID-19 pandemic, and economic shock. Conflicts have continued to displace people, disrupt livelihoods, and damage economic growth. Similarly, the COVID-19 pandemic has also aggravated the pre-existing drivers of food adequacy and sustainability. It has widened the inequality and the vulnerability of local and global food systems among poor households [14].

In West Africa and Sahel, about 24.8 million people were in crisis or worse food situation due to the impact of conflict, displacement, and economic impact of COVID-19, and about 5.4 million children are malnourished because of the difficulty of parents to access and sustain household nutritious healthy food [14,34]. About 7.2 million children are wasted in ten countries, while 31.9 million suffer from stunting [8].

Nigeria was among the ten countries that experienced high food crises in 2019[8]. In 2020, conflicts/ insecurity, extreme weather conditions, and economic shock influenced by Covid-19 significantly contributed to acute food insecurity [14]. This situation heightened because of the increase of about 2 million children in internally displaced people's (IDPs) camps due to insurgence from "Boko haram" terrorist attacks ravaging the northern regions, further narrowing the progress towards achieving food security among households [4].

Conflicts have remained a prominent driver of food insecurity, especially among children in Nigeria. For instance, about 1.5% of the total population displaced by conflict in 2020 were children [15]. The projected outlook for the worst food crises in 2021 indicated that about 12.8 million more people, including children, would be in food crisis, which accounts for about a 34% increase from the 2020 peak, especially during the lean period, which usually falls around June to August [35]

Also, the restriction on human movement implemented to contain the COVID-19 pandemic deprived households of livelihood, disrupted market activities, trades, agricultural activities, and prevented herders from accessing grazing land, thereby contributing to high food prices and scarcity. Conflicts between non-state armed groups (civilian youths) and regular armed forces (police and military personnel) like the 'END SARS' saga in Lagos State in 2019 is another form of conflict experienced in Nigeria. Also, the southern regions often experience village raids, kidnapping, and cattle rustling, which drive many from their homes and farmlands, leading to the untimely deaths of breadwinners, and loss of financial power. Thus, exposing more children to severe hunger, acute malnutrition, infections, domestic violence, increased number of orphans and vulnerable children (OVCs), vices, and food insecurity which are preventable causes of death [4,18].

CONCLUSION

The nutritional status and health outcome of children in Nigeria strongly predict the country's food and nutrition security status. It is a measure of the country's progress towards achieving zero hunger, nutrition security, and sustainability as it navigates toward the attainment of the Sustainable Development Goals 2030 and Africa Agenda 2063. Incessant national conflicts contributed immensely to food scarcity, the number of OVCs, and severe hunger among children.

This study revealed that many Nigerian children do not have access to safe, healthy, nutritious food, a hygienic environment, and quality health care services; hence, they are merely surviving and not thriving. It also reveals that the poor consumption pattern of nutritious meals among children can be improved through home-gardening and small-scale animal husbandry at convenience and no extra cost on the limited resources within the households.

Conflict of Interest: The authors declare that they have no conflict of interest

Authors' Contributions: Alice Bosede Omachi conceptualized and drafted the article, while Unathi Kolanisi and Annette van Onselen critically revised the article and gave final approval for publication.

REFERENCES

1. **UNICEF, SWOC.** Children, Food and Nutrition in West and Central Africa: Growing Well in a Changing World, New York, USA, 2019;1-258, www.unicef.org/sowc Accessed March 30, 2022.
2. **Coleman-Jensen A, McFall W and M Nord** Food Insecurity in Households with Children: Prevalence, Severity, and Household Characteristics, 2010-2011. *Economic Research Service* 2013; **113**: 1–60.
3. **Metu AG, Okeyika KO and OD Maduka** Achieving Sustainable Food Security in Nigeria: Challenges and Way Forward. 3rd International Conference on African Development Issues 2016; 182–187.
4. **UNICEF, WHO, World Bank, JME Levels and Trends in Child Malnutrition.** Key Findings of the 2019 Edition of the Joint Child Malnutrition Estimates. Geneva, 2019; 1-16 <https://www.who.int/nutgrowthdb/jme-2019-key-findings.pdf> Accessed March 10, 2022.
5. **FAO, IFAD, UNICEF, WFP and WHO.** The State of Food Security and Nutrition in the World: Safeguarding against Economic Slowdowns and Downturns. 2019. Rome, FAO <https://docs.wfp.org/api/documents/WFP-0000106763> Accessed December 2, 2021.
6. **Woldeamanuel BT, and TT Tesfaye** Risk Factors Associated with Under-Five Stunting, Wasting, and Underweight Based on Ethiopian Demographic Health Survey Datasets in Tigray Region, Ethiopia. *Journal of Nutrition and Metabolism* 2019; 1–11.
7. **Turner C, Aggarwal A, Walls H, Herforth A, Drewnoski A, Coates J, Kalamatianou S and S Kadiyala** Concepts and Critical Perspectives for Food Environment Research: A Global Framework with Implications for Action in Low- and Middle-Income Countries. *Global Food Security* 2018; **18**: 93–101.
8. **Schleifer P and Y Sun** Reviewing the Impact of Sustainability Certification on Food Security in Developing Countries. *Global Food Security* 2020; **24**: 2211–9124.
9. **UNICEF, WHO, the WB group, and the UN population working group.** United Nations Inter-Agency Group for Child Mortality Estimation (UN IGME), 2017 Report, New York.

10. **Hug L, Sharrow D and D You** Levels and Trends in Child Mortality: Estimates Developed by the UN Inter-agency Group for Child Mortality. 2017.
11. **UNICEF, WHO and World Bank.** Levels and Trends in Child Malnutrition, Key Findings of the 2020 Edition of the Joint Child Malnutrition Estimates. Geneva: WHO, 2020; 24.
12. **Ajala S** Can SDGs be Achieved in Nigeria before 2030? According to Data, not Likely. Dataphyte, <https://www.dataphyte.com/latest-reports/development/can-sdgs> Accessed March 10, 2022.
13. **USAID.** Nigeria Nutrition Profile. United State Agency International Development. Abuja, Nigeria, 2018. <https://doi.org/10.1186/s40748-018-0087-z>
14. **Motbainor A, Worku A and A Kumie** Household Food Insecurity is Associated with Body Mass Index and Mid-Upper-arm Circumference of Mothers in Northwest Ethiopia: A Comparative Study. *International Journal of Women's Health*, 2017; **9**: 379–389.
15. **National Bureau of Statistics (NBS), National Nutrition and Health Survey (NNHS).** Abuja, Nigeria. <https://www.unicef.org/nigeria/reports/national-nutrition-and-health-survey-nnhs-2018> Accessed June 2018.
16. **National Population Commission (NPC), Federal Republic of Nigeria and ICF.** International Nigeria Demographic and Health Survey 2013. Abuja, Nigeria, June 2014.
17. **FSIN.** Global Report on Food Crises: Joint Analysis for Better Decisions, and Assessments, Food Security Analysis. 2021, Italy. <https://www.ifpri.org/publication/2021-global-report-food-crises-joint-analysis-better-decisions> Accessed March 9, 2022.
18. **Etea BG, Zhou D, Abebe KA and D Sedebo** Household Income Diversification and Food Security: Evidence from Rural and Semi-urban Areas in Ethiopia. *Sustainability*, 2019; **11**: 3232.

19. **Mahmudiono T, Nindya TS, Andrias DR, Megatsari H and RR Rosenkranz** Household Food Insecurity as a Predictor of Stunted Children and Overweight/Obese Mothers (SCOWT) in Urban Indonesia. *Nutrients*; 10:535. <https://doi.org/10.3390/nu10050535>
20. **Mekonnen DA, Akerele D, Achterbosch T, de Lange T and E Talsma** Affordability of Healthy and Sustainable Diet in Nigeria. *Frontiers in Sustainable Food Systems*; 5: 726773. <https://doi.org/10.3389/fsufs.2021.726773>
21. **Owoo NS** Demographic Considerations and Food Security in Nigeria. *Journal of Social and Economic Development*, 2020; 23: 128–167.
22. **Alaofè H and I Asaolu** Maternal and Child Nutrition Status in Rural Communities of Kalalé District, Benin: The Relationship and Risk Factors. *Food and Nutrition Bulletin*, 2019; 40(1): 56–70.
23. **Adewusi OA and EE Nwokocha** Maternal Education and Child Mortality in Nigeria. *The Nigerian Journal of Sociology and Anthropology*, 2018; 16: 111–130.
24. **Fadare O, Mavrotas G, Akerele D and M Oyeyemi** Micronutrient-rich Food Consumption, Intra-household Food Allocation and Child Stunting in Rural Nigeria. *Public Health Nutrition*, 2018; 22(3): 444–454. <https://doi.org/10.1017/S1368980018003075>
25. **Benson T, Amare M, Oyeyemi M and O Fadare** Study of the Determinants of Chronic Malnutrition in Northern Nigeria: Qualitative evidence from Kebbi and Bauchi states 45, Abuja, 2017.
26. **Obayelu OA and El Akpan** Food Insecurity Transitions among Rural Households in Nigeria. *Studies of Applied Economics*, 2021; 39(2). <https://doi.org/10.25115/EEA.V39I2.3505>
27. **CILSS-CH.** Cadre Harmonize Result for Identification of Risk Areas and Vulnerable Populations in 15 Northern States and the Federal Capital Territory (FCT) of Nigeria, https://fscluster.org/sites/default/files/documents/nigeria_ch_fiche_october-2020-final-23-11-2020.pdf Accessed October 21, 2021.

28. **Okon GJ, Ushie EM and JE Otu** Socioeconomic Well-being of Orphans and Vulnerable Children in Orphanages within Cross River State, Nigeria. *African Journal of Career Development* 2020; **2**: 1–7.
29. **World Bank.** Nigeria's Economy Faces Worst Recession in Four Decades, Washington, D.C. USA, 2020. <https://www.worldbank.org/en/news/press-release/2020/06/25/nigerias-economy-faces-worst-recession-in-four-decades-says> Accessed October 21, 2021.
30. **Emejo J** (2022, November 29). NBS: 133m Nigerians Living in Poverty. THISDAY. <https://www.thisdaylive.com/index.php/2022/11/18/nbs-133m-nigerians-living-in-poverty/> Accessed November 28, 2022.
31. **Matemilola S and I Elegbede** The Challenges of Food Security in Nigeria. *Open Access Library Journal*, 2017; **4**: 1-22. <https://doi.org/10.4236/oalib.1104185>
32. **Onyeiwu S** Nigeria's Poverty Profile is Grim It is Time to Move Beyond Handouts, <https://theconversation.com/nigerias-poverty-profile-is-grim-its-time-to-move-beyond-handouts-163302> Accessed February 20, 2022.
33. **Ashagidigbi WM, Sulaiman AY and OO Victor** Determinants of Households' Food Demand in Nigeria. *World Rural Observ* 2012; **4**: 17–28.
34. **UNICEF, WHO, World Bank.** Levels and Trends in Child Malnutrition. New York, Geneva, Washington DC, 2017.
35. **USAID.** Nigeria Nutrition Profile. United State Agency International Development. Abuja, Nigeria, 2018. <https://doi.org/10.1186/s40748-018-0087-z>
36. **Oyekanmi S** Nigeria's Inflation Rate Hits a New 17-year High of 20.77% in September 2022. Nairametrics, African Marketer. <https://www.african-markets.com/en/news/west-africa/nigeria/nigeria-s-inflation-rate-hits-a-new-17-year-high-of-20-77-in-september-2022> Accessed November 29, 2022.
37. **Central Bank of Nigeria.** Nigeria's Inflation Rate (Percent). <https://www.cbn.gov.ng/rates/inflrates.asp> Accessed November 28, 2022.
38. **Bai Y, Alemu R, Block SA, Headey D and W Masters** Cost and Affordability of Nutritious Diets at Retail Prices: Evidence from 177 countries. *Food Policy*, 2021; 99. <https://doi.org/10.1016/J.FOODPOL.2020.101983>

39. **Lee AJ, Cullerton K and LM Herron** Achieving Food System Transformation: Insights from a Retrospective Review of Nutrition Policy (In) Action in High-Income Countries. *Int J Health Policy Manag*, 2020; **2020**: 1–18.
40. **Salawu MB, Rufai AM, Salman KK and IA Ogunnuiyi** The Influence of Women Empowerment in Child Nutrition in Rural Nigeria. Working Papers GMBF-013, Nairobi, Kenya, January 2020.
41. **Endalifer ML, Andargie G, Mohammed B and B Endalifer** Factors Associated with Dietary Diversity among Adolescents in Woldia, Northeast Ethiopia. *BMC Nutrition*, 2021; **7(27)**.
42. **Yang Y, Zhao LG, Wu QJ, Ma X and YB Xiang** Association between Dietary Fibre and Lower Risk of All-Causes of Mortality: A Meta-analysis of Cohort Studies. *American Journal of Epidemiology*, 2015; **181(2)**.
<https://doi.org/10.1093/aje/kwu257>
43. **Senbanjo IO, Senbanjo CO, Afolabi WA and I Olayiwola** Co-existence of Maternal Overweight and Obesity with Childhood Undernutrition in Rural and Urban Communities of Lagos State, Nigeria. *Acta Biomedica*, 2019; **90(3)**: 266–274.
44. **Amare M, Benson T, Fadare O and M Oyeyemi** Study of the Determinants of Chronic Malnutrition in Northern Nigeria: Quantitative Evidence from the Nigeria Demographic and Health Surveys and International Food Policy Research Institute (IFPRI) working paper 45. *Food and Nutrition Bulletin* 2018; **39**: 296–314.