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**Høgskulen
på Vestlandet**

Unveiling a “silent epidemic”: How do food insecurity and malnutrition affect the health outcomes of the older adults in West Africa?

An analysis of the impact and health outcomes of food insecurity and malnutrition among older adults in West Africa.

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Abstract

Background: Food insecurity and malnutrition have been major challenges and threats to humans influencing health generally as well as having negative effects on the economy. In West Africa, the older population is subjected to food insecurity and malnutrition, especially among the rural dwellers which leads to various health effects physically, biologically, and psychologically. Food insecurity and malnutrition are caused by several factors such as climate change, war and famine, pests and diseases, and political and economic crises.

Objectives: The aim of this study is to understand more of the health outcomes and causes of food insecurity and malnutrition among the older population in West Africa.

Methods: This study utilizes a narrative review method in which a database search was conducted using Google Scholar, Medline, and Pubmed with search terms “Food insecurity”, “Malnutrition”, “Diet”, “Hunger”, and “West Africa”. The selected articles are within West Africa. Zotero software was used to save the selected articles for reference. The study is written as a monograph.

Results: The results of the studies show that the majority of the older adults in West Africa are suffering from food insecurity and malnutrition, which is highly prevalent among rural dwellers and this has severe health effects such as mental and psychological disorders, weakened immune and dysfunction and other chronic and cardiovascular diseases. The finding also shows that food insecurity and malnutrition are caused by climate change, war and famine, pests and diseases, economic crises, and political crises. The findings show that little attention is paid to the health effects caused by food insecurity and malnutrition among the older population in this region, thus increasing the health problem.

Conclusions: The study shows that food insecurity and malnutrition contribute to health problems among the older population in West Africa and these health effects include psychological and physical effects (mental disorders and inability to complete daily activities), and biological (chronic, cardiovascular diseases). Factors that contribute to food insecurity and malnutrition in West Africa are climate change, war and famine, pests, and diseases while reaffirming to creation of a supportive program to reduce and eliminate food insecurity and malnutrition in the region.

Keywords: Food security, Food insecurity, Malnutrition in West Africa, Psychological disorder, Mental Disorder, Nutritional Disorder, Climate change, violence, Conflicts, Aged, older adult, and balanced diet.

1. Introduction

1.1. Overview

As the world population is aging rapidly, there is a need to maintain adequate nutrition and a balanced diet to prevent age-related problems as well as to live a healthy life (WHO, 2022). Food insecurity has been a major challenge and threat to human health, which has increased recently as a result of COVID-19, climate change, and conflicts thus resulting in a shortage of food supply, poor farming products, and malnutrition (WHO, 2022; Beyene, 2023, p. 16; Alaimo et al., 2022). This study focuses mainly on West Africa while exploring the health effects and the causes of food insecurity and malnutrition in the region. The reason for choosing West Africa is because the older population in this region has not been given adequate attention in the aspect of malnutrition and food insecurity. There is a lack of comprehensive understanding of the health effects of food insecurity among the older population in the region.

1.2. Food insecurity

Food insecurity is defined *“as a kind of state whereby a person lacks regular access to enough safe and nutritious food for normal growth and development and an active and healthy life”* (FAO, 2023). Food insecurity has a negative health effect, reducing physical performance, lower cognitive function, and physiologic diminishing ability to preserve homeostatic mechanisms (Lee et al. 2010, p. 124). Food insecurity has been a major challenge in the world, dating back to the 1970s when global food crises occurred (Gerlach, 2015, p. 929). This prompted different organizations, such as the United Nations, the World Food Organization, and the Food and Agricultural Organization (FAO) to work together on the means of eradicating food insecurity and malnutrition by improving food supply accessibilities, creating and formulating goals and policies, such as United Nations Millennium Declaration A/Res/55/2 (2000 p. 19), The Right to Adequate Food, (1999. p. 6), and more. To this present day, food insecurity still prevails.

The FAO report shows that approximately 11% of the world population was subject to food insecurity and Malnutrition in 2016, and the World Bank states that nearly 83 million people in

45 countries are starving in Sub-saharan Africa and Asia which are mostly affected by food insecurity and Malnutrition (Food and Agricultural Organization, 2023).

Food insecurity and malnutrition influence health generally. The health effects of food insecurity and malnutrition range from psychological effects such as mental disorders, cognitive decline, depression, and more (Raskind et, al, 2019, p. 477; Myers, 2020, p. 111). The biological effects include changes in metabolism, a weakened immune system, morbidity, and co-morbidity (Ahmed & Haboubi, 2022, p. 214). A relationship between food insecurity and malnutrition, chronic and cardiovascular diseases, which exacerbate the health effects and increase the prevalence rate of diseases and infections as a result of a weakened immune system, is also reported in the study research (Leung et, al 2020, p.2; Gundersen & Ziliak, 2015, p. 1832). The physical effect includes the inability to complete daily tasks, aging decline, and more (Brewer et, al. 2010, p. 162; Gallegos et, al. 2021, p. 15).

1.3. Food insecurity in Africa

The African continent has been facing food insecurity for the past decades, and this has caused a lot of misfortunes, loss of lives, and diseases (Crush et. al, 2012, p. 272). The prevalence of undernourishment (PoU) rose from 19.4 % (11 million) in 2021 to 19.7 % in 2022 (57 million), whereas in Asia, it fell from 8.8 % in 2021 to 8.5 % in 2022 (Food and Agricultural Organization, 2023). The African continent has become the region that receives the most food aid, and it is estimated that 30 million people receive food aid annually. The main drivers of food insecurity in Africa are conflicts and war, droughts, climate change, high poverty rate, and economic instability (Clover, 2003, p. 8; Akwango et, al, 2017, p. 2). Food insecurity and malnutrition are common in Africa, Middle Africa, Eastern Africa, and Sub-Saharan Africa. In Africa, Sub-Saharan is the leading region in food insecurity and malnutrition in Africa, while North, South, and West Africa have milder prevalence rates (Food and Agricultural Organization, 2023).

Table 1 shows the statistics and the prevalence rate of malnutrition globally, but in this statistics, we are focusing on the prevalence of undernourishment (PoU) in West Africa. The

PoU in West Africa decreased from 12.2% in 2005 to 10.6% in the year 2017, before increasing to 11.1% in 2018, to 14.6% in 2022, which shows in the coming years, the prevalence rate will increase more in West Africa (Food and Agricultural Organization, 2023).

Table 1: Food and Agricultural Organization (2023). FAOSTAT: Suite of Food Security Indicators. FAO. Available at: www.fao.org/faostat/en/#data/FS

Prevalence of undernourishment (%)										
	2005	2010	2015	2016	2017	2018	2019	2020*	2021*	2022*
WORLD	12.1	8.6	7.9	7.8	7.5	7.6	7.9	8.9	9.3	9.2
AFRICA	19.2	15.1	15.8	16.6	16.5	16.6	17.0	18.7	19.4	19.7
Northern Africa	6.2	4.7	5.4	5.7	6.0	6.0	5.8	6.0	6.9	7.5
Sub-Saharan Africa	22.5	17.6	18.2	19.1	18.9	19.1	19.5	21.6	22.2	22.5
Eastern Africa	31.7	23.8	24.6	26.2	26.2	26.0	26.7	28.1	28.4	28.5
Middle Africa	31.9	22.5	23.3	24.7	23.7	24.4	24.8	27.6	28.5	29.1
Southern Africa	5.1	7.2	9.3	8.3	7.8	7.7	8.3	9.5	10.0	11.1
Western Africa	12.2	10.8	10.6	10.7	10.6	11.1	11.0	13.7	14.5	14.6
ASIA	13.9	9.3	8.0	7.5	7.0	7.1	7.4	8.5	8.8	8.5
Central Asia	13.8	6.6	4.0	3.8	3.5	3.1	2.8	3.3	3.2	3.0
Eastern Asia	6.8	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
South-eastern Asia	17.3	11.1	7.5	6.5	5.8	5.5	5.3	5.3	5.3	5.0
Southern Asia	20.2	15.4	14.0	12.9	12.2	12.3	13.3	15.6	16.4	15.6
Western Asia	7.9	6.5	9.1	10.0	9.8	10.3	10.3	10.5	10.2	10.8
<i>Western Asia and Northern Africa</i>	7.1	5.7	7.4	8.0	8.1	8.3	8.2	8.4	8.7	9.2
LATIN AMERICA AND THE CARIBBEAN	9.3	6.2	5.3	6.1	5.8	5.9	5.6	6.5	7.0	6.5
Caribbean	18.4	14.7	13.2	13.5	13.2	14.0	14.2	15.2	14.7	16.3
Latin America	8.6	5.6	4.7	5.5	5.2	5.3	4.9	5.9	6.4	5.8
Central America	8.1	6.8	6.7	6.2	6.1	6.1	5.1	4.8	5.0	5.1
South America	8.8	5.1	3.9	5.2	4.9	5.0	4.9	6.3	7.0	6.1
OCEANIA	6.9	6.5	6.2	6.1	6.1	6.4	6.4	6.0	6.6	7.0
NORTHERN AMERICA AND EUROPE	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5

In West Africa, some countries are subjected to food insecurity, though the rate is not as high as in Sub-Saharan, Northern, and Middle Africa. There are 17 countries in West Africa; Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea- Bissau, Liberia, Mali,

Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo, Saint Helena (British Overseas territory) (UN, 2014). The report shows that in Mauritania, Niger, and Chad, the food insecurity and malnutrition prevalence rates are above the alert threshold, while Mali and some other regions in Niger exceed the emergency threshold. In North East and North West Nigeria, the majority of older adults are subjected to malnutrition and food insecurity. Moreso, Burkina Faso is also facing malnutrition. Mauritania, part of Senegal, Gambia, Sierra Leone, and some parts of Burkina Faso are subjected to a medium rate of malnutrition. The remaining countries in West Africa were not analyzed and there is no report of food insecurity and malnutrition (UNICEF 2021). In summary, out of 17 countries in West Africa, 6 of them are facing extremely high malnutrition, though some countries like Nigeria and Burkina Faso are not fully facing malnutrition and food insecurity, it only applies to some regions in the country, while a country like Senegal, Mauritania, Gambia, are facing high and medium malnutrition and food insecurity. (UNICEF 2021).

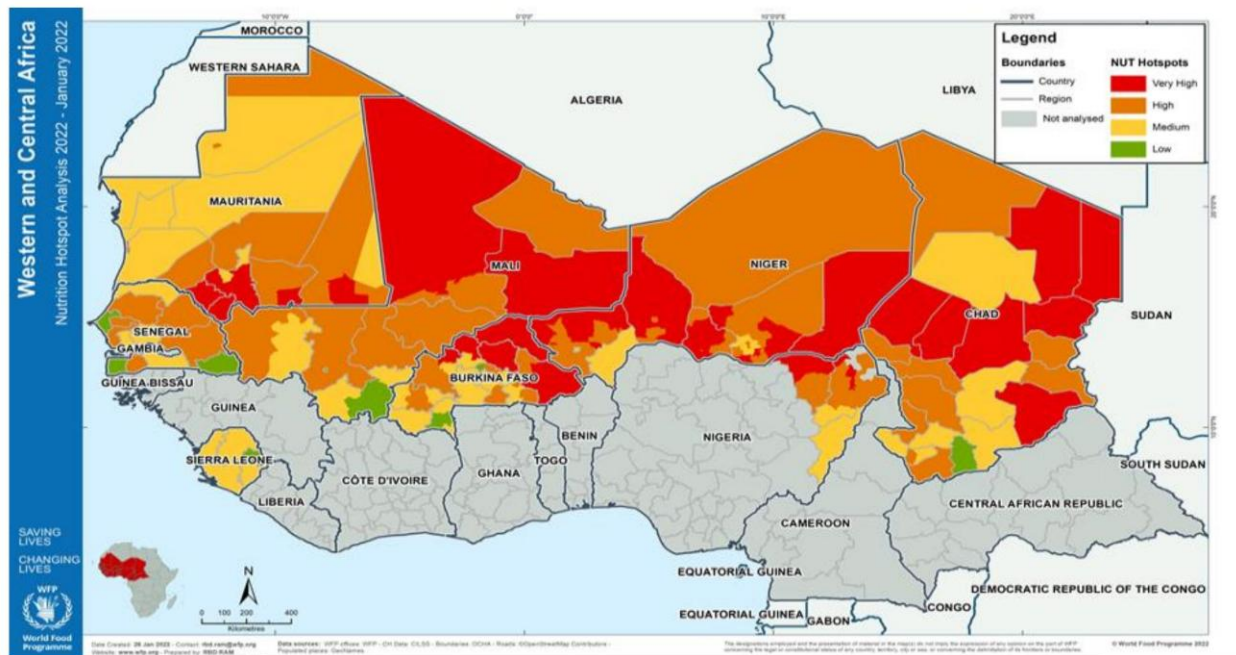


Figure 1: UNICEF (2021). Prioritization exercise: Nutrition Hotspot Analysis 2022. Available at <https://www.unicef.org/wca/media/7826/file/Note-nutrition-nie-final-en.pdf>

1.4. Factors that contribute to Food insecurity in West Africa.

Food insecurity is caused by several factors, but the common drivers of food insecurity include climate change, war, conflicts, economic crisis, and political influence, these are discussed in the present chapter.

Climate change is defined as a "change in the mean variability properties of the climate, which persists over an extended period of time, typically within decades or longer. The climate condition is the long-term summation of the atmospheric elements which includes solar radiation, temperature, relative humidity, and precipitation" (Ani et al, 2022, p. 149). The main causes of the climate change that is experienced presently are linked to the human expansion of greenhouse and aerosols that is uttered such as the burning of fossil fuels, coal, and oil, clearing of land for agricultural processes, and more, thus resulting in greenhouse effects and global warmings (IPCC, 2014; Enete, 2000). This rapid change has an effect on farming products by increasing the heat waves, as well as altered patterns of droughts and floods in any region due to the variability and extreme changes, which have a large impact on farm products and food supply (Jung and Kunstmann, 2007, p. 112; Wossen and Berger, 2015, p. 7). Countries in West Africa are experiencing climate change which leads to droughts affecting the crops. Climate change has an impact on agricultural products and food production, and this results in a shortage of food supply. According to the International Monetary Fund (IMF), climate vulnerabilities affect farming products and lead to food insecurity in Mali (Tucker, 2023). One of the findings reveals that climate change-induced alterations such as droughts, heavy precipitation, flooding of farmlands; rising temperature, increasing aridity, and soil acidity, changes in relative humidity, and increased evaporation, among others, have an adverse effect on agricultural productivity and food systems in Nigeria and West Africa (Adishi and Oluka, 2018; Nzeh et. al, 2016, p. 103).

War and conflict are important drivers of food insecurity in West Africa. The effect has an impact on the health of the older population. Conflict-affected countries have a higher rate of

food insecurity and malnutrition than non-conflict-affected countries, and most of the conflict zones occur in rural areas that have a lot of agricultural products (Food and Agricultural Organization, 2017 p. 44). For example, in the northern part of Nigeria (Adamawa, Borno, and Yobe), Boko Haram has been terrorizing the people, destroying their farm products and burning their farms, destroying government storage facilities that store fertilizers and other farming machines and equipment, thereby leading to loss of life and shortage of food contributing to food insecurity in Nigeria (Adelaja and George, 2019, p. 3; Akerele et. al, 2013 p. 407; Eme et. al, 2014 p. 1; Otaha, 2013, p. 33; Ae-Ngibise et. al, 2021, p. 2; Akwango et. al, 2017, p. 1). Moreso, in Burkina Faso, there is a conflict in the northern part which is the rural area where agricultural products are produced. This same region experiences low rainfall, conflicts, and violence frequently led by communal militias and jihadists that destroy livelihoods, farming products, and properties. This extends to the eastern parts, and other parts of the country, and leads to food shortages (Maitre d'Hôtel, 2023, p. 1278).

Economic growth is associated with food security. In a situation where there is an economic crisis, it will increase the unemployment rate, and poverty rate, lead to inflation, and destabilize the country's economy, thus causing food shortages or limited food supplies and malnutrition (Warr, 2014, p. 519). Therefore, an economic crisis could affect trade, accessibility, and affordability of food supplies (Cockburn et. al, 2010, p. 5).

1.5. Food Insecurity Strategies in West Africa

There have been several strategies to curb and reduce food insecurity and malnutrition, but food insecurity still prevails in West Africa (Akinyele 2009, p. 1). Some of the programs created to curb food insecurity include National Accelerated Food Production (NAFPP) whose aim is to increase rice, maize, millet, sorghum, cassava, and wheat production in the country (Njoku & Mijindadi, 1985), Operation Feed the Nation which was established in the year 1976 to increase local food production and reduce food importation (Arua, 1982), Agricultural Development Programme in the year 1972 whose aim is to improve the level of agricultural production and

boost food production in Nigeria (Elijah et al, 2019, p. 6), Food and Agriculture Organization of the United Nation (FAO), World Bank, the United Nations Children’s Fund (UNICEF), the United Nation World Food Programme (WFP) and World health organization (WHO) (FAO, UNICEF, WFP, 2022) and more. Despite to several intervention programs, West Africa is still subjected to food insecurity which has health effects on the older population. For example, the effect of food insecurity was associated with psychological distress, morbidity, and long-term care in older adults during the HIV care cascade research outcome in Senegal (Ae-Ngibise et. al, 2021, p. 2; Benzekri et. al, 2021, p. 13).

1.6. Objective of the study

A “silent epidemic” of food insecurity and malnutrition continues to afflict the older population in West Africa, and this population group often escapes the spotlight of public health discourses. The main objective of this study is to understand the health outcomes and causes of food insecurity and malnutrition among the older population in West Africa.

The research question is:

How do food insecurity and malnutrition affect the health outcomes of the older population in West Africa?

A subquestion for the study is: What are the causes of food insecurity and malnutrition in West Africa

2. Methodology

The narrative review method was chosen for this research due to its possibility to provide a synthesis of findings that can explain the causes of food insecurity and malnutrition and the health outcomes on older adults in West Africa. while the PCC framework was used to inform the search strategy. The PCC Frameworks are:

Population (P): Older adults

Concept (C): Food insecurity and malnutrition

Context (C): West Africa

Search strategy

A database search for the relevant studies was conducted. Google Scholar, Medline, and PubMed with the terms “Food security”, “Food insecurity”, “Hunger”, “Diet”, “Older Adults”, “Malnutrition”, “psychological effect”, “Physical effects”, “Biological effects”, “Health effects”, and “West Africa”. The search terms were combined with “OR” and “AND”.

Eligibility and selection strategy

The selected articles were based on certain criteria which were discussed below:

Articles whose abstracts and titles include food insecurity or malnutrition health outcomes on older adults within the West Africa Region were selected. Articles written in English language were selected, and articles that discuss psychological, physical, and biological health effects were also selected. Articles that use scoping review and systematic review methods, commentary pieces, book chapters, editorials, conference abstracts, and review protocols were excluded while articles that use probability, non-probability, multi-stage, cross-sectional, purposive, and randomized pilot were selected. Non-adults and articles outside West Africa region were excluded and the studies that don't report health effects from food insecurity were also excluded. Zotero software was used to save the selected article for reference. Table 2 shows the inclusion and exclusion criteria.

Table 2: The inclusion and exclusion criteria for the study

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none">Articles published in English Language	<ul style="list-style-type: none">Articles published in another language other than English Language.

<ul style="list-style-type: none"> • Articles from West Africa. • Full Text Available • Among the recruited participants, included older adults. • Research articles on insecurity and Malnutrition effect on older adults in and West Africa. • Psychological, mental, biological, and physical effects of food insecurity on the older adult. • Publication dates from 2013-2023, with the exception of some important articles. • Reported prevalence and/or associated factors of food insecurity, malnutrition, and low diet. 	<ul style="list-style-type: none"> • Published articles on food insecurity's effect on older adults outside West Africa. • Non-adults were excluded. • Studies that do not report the health effects of food insecurity on older adults.
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Analysis

Thematic analysis was used to explore the impact of food insecurity and malnutrition on the health outcomes of the older population in West Africa, which is structured into two themes which are;

Theme 1: Impact of Food Insecurity: This section analyzes the health outcomes of food insecurity among the older population in the region, as well as the association between food insecurity, and chronic and cardiovascular diseases. This section also discussed how food insecurity could increase the risk of chronic diseases, compromised immune function, cognitive

decline, and other health challenges as a result of inadequate or limited access to food. It also analyzes other psychological, biological, and physical effects of food insecurity on the older population in this region.

Theme 2: Impact of Malnutrition: This section analyzes the health outcomes of malnutrition on the older population in West Africa, as well as the health challenges and problems linked to it. It also analyzes the psychological, biological, and physical effects of malnutrition on the older population in this region.

Conclusion: Exploring, analyzing, and understanding the health outcomes and causes of food insecurity and malnutrition will create an avenue to provide a support program that could reduce food insecurity and malnutrition in the region as well as avert health-related problems that are associated with it.

3. Result

3.1 Description of the Selected Papers

Google Scholar (Result of the search = 35,100), PubMed (Result of the search = 0), and Medline database search were used (Result of the search = 1597) which brought 36,697 results in total., Relevant articles were selected from the first hundreds of hits from each of the databases. These were screened for relevant topics and research methods for the research question. 75 articles were selected from this first selection. From these 75 articles, 70 articles were found relevant based on their abstracts and moved on to the next stage. Of these, 18 articles were eligible and met the inclusion criteria for the study. Among the eligible selected articles, some focus on nutritional and dietary effects in West Africa including the prevalence and the factors that influence low dietary while some articles focus their research on food insecurity, its impact, and the health effects on older populations, in association with chronic and cardiovascular disease. More so, among the selected articles, 10 articles were from Nigeria, 4 were from Ghana, 2 were from Senegal. Meanwhile one articles each comes from a combined countries such as Kenya, Nigeria (1) & Tanzania and Nigeria, Uganda and Ghana (1). 11 articles utilize the cross-sectional method, 2 articles use the probability sampling method, 1 article each uses non-probability, and randomized, purposive, mix (quantitative and qualitative) descriptive and multistage.

The flow chart in Figure 2 and Table 3 show the selected and screened articles with the detailed results:

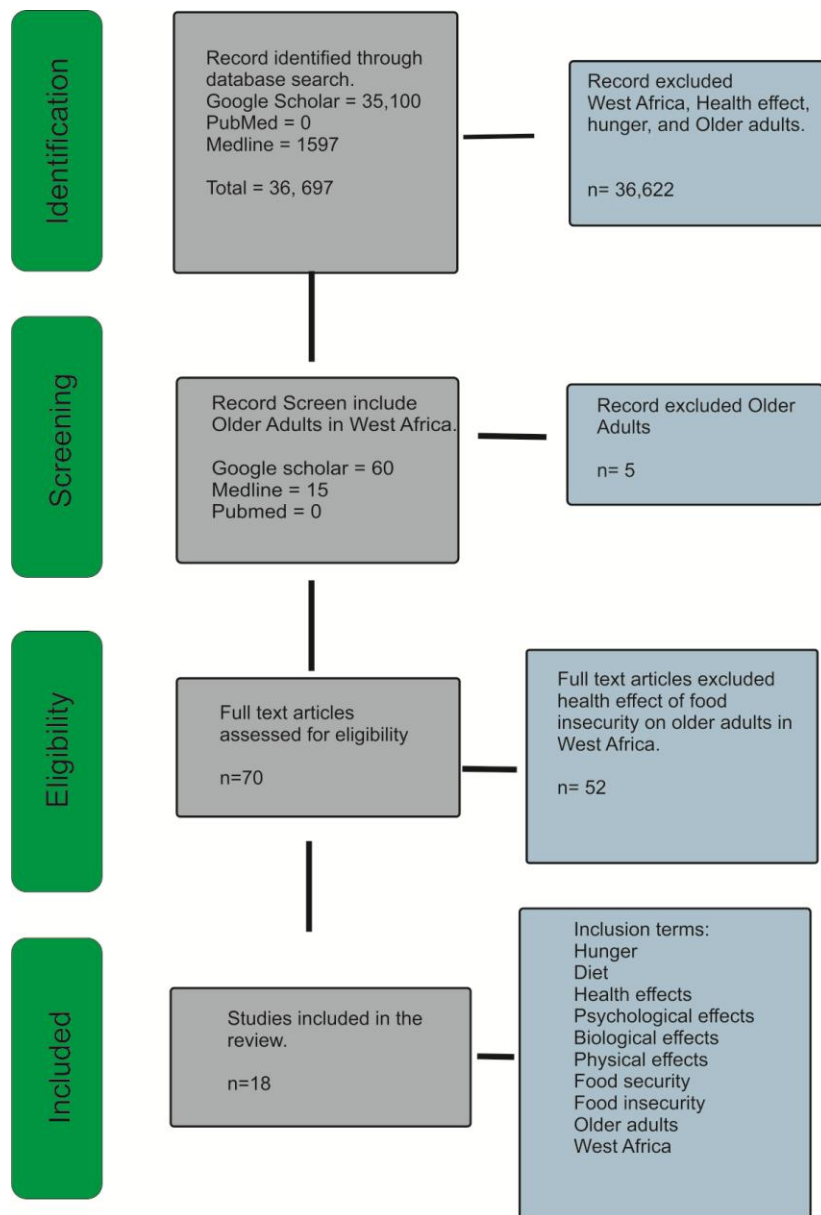


Figure 2: Flow chart of the included studies.

Table 3: Lists of the selected articles.

Author, year & Country	Title
Afolabi et al. 2015, Abeokuta Ogun State Nigeria	NUTRIENT INTAKE AND NUTRITIONAL STATUS OF THE AGED IN LOW-INCOME AREAS OF SOUTHWEST, NIGERIA

Agbawodikeizu et al. 2021, Nigeria.	Exploring the Impact of COVID-19 Pandemic on Economic Activities and Well-being of Older Adults in South-eastern Nigeria: Lessons for Gerontological Social Workers
Agbozo et al. 2018, Ghana	Nutrition knowledge, dietary patterns and anthropometric indices of older persons in four peri-urban communities in Ga West municipality, Ghana
Ani et al., 2022 Nigeria	The impact of climate change on food and human security in Nigeria.
Benzekri et al. 2021, Senegal, West Africa.	High Prevalence of Severe Food Insecurity and Malnutrition among HIV-Infected Adults in Senegal, West Africa
Benzekri et al. 2019, Senegal & West Africa	Nutrition support for HIV-TB co-infected adults in Senegal, West Africa: A randomized pilot implementation study
Braimah and Rosenberg, 2022, Ghana	An ecological systems analysis of food access barriers and coping strategies adopted by older adults in Ghana
Fasasi and Jegede, 2018, Nigeria	Perceived Effects of Dietary Behaviour on Household Food Security and Health of the Elderly Yoruba in Oyo State, Nigeria
Federal University of Agriculture and Oyekale et al. 2017, Nigeria	ANALYSIS OF RURAL HOUSEHOLDS; FOOD SECURITY STATUS IN OGUN STATE, NIGERIA
Folaniyan et al. 2021 Nigeria	Factors Associated with Financial Security, Food Security and Quality of Daily Lives of Residents in Nigeria during the First Wave of the COVID-19 Pandemic
Gyasi et al. 2020, Ghana	Association of food insecurity with psychological disorders: Results of a population-based study among older people in Ghana
Gyasi et al. 2021, Ghana	How Far Is Inclusivity of Financial Services Associated With Food Insecurity in Later Life? Implications for Health Policy and Sustainable Development Goals
L. Olawumi et al. 2023, Nigeria	Relationship between anemia, hypoalbuminemia, and dietary lifestyle of the older adults attending a primary care clinic in Nigeria
Nzeagwu et al. 2022, Nigeria	Association between dietary patterns and lipid profile of older adults in Kogi State, Nigeria
Olayiwola et al. 2014, Nigeria	Serum micronutrient status and nutrient intake of elderly Yoruba

	people in a slum of Ibadan, Nigeria
Onyenakie et al, 2022 Kenya & Tanzania	Prevalence and predictors of food insecurity among people living with and without HIV in the African Cohort Study
Onyenweaku et al. 2022, Nigeria	Effect of the coronavirus pandemic on nutrition and health of adults in Calabar, Nigeria: A post-lockdown analysis
Sweetland et al. 2019, Nigeria, Uganda & Ghana.	Food insecurity, mental distress and suicidal ideation in rural Africa: Evidence from Nigeria, Uganda, and Ghana

3.2. Themes

There are several research studies that focus on food security, food insecurity, malnutrition, nutritional insecurity, and diet intake in West Africa. Some of this research is directly linked to cardiovascular, chronic diseases, mental disorders, and other psychological disorders, while some explore the possible effects on households, women, men, children, adolescents, and adults, while some focus the research on morbidity health effects. One of the theme of the thesis also analyzes the factors that contribute to food insecurity and malnutrition among the older population in West Africa such as climate change, war and conflicts, famine, pests, and diseases.

Health outcomes of food insecurity and malnutrition

Food insecurity and malnutrition have psychological, biological, and physical health effects on older adults in West Africa, which are linked to numerous chronic, cardiovascular diseases and mental disorders.

Psychological effects

Food insecurity and malnutrition have a negative impact on the older population psychologically, with the effects such as mental disorders, depression, anxiety, cognitive decline, and other related psychological disorders (Gyasi et al, 2020). In a study conducted in Ghana which shows a relationship between food insecurity and psychological disorders, mental

disorders, depression and suicidal among older adults, out of which 1200 adults participated in the research. The prevalence rate of food insecurity of hunger is 36%, while those who skip breakfast are 29%. Those ones with a late intake of the first daily meal are 5%, after adjustment, moderate and severe food insecurity significantly increase psychological disorder compared to those without food insecurity, therefore it shows that late meal and inadequate nutrition is associated with increased psychological disorder (Sweetland et, al 2019, p.22). The findings show that food insecurity and malnutrition are associated with a higher prevalence of psychological and mental disorders among older adults in West Africa.

Biological and physical effects

Food insecurity and malnutrition are associated with several biological and physical effects such as a weak immune system, impaired immunological recovery, incidents of stroke, aging decline, stunted growth, and other chronic and cardiovascular diseases (Afolabi et al, 2015, p. 66). In a study research that was conducted in Senegal, which shows the relationship between malnutrition and HIV/AIDs among the infected adults where one hundred and nine participants with HIV-1 and HIV-2 enrolled. The prevalence of food insecurity was 84.6% in Dakar and 89.5% in Ziguinchor, therefore the severity of food insecurity was 59.6% in Dakar and 75.4% in Ziguinchors, while malnutrition was 19.2% in Dakar and 26.3% in Ziguinchors. Food insecurity severity was associated with missing clinic appointments and failure to take antiretroviral therapy in relation to hunger, while malnutrition was associated with lower CD4 cell counts. In conclusion, it shows that food insecurity and malnutrition are associated with HIV which leads to increased mortality, poor adherence to ART, virologic failure, impaired immunological recovery, and death (Benzekri et, al. 2011, p. 13).

Another study that was conducted among the community-dwellers of ambulatory older adults also shows that malnutrition and food insecurity have severe health effects. In the findings, 28% of the participants have adequate knowledge of geriatric nutrition, while 40% of them have dietary patterns, 53% have poor dietary patterns, 25% have bloating, 18% constipation, 12% appetite loss, 11% chewing difficulties, 10% underweight, 21.7% overweight and 16.6% obese. The overall findings show that poor diet and malnutrition are linked to health problems

among older adults in West Africa, thereby causing aging-related disorders, underweight, a decline in aging, poor adherence to treatment, and stunted growth (Agbozo et al. 2018, p. 748, p. 305; Nzeagwu et. al, 2022; Olayiwola et.al 2014). Malnutrition in relation to dietary patterns, behavior, and lifestyle has a significant impact on the health of older adults in West Africa such as adherence to treatment, barriers in controlling chronic and cardiovascular diseases, inability to recover from acute health threats or stressors (L. Olawumi et al, 2024, p. 301). According to the study conducted in Nigeria to examine the perceived effects of changing dietary behaviors on Household Food Security (HFS) and the health of the elderly shows that 65% of the elderly were food insecure, while 37% were healthy according to self-reported analysis, therefore concluding that most of the elderly were affected by household dietary behavior and this has a negative impact on their health (Fasasi and Jegede, 2018, p. 93).

Food insecurity and malnutrition are associated with the aging decline in renal function, fluid imbalance, poor hydration, and long-term chronic illness, according to the findings that were conducted among elderly Yoruba participants in Nigeria West Africa in which the diet intake contained inadequate vitamin B and other micronutrients, which has a negative impact on their health (Olayiwola et al, 2014, p.459)

Causes of food insecurity

The findings show that food insecurity and malnutrition are caused and influenced by several factors that have a negative impact on the health of the older population in West Africa. Among the causes include climatic change, low income, conflicts and famine, pandemics, and more (Gyasi et al., 2020, p. 190).

Climate change

Climate change is one of the factors that contribute to food insecurity and malnutrition in West Africa. The main causes of climate change and global warming that are experienced presently are linked to the human expansion of greenhouse and aerosols that is uttered such as the burning of fossil fuels, coal, and oil, clearing of land for agricultural processes, and more, thus resulting to increasing in heat waves, droughts, flood and more (Benzekri et al., 2015),

therefore cause severe adverse effects on agricultural products such as droughts, heavy precipitation, flooding of farmlands, rising temperature, increasing aridity, and soil acidity, changes in relative humidity and more thereby affect food supply chain, and contribute to food insecurity and malnutrition in West Africa (Braithwaite & Rosenberg, 2022).

Low income

Another factor that causes food insecurity and malnutrition is low income. Low income can lead to inability to purchase adequate nutritional food, especially among older adults who have no income or depends on a pension that is not sufficient enough (Folaniyan et. al, 2021). In a study report that was conducted in Nigeria, they found that low income contributes to food insecurity and malnutrition and affects food consumption; the mean age and household size of the respondents were 43 years and above. The per capita household expenditure per day was N113.57, by using two-thirds mean per capital expenditure as a food security line, the result shows that 70.1 percent of the households were food secure, while 36.7 percent were food secure with dollar-per-day per person food security line (Federal University of Agriculture, Abeokuta, et al., 2017)

Another finding also shows the effect of low income on food security; Out of 4439 participants/respondents, 2487 were financially insecure, 907 decreased food intake, and 4029 had their daily lives negatively impacted. 84 Males with depression, 62 males with PLHIV, and 55 had lower odds of reporting decreased food intake (Folaniyan et. al, 2021).

Other findings also show how older adults in low-income areas in the southwest region of Nigeria are subjected to malnutrition. The study shows the results of the participants who were married, and illiterate with farming and trading occupations earning around #1000 and #6000 monthly (less than 6 dollars per month) could not afford to buy nutritious food and this affected their nutrient intake. Their intake includes protein, calcium, riboflavin, niacin, and vitamin C for both men and women which was below DRI while iron, phosphorus, thiamine, and energy intakes were inadequate, thereby leading to underweight (Afolabi et al., 2015)

Conflicts and Famine

War and famine contribute to food insecurity and malnutrition in West Africa. War as a result of conflict and famine affects and disrupts food supply and agricultural products. There are several instances that could lead to war and conflicts which are either linked directly or indirectly to religion, ethnic crisis, and political crisis. This has claimed many lives and destroyed a lot of farm products. Famine is caused by drought, pests, and diseases which also have an effect on agricultural products and this could lead to scarcity of food products. For example, in Nigeria, Boko Haram insurgency, Niger Delta militancy, Communal clashes, Secessionist agitation, inter-religious conflicts, and Fulani herdsman conflict are responsible for killing, destroying farm products, and causing chaos (Ani et al., 2022, p. 156).

Pandemic

Pandemic can also cause food insecurity and malnutrition. Pandemic such as COVID-19 has a severe impact on food supply, which affects the majority of the older adults who are illiterate and engage in farming are restricted from going to farms and markets, as a result making it difficult to earn their living and contributes to low-income makes it difficult to purchase nutritious food (Agbawodikeizu et al., 2021, p. 614). COVID-19 is an unprecedented challenge for West Africa which disrupted some agricultural activities and supply chains as a result of lockdowns, social distancing, and social restrictions in movement and transportation, perhaps before the pandemic, the cropping system was rainfed while expecting the rain but when COVID-19 broke out, it affected the farming plantations, because the majority of crop, fish, and livestock farmers were unable to go farm due to restriction and lockdown, while marketing of food products, stores, hotels, and shopping malls was shut down, thus reducing the cash flow among food vendor and farmer, therefore, discourage them from engaging in farming (Folayan et al., 2021).

4.0. Discussion

In this thesis, the impact of food insecurity and malnutrition on the health outcomes of the older population and the causes in West Africa have been critically examined using narrative review. The narrative review approach was chosen so as to synthesize existing literature, identify gaps in knowledge, and provide a comprehensive overview of food insecurity and malnutrition. It also allows a qualitative exploration of the topic, while enabling a deeper understanding of the complex relationships between food insecurity, malnutrition, causes, and health outcomes in older adults. Unlike systematic reviews that follow a structured protocol and focus on specific research questions, narrative reviews allow us to explore a wide range of studies.

The findings of this narrative review shed light on the silent epidemic of food insecurity and malnutrition among older adults in West Africa as well as its detrimental outcome effects on health and causes. The data collected and analyzed in this research demonstrate an association between food insecurity, malnutrition, causes, and adverse health outcomes among older adults. One of the key findings of this study is the prevalence of food insecurity among older adults in West Africa in which the data reveal high levels of food insecurity, with a significant proportion of the older population experiencing limited access to an adequate and nutritious diet (Olayiwola et al., 2014). This is consistent with existing literature highlighting the vulnerability of older adults to food insecurity due to factors such as climate change, low income, conflicts, and famine pandemic, which affect their ability to procure and prepare food (Gyasi et al. 2021, p. 190).

Furthermore, the study also identifies a concerning prevalence of malnutrition among older adults in the region. Malnutrition, whether due to undernutrition or overnutrition, has been shown to have detrimental effects on health outcomes, particularly in older populations. The data collected in this study point to a complex relationship between malnutrition and various

health conditions commonly observed among older adults, including psychological disorders, chronic and cardiovascular diseases such as HIV/AIDS, tuberculosis, anemia, mental distress, fluid imbalance, cognitive impairment, and more (Onyenakie et al, 2022; L. Olawumi et al., 2023; Benzekri et al., 2011; Gyasi et, al. 2021).

The impact of food insecurity and malnutrition on the health outcomes of older adults in West Africa cannot be overstated. The findings suggest that older adults experiencing food insecurity are more likely to suffer from malnutrition, which in turn significantly increases their risk of developing chronic diseases and experiencing functional decline. This highlights the interconnected nature of food insecurity, malnutrition, and health outcomes, underscoring the need for comprehensive approaches that address these issues.

Moreover, the study reveals disparities in the prevalence of food insecurity and malnutrition among older adults in different regions of West Africa. Factors such as conflicts and famine, pandemics, and climate change play a crucial role in shaping the experiences of older adults in relation to food insecurity and malnutrition (Gyasi et, al. 2021). This underscores the importance of context-specific interventions that take into account the unique challenges faced by older adults in different settings within the region.

In light of these findings, there is a need to address food insecurity and malnutrition among the older population in West Africa as well as work on the means to increase access to nutritious food, enhance social support systems, and improve healthcare services for older adults which is one of the important steps in mitigating the negative health impact of food insecurity and malnutrition.

Furthermore, policymakers, healthcare providers, and community organizations must work together to develop targeted interventions that are tailored to the specific needs of older adults in West Africa. This includes implementing nutrition education programs, expanding social safety nets, and promoting age-friendly environments that support healthy aging and well-being. Collaborative efforts at the local, national, and regional levels are crucial in addressing the "silent epidemic" of food insecurity and malnutrition among the older population in West Africa.

4.1. Limitations of the study

The study was majorly based on an assessment and data collection of malnutrition, low dietary, and food insecurity in certain regions which limits the data availability. Therefore some regions may be lacking quality data, thus resulting in potential biases. For example, the search word is limited to food security, food insecurity, dietary, and malnutrition, as well as the adult population in the region of West Africa, which limits the search to specific results, maybe if the search could be extended to other regions like East, North and South Africa, it could give more details then compare the prevalence rate, health outcomes and the causes in these regions together could improve the result. Another aspect of the limitation is the sample size. Majority of the study research from the selected articles have a smaller sample size which may be prone to selection bias, therefore it cannot be generalized to a larger population. There is a limitation in exploring the factors that influence food insecurity and malnutrition among the older population in West Africa because it wasn't fully explored in the studies, therefore affecting the depth of the analysis. The studies don't discuss in detail the intervention strategies to reduce food insecurity and malnutrition in West Africa, as well as possible means to elevate these problems. In conclusion, the study on the older population in West Africa is not generalized to all countries in the region due to their demographics, health systems, and environmental factors.

5.0. Conclusion

In conclusion, this narrative review has shed light on the pervasive but often overlooked issue of food insecurity and malnutrition, and low diet among the older population in West Africa. The findings synthesized from the selected studies highlight the significant impact that inadequate access to nutritious food and poor nutritional status can have on the health outcomes of older adults in this region. The study also explores how malnutrition, food insecurity, and dietary patterns have an impact on mental, physical, and biological effects among the older population in West Africa, and these health effects range from mild to severe,

which could cause serious health problems and death. The study also shows how malnutrition, dietary, and food insecurity are associated with pandemic diseases such as COVID-19. The studies also analyzed and revealed a multitude of adverse effects, ranging from increased risk of chronic conditions, and cardiovascular diseases such as HIV/AIDS, tuberculosis, impaired immune, and diabetes to compromised immune function and cognitive decline. While this thesis contributes to the growing body of literature on food insecurity, malnutrition, and health outcomes in the older population of West Africa it also illuminates the challenges faced by older adults in accessing adequate and nutritious food, it is hoped that this research will serve as a catalyst for informed policies and interventions that promote healthy aging and improve the overall quality of life for older individuals in the region.

References

Adelaja, A., & George, J. (2019). Terrorism and land use in agriculture: The case of Boko Haram in Nigeria. *Land Use Policy*, 88, 104116. <https://doi.org/10.1016/j.landusepol.2019.104116>

Adelaja, A., & George, J. (2019). Effects of conflict on agriculture: Evidence from the Boko Haram insurgency. *World Development*, 117, 184–195.
<https://doi.org/10.1016/j.worlddev.2019.01.010>

Adishi, E. and Oluka, N.L. (2018), “Climate change, insecurity, and conflict: issues and probable roadmap for achieving sustainable development goals in Nigeria”, *International Journal of Social Sciences and Management Research*, Vol. 4 No. 8, pp. 12-20.

Ae-Ngibise, K. A., Asare-Doku, W., Peprah, J., Mujtaba, M. N., Nifasha, D., & Donnir, G. M. (2021). The Mental Health Outcomes of Food Insecurity and Insufficiency in West Africa: A Systematic Narrative Review. *Behavioral Sciences*, 11(11), 146.
<https://doi.org/10.3390/bs11110146>

Afolabi, W. A. O., Olayiwola, I. O., Sanni, S. A., & Oyawoye, O. (2015). NUTRIENT INTAKE AND NUTRITIONAL STATUS OF THE AGED IN LOW-INCOME AREAS OF SOUTHWEST, NIGERIA. *The Journal of Aging Research and Lifestyle*, 1–7. <https://doi.org/10.14283/jarcp.2015.51>

Agbawodikeizu, P. U., Ezulike, C. D., Ekoh, P. C., George, E. O., Okoye, U. O., & Nnebe, I. (2021). Exploring the Impact of COVID-19 Pandemic on Economic Activities and Well-being of Older Adults in South-eastern Nigeria: Lessons for Gerontological Social Workers. *Journal of Gerontological Social Work*, 64(6), 613–628. <https://doi.org/10.1080/01634372.2021.1907497>

Agbozo, F., Amardi-Mfoafo, J., Dwase, H., & Ellahi, B. (2018). Nutrition knowledge, dietary patterns and anthropometric indices of older persons in four peri-urban communities in Ga West municipality, Ghana. *African Health Sciences*, 18(3), 743. <https://doi.org/10.4314/ahs.v18i3.33>

Ahmed, T., & Haboubi, N. (2010). Assessment and management of nutrition in older people and its importance to health. *Clinical Interventions in Aging*, 5, 207–216. <https://doi.org/10.2147/cia.s9664>

Akerele, D., Momoh, S., Aromolaran, A. B., Oguntona, C. R. B., & Shittu, A. M. (2013). Food insecurity and coping strategies in South-West Nigeria. *Food Security*, 5(3), 407–414. <https://doi.org/10.1007/s12571-013-0264-x>

Akinyele, Isaac O. 2010. Ensuring food and nutrition security in rural Nigeria: An assessment of the challenges, information needs, and analytical capacity. NSSP Brief 18. Abuja, Nigeria: International Food Policy Research Institute (IFPRI). <http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/536>

Akwango, D., Obaa, B. B., Turyahabwe, N., Baguma, Y., & Egeru, A. (2017). Effect of drought early warning system on household food security in Karamoja subregion, Uganda. *Agriculture & Food Security*, 6(1), 43. <https://doi.org/10.1186/s40066-017-0120-x>

Alaimo, L. S., Fiore, M., & Galati, A. (2022). Measuring consumers' level of satisfaction for online food shopping during COVID-19 in Italy using POSETs. *Socio-Economic Planning Sciences*, 82, 101064. <https://doi.org/10.1016/j.seps.2021.101064>

Amaza, P. S., Umeh, J. C., Helsen, J., Adejobi, A. O., Amaza, P. S., Umeh, J. C., Helsen, J., & Adejobi, A. O. (2006). *Determinants and Measurements of Food Insecurity in Nigeria: Some Empirical Policy Guide*. <https://doi.org/10.22004/AG.ECON.25357>.

Arua, E. O. (1982). Achieving food sufficiency in Nigeria through the operation 'Feed the Nation' Programme. *Agricultural Administration*, 9(2), 91–101. [https://doi.org/10.1016/0309-586X\(82\)90128-5](https://doi.org/10.1016/0309-586X(82)90128-5)

Benzekri, N. A., Sambou, J., Diaw, B., Sall, E. H. I., Sall, F., Niang, A., Ba, S., Ngom Guèye, N. F., Diallo, M. B., Hawes, S. E., Seydi, M., & Gottlieb, G. S. (2015). High Prevalence of Severe Food Insecurity and Malnutrition among HIV-Infected Adults in Senegal, West Africa. *PLOS ONE*, 10(11), e0141819. <https://doi.org/10.1371/journal.pone.0141819>

Benzekri, N. A., Sambou, J. F., Tamba, I. T., Diatta, J. P., Sall, I., Cisse, O., Thiam, M., Bassene, G., Badji, N. M., Faye, K., Sall, F., Malomar, J. J., Seydi, M., & Gottlieb, G. S. (2019). Nutrition

support for HIV-TB co-infected adults in Senegal, West Africa: A randomized pilot implementation study. *PLOS ONE*, *14*(7), e0219118.

<https://doi.org/10.1371/journal.pone.0219118>

Beyene, S.D. The impact of food insecurity on health outcomes: empirical evidence from sub-Saharan African countries. *BMC Public Health* **23**, 338 (2023).

Brewer, D. P., Catlett, C. S., Porter, K. N., Lee, J. S., Hausman, D. B., Reddy, S., & Johnson, M. A. (2010). Physical Limitations Contribute to Food Insecurity and the Food Insecurity–Obesity Paradox in Older Adults at Senior Centers in Georgia. *Journal of Nutrition For the Elderly*, *29*(2), 150–169. <https://doi.org/10.1080/01639361003772343>

Bryman, A. (2012). *Social research methods* (4th ed.). Oxford, UK: Oxford University Press.
Cf Committee on Economic, Social and Cultural Rights, General Comment No. 12 (The Right to Adequate Food), E/C.12/1999/5 (12 May 1999), para 6.

Clover, J. (2003). FOOD SECURITY IN SUB-SAHARAN AFRICA. *African Security Review*, *12*(1), 5–15. <https://doi.org/10.1080/10246029.2003.9627566>

Cole, S. M., & Tembo, G. (2011). The effect of food insecurity on mental health: Panel evidence from rural Zambia. *Social Science & Medicine*, *73*, 1071–1079.
[doi:10.1016/j.socscimed.2011.07.012](https://doi.org/10.1016/j.socscimed.2011.07.012)

Crush, J., Frayne, B., & Pendleton, W. (2012). The Crisis of Food Insecurity in African Cities. *Journal of Hunger & Environmental Nutrition*, *7*(2–3), 271–292.
<https://doi.org/10.1080/19320248.2012.702448>

E.C.Nzeh, P.C. Uke, N. Attamah, D.C Nzeh, and O. Agu. (2016). Climate Change and Agricultural Production in Nigeria: A Review of Status, Causes and Consequences. *Nigerian Agricultural Policy Research Journal*. Volume 1, Issue 1, 2016. <http://aprnetworkng.org>.

Elijah, Yusuf & Francis, John Tenong. (2019). AGRICULTURAL PROGRAMMES AND FOOD SECURITY IN NIGERIA (1960-2016). A HISTORICAL OVERVIEW. 9. 143-152. 10.5775/J.JosGST.2021.0606202.

Eme, O. I., Onyishi, A. O., & Uche, O. A. (2014). Food Insecurity in Nigeria: A Thematic Exposition. *Oman Chapter of Arabian Journal of Business and Management Review*, 4(1), 1–14. <https://doi.org/10.12816/0016563>

Enete, C.I. (2000), "Climate and climate change", in Obasikene J.I., et al. (Eds), *Man and the Environment*, Computer Edge Publishers, Enugu.

Fasasi, L. T., & Jegede, A. S. (2018). Perceived Effects of Dietary Behaviour on Household Food Security and Health of the Elderly Yoruba in Oyo State, Nigeria. *The Nigerian Journal of Sociology and Anthropology*, 16(1). [https://doi.org/10.36108/NJSA/8102/61\(0160\)](https://doi.org/10.36108/NJSA/8102/61(0160))

Food and Agricultural Organization (2023). FAOSTAT: Suite of Food Security Indicators. *FAO*. Available at: www.fao.org/faostat/en/#data/FS

Food and Agricultural Organization (Ed.). (2010). Addressing food insecurity in protracted crises. FAO.

Food and Agriculture Organization, Rome (2017). Available at: www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/

Food and Agricultural Organization, Report of the World Food Conference, Rome 5–16 November 1974 (FAO, 1974). The Universal Declaration on the Eradication of Hunger and Malnutrition itself contains no definition.

Food and Agricultural Organization, Undernourishment can be defined as ‘food intake that is continuously insufficient to meet dietary energy requirements’ leading to ‘undernutrition’, FAO, The State of Food Insecurity in the World 2002 (FAO, 2001), at 50.

Food and Agricultural Organization (2018) Northeastern Nigeria: Situation Report- January 2017. Online: http://www.fao.org/fileadmin/user_upload/FAO-countries/Nigeria/ToR/FAO_Situation_Report_Northeastern_Nigeria_January_2017.pdf (Last accessed: 31/03/2020).

Food and Agricultural Organization, UNICEF, and WFP (2022) call for urgent and long-lasting action in West and Central Africa as the region faces another year of record hunger with thousands experiencing catastrophic levels of food insecurity.

Food and Agricultural Organization (2023), 2.1 Food security indicators – latest updates and progress towards ending hunger and ensuring food security.

<https://www.fao.org/3/cc3017en/online/state-food-security-and-nutrition-2023/food-security-nutrition-indicators.html#tab1>.

For the IOF CSA Nutrition Working Group, Mithal, A., Bonjour, J.-P., Boonen, S., Burckhardt, P., Degens, H., El Hajj Fuleihan, G., Josse, R., Lips, P., Morales Torres, J., Rizzoli, R., Yoshimura, N.,

Wahl, D. A., Cooper, C., & Dawson-Hughes, B. (2013). Impact of nutrition on muscle mass, strength, and performance in older adults. *Osteoporosis International*, 24(5), 1555–1566. <https://doi.org/10.1007/s00198-012-2236-y>

Fang, D., Thomsen, M. R., & Nayga, R. M. (2021). The association between food insecurity and mental health during the COVID-19 pandemic. *BMC Public Health*, 21(1), 607. <https://doi.org/10.1186/s12889-021-10631-0>

FSIN and Global Network Against Food Crises. 2022. GRFC 2022 Mid-Year Update. Rome.
Gallegos, D., Eivers, A., Sondergeld, P., & Pattinson, C. (2021). Food Insecurity and Child Development: A State-of-the-Art Review. *International Journal of Environmental Research and Public Health*, 18(17), 8990. <https://doi.org/10.3390/ijerph18178990>

Gerlach, C. (2015). Famine responses in the world food crisis 1972–5 and the World Food Conference of 1974. *European Review of History: Revue Européenne d'histoire*, 22(6), 929–939. <https://doi.org/10.1080/13507486.2015.1048191>

Global Food Security Index scores (2015): 1 – Overall score; 2 – Affordability score; 3 – Availability score; 4 – Quality and Safety score. Source: <http://foodsecurityindex.eiu.com>.

Gundersen, C., & Ziliak, J. P. (2015). Food Insecurity And Health Outcomes. *Health Affairs*, 34(11), 1830–1839. <https://doi.org/10.1377/hlthaff.2015.0645>

Gyasi, R. M., Phillips, D. R., & Adam, A. M. (2021). How Far Is Inclusivity of Financial Services Associated With Food Insecurity in Later Life? Implications for Health Policy and Sustainable

Development Goals. *Journal of Applied Gerontology*, 40(2), 189–200.

<https://doi.org/10.1177/0733464820907441>

Hanmer, J., DeWalt, D. A., & Berkowitz, S. A. (2021). Association between Food Insecurity and Health-Related Quality of Life: A Nationally Representative Survey. *Journal of General Internal Medicine*, 36(6), 1638–1647. <https://doi.org/10.1007/s11606-020-06492-9>

IPCC (2014), “Global climate change impacts in the United States”, Fifth assessment report of the United States Global Change Research programme, Cambridge University Press.

Jung, G., & Kunstmann, H. (2007). High-resolution regional climate modeling for the Volta region of West Africa. *Journal of Geophysical Research: Atmospheres*, 112(D23), 2006JD007951. <https://doi.org/10.1029/2006JD007951>

Katherine Alaimo, Mariana Chilton, Sonya J. Jones, Chapter 17 - Food insecurity, hunger, and malnutrition, Editor(s): Bernadette P. Marriott, Diane F. Birt, Virginia A. Stallings, Allison A. Yates, Present Knowledge in Nutrition (Eleventh Edition), Academic Press, 2020,

L. Olawumi, A., A. Grema, B., K. Suleiman, A., C. Michael, G., A. Umar, Z., A. Mohammed, A., I. Rufai, A., B. Mahmud, M., & A. Muhammad, H. (2023). Relationship between anemia, hypoalbuminemia, and dietary lifestyle of the older adults attending a primary care clinic in Nigeria. *Ghana Medical Journal*, 57(4), 300–307. <https://doi.org/10.4314/gmj.v57i4.7>

Lamidi, E. O. (2019). Household composition and experiences of food insecurity in Nigeria: The role of social capital, education, and time use. *Food Security*, *11*(1), 201–218.

<https://doi.org/10.1007/s12571-019-00886-2>

Lee, J. S., Fischer, J. G., & Johnson, M. A. (2010). Food Insecurity, Food and Nutrition Programs, and Aging: Experiences from Georgia. *Journal of Nutrition For the Elderly*, *29*(2), 116–149.

<https://doi.org/10.1080/01639366.2010.480895>

Leung, C. W., Kullgren, J. T., Malani, P. N., Singer, D. C., Kirch, M., Solway, E., & Wolfson, J. A. (2020). Food insecurity is associated with multiple chronic conditions and physical health status among older US adults. *Preventive Medicine Reports*, *20*, 101211.

<https://doi.org/10.1016/j.pmedr.2020.101211>

Maitre d’Hôtel, E., Béné, C., Pelloquin, R., Badaoui, O., Gharba, F., & Sankima, J. (2023). Resilience of food system actors to armed conflicts: Empirical insights from Burkina Faso. *Food Security*, *15*(5), 1275–1292. <https://doi.org/10.1007/s12571-023-01383-3>

Mosadeghrad, Ali Mohammad, et al. ‘Impact of Food Insecurity and Malnutrition on the Burden of Non-communicable Diseases and Death in Ethiopia: A Situational Analysis’. 1 Jan. 2019: 213 – 220.

Myers, C. A. (2020). Food Insecurity and Psychological Distress: A Review of the Recent Literature. *Current Nutrition Reports*, *9*(2), 107–118. [https://doi.org/10.1007/s13668-020-](https://doi.org/10.1007/s13668-020-00309-1)

00309-1

Njoku, J. E., & Mijindadi, N. B. (1985). The National Accelerated Food Production Project as a strategy for increased food production in Nigeria: A review of problems and prospects with particular reference to sorghum, millet, and wheat. *Agricultural Administration*, 18(3), 175–185. [https://doi.org/10.1016/0309-586X\(85\)90077-9](https://doi.org/10.1016/0309-586X(85)90077-9)

Nzeagwu, O. C., Emmanuel, B. B., & Iheme, G. O. (2022). Association between dietary patterns and lipid profile of older adults in Kogi State, Nigeria. *The North African Journal of Food and Nutrition Research*, 6(14), 207–217. <https://doi.org/10.51745/najfnr.6.14.207-217>

Nzeh, E. C., Uke, P. C., Attamah, N., Nzeh, D. C., Agu, O., Nzeh, E. C., Uke, P. C., Attamah, N., Nzeh, D. C., & Agu, O. (2016). *Climate Change and Agricultural Production in Nigeria: A Review of Status, Causes and Consequences*. <https://doi.org/10.22004/AG.ECON.292062>

Olayiwola, I. O., Fadupin, G. T., Agbato, S. O., & Soyewo, D. O. (2014). Serum micronutrient status and nutrient intake of elderly Yoruba people in a slum of Ibadan, Nigeria. *Public Health Nutrition*, 17(02), 455–461. <https://doi.org/10.1017/S1368980012004971>

Olayiwola, I. O., & Ketiku, A. O. (2006). Socio-demographic and nutritional assessment of the elderly Yorubas in Nigeria. *Asia Pacific Journal of Clinical Nutrition*, 15(1), 95–101.

Otaha, I. (2013). Food Insecurity in Nigeria: Way Forward. *African Research Review*, 7(4), 26. <https://doi.org/10.4314/afrrrev.v7i4.2>

Petersen, C. L., Brooks, J. M., Titus, A. J., Vasquez, E., & Batsis, J. A. (2019). Relationship Between Food Insecurity and Functional Limitations in Older Adults from 2005–2014 NHANES. *Journal of Nutrition in Gerontology and Geriatrics, 38*(3), 231–246.

<https://doi.org/10.1080/21551197.2019.1617219>

Pollock, D., Peters, M. D. J., Khalil, H., McInerney, P., Alexander, L., Tricco, A. C., Evans, C., de Moraes, É. B., Godfrey, C. M., Pieper, D., Saran, A., Stern, C., & Munn, Z. (2023). Recommendations for the extraction, analysis, and presentation of results in scoping reviews. *JBI Evidence Synthesis, 21*(3), 520–532. <https://doi.org/10.11124/JBIES-22-00123>.

Raskind, I. G., Haardörfer, R., & Berg, C. J. (2019). Food insecurity, psychosocial health and academic performance among college and university students in Georgia, USA. *Public Health Nutrition, 22*(3), 476–485. <https://doi.org/10.1017/S1368980018003439>

Sage . C, 'Food Security', in E. Page, M. Redcliff (eds), *Human Security and the Environment—International Comparisons* (Elgar, 2002), 128, 129. See S. Maxwell, 'Food Security: a Post-modern Perspective', (1996) 21 *Food Policy* 155, 170 for a list of 32 different definitions of food security from 1975–1991.

Sukhera, J. (2022). Narrative Reviews: Flexible, Rigorous, and Practical. *Journal of Graduate Medical Education, 14*(4), 414–417. <https://doi.org/10.4300/JGME-D-22-00480.1>.

Sweetland, A. C., Norcini Pala, A., Mootz, J., Kao, J. C.-W., Carlson, C., Oquendo, M. A., Cheng, B., Belkin, G., & Wainberg, M. (2019). Food insecurity, mental distress and suicidal ideation in rural Africa: Evidence from Nigeria, Uganda and Ghana. *International Journal of Social Psychiatry, 65*(1), 20–27. <https://doi.org/10.1177/0020764018814274>

To, Q. G., Frongillo, E. A., Gallegos, D., & Moore, J. B. (2014). Household Food Insecurity Is Associated with Less Physical Activity among Children and Adults in the U.S. Population. *The Journal of Nutrition*, 144(11), 1797–1802. <https://doi.org/10.3945/jn.114.198184>

Tucker, Luc. Climate Vulnerabilities and Food Insecurity in Mali. IMF Selected Issues Paper (SIP/2023/054). Washington, D.C.: International Monetary Fund.

UN GA United Nations Millennium Declaration (2000), A/Res/55/2, para 19. Both goals were recognized also in the Plan of Implementation of the World Summit on Sustainable Development, Report of the World Summit on Sustainable Development, 26 August–4 September 2003, UN Doc A/CONF.199/20, para 40(a).

UN (2014). West Africa

Map. https://www.un.org/geospatial/sites/www.un.org.geospatial/files/files/documents/2020/Apr/west_africa_4533_oct14_115.pdf

UNICEF 2021. Prioritization exercise: Nutrition Hotspot Analysis 2022.

<https://www.unicef.org/wca/media/7826/file/Note-nutrition-nie-final-en.pdf>

Volkert, D. (2013). Malnutrition in Older Adults - Urgent Need for Action: A Plea for Improving the Nutritional Situation of Older Adults. *Gerontology*, 59(4), 328–333.

<https://doi.org/10.1159/000346142>.

Warr, P. (2014). Food insecurity and its determinants. *Australian Journal of Agricultural and Resource Economics*, 58(4), 519–537. <https://doi.org/10.1111/1467-8489.12073>

WHO (2023). The state of food security and nutrition in the world 2023.

<https://www.who.int/publications/m/item/the-state-of-food-security-and-nutrition-in-the-world-2023>.

Worldbank (2023). World Bank Climate Change Knowledge Portal. Climate Change Knowledge Portal. <https://climateknowledgeportal.worldbank.org/overview>.

Wossen, T., Berger, T., Haile, M. G., & Troost, C. (2018). Impacts of Climate Variability and Food Price Volatility on Household Income and Food Security of Farm Households in East and West Africa. *Agricultural Systems*, 163, 7-15. <https://doi.org/10.1016/j.agsy.2017.02.006>