

# Food Safety Culture in Nigeria

Subjects: [Microbiology](#) | [Public, Environmental & Occupational Health](#) | [Environmental Sciences](#)

Contributor: Helen Onyeaka

Food safety culture describes a collection of learned and shared attitudes, values and beliefs that form the foundation of the hygienic behaviors used within a particular food handling environment. Sharman et al. defines food safety culture as a long-term paradigm in a food handling organization deeply rooted in beliefs, behaviors and assumptions which impact the food safety performance within the organization.

food safety

foodborne illness

consumer demand

producer behavior

food handling

organizational culture

## 1. Introduction

Food safety is one of the most significant public health issues worldwide, particularly in emerging and developing countries <sup>[1]</sup>. It has also become one of the most challenging social issues that need to be addressed in most low- to middle-income countries, including Nigeria. The World Health Organization (WHO) developed five crucial components for achieving safer food. The key features of these are: ensuring cleanliness, separating raw and cooked food, cooking thoroughly, keeping food at safe temperatures, and using safe water and raw materials <sup>[2]</sup>. Food safety culture describes a collection of learned and shared attitudes, values and beliefs that form the foundation of the hygienic behaviors used within a particular food handling environment <sup>[3][4]</sup>. Sharman et al. defines food safety culture as a long-term paradigm in a food handling organization deeply rooted in beliefs, behaviors and assumptions which impact the food safety performance within the organization <sup>[5]</sup>. Recently, food safety culture assessments among consumers and food businesses have gained attention from both scientists and food regulatory agencies <sup>[6][7][8][9][10]</sup>. Despite this merited attention and the efforts made to date to advance and implement food safety management systems (FSMSs), consumer food poisoning and outbreaks are still reported and remain an important cause of human disease <sup>[9][10][11][12]</sup>. Hence, the focus has shifted from a formal and technical-oriented food safety management systems approach to a more human approach, as mirrored by the emergence of the concept of food safety culture <sup>[13][14][15][16]</sup>.

In Nigeria, over 200,000 people die from foodborne illness annually. The economic burden associated with foodborne illnesses is around US\$ 3.6 billion per annum <sup>[17]</sup>. As in most developing countries, meeting the WHO's five key requirements for achieving safer food has been a struggle in Nigeria where basic amenities, particularly running water and robust sanitary units, are lacking <sup>[18]</sup>. These gaps in all aspects of the food chain—from the farm to the table—have amplified food safety issues in Nigeria. By the same token, other issues have contributed to poor food safety practices in Nigeria, including the rising population, the disparity in incomes, the extended food supply chains, the constantly evolving demographics, the dearth of education, the food consumption patterns, little or lack of food safety regulation, and other factors that are endemic in places with low levels of economic development <sup>[18][19][20]</sup>. Unfortunately, most households with low socioeconomic status mainly eat staples that are produced by the informal sector, exposing them to monotonous diets, which further compound issues around food safety culture. Furthermore, opportunistic and profit-driven behaviors, such as food fraud and adulteration and food information asymmetries, have also constantly fueled the fire of food safety concerns in Nigeria <sup>[17][18][21]</sup>.

In Nigeria, fundamental facilities and adequate enlightenment or sensitization on the importance of food safety culture are gravely lacking in many rural and sub-urban regions <sup>[22][23][24][25]</sup>. Some of the factors that have been identified as contributing to foodborne outbreaks in Nigeria include methods of cooking; poor food practices such as inadequate refrigeration, prolonged handling and improper reheating of cooked food; and food contamination by commercial or household food handlers <sup>[26][27]</sup>. Furthermore, the nature of food safety management in Nigeria is evolving, as the amount of ready-to-eat foods sold in the informal sector as street food have gained significant traction in society <sup>[17][18]</sup>. Ironically, the economic situation of the country has motivated these changing lifestyles. Interestingly Jespersen et al. <sup>[9]</sup> proposed that by enumerating food safety maturity via a validated triangulation method, food handling organizations can estimate the proportion of their sales that are wasted through the cost of poor quality items. This approach can have positive impacts on the design of specific interventions, which are needed in order to strengthen food safety management and to control activities in an organization <sup>[9]</sup>. With a looming global food crisis, the current COVID-19 pandemic (caused by SARS-CoV-2), and the ever-increasing Nigerian population <sup>[28][29]</sup>, the subject of food safety should be a focal point of discourse.

## 2. Perception of Food Safety among Consumers, Food Businesses, and Farmers

Generally, two interesting phenomena associated with consumer's perceptions of food safety and quality have been observed [30]. Firstly, there is a perception among consumers that ready-made meals (a prepackaged meal requiring very little or no preparation besides heating up) are more dangerous than home-cooked meals, and this potential danger can be worsened when new technologies are used. Secondly, there is a perception that familiar risks are less severe than unfamiliar ones [30]. In Nigeria, remarkably, the second phenomenon takes precedence over the first [30]. In addition, consumers and manufacturers possess striking differences in their perceptions of food safety. Consumers are focused on different components such as packaging, taste, and richness in nutrients as critical components of quality, whereas manufacturers consider product design, performance, and forms to be crucial components of food safety [30][31].

As society continues to evolve rapidly due to social innovations, more and more consumers in Nigeria are spending an increasingly significant portion of their income in ways remarkably different from conventional ways of spending. In Nigeria, a significant proportion of the population—mostly low-income earners—are more interested in money-saving and convenience than in food safety, quality and hygiene [32][33]. The preferred food destination for these people (low-income workers, shoppers, travelers, and school children) are food vendors on the street, as the main objective of these consumers is to quench their hunger with little concern for the safety or nutritional quality of such vended street foods [33][34]. Sadly, unhygienic food handling practices have become common among these informal food-selling vendors, as foods are either cooked, baked, or processed in extremely unsanitary environments. While several consumers and food businesses are keen to improve their food safety practices, the appropriate facilities that would help to promote safe food handling practices have been deficient. For instance, many communities and food businesses lack: adequate means of hygienically washing and drying utensils and equipment; lavatories of appropriate hygienic design; adequate facilities for food storage, ingredients, and non-food chemicals; and adequate drainage and waste disposal systems [35][36][37]. The lack of a continuous power supply further hampers the storage of raw agricultural products and processed food. Additionally, poor maintenance culture is another issue for the few communities with some of these facilities.

### 3. Attitude towards Food Safety in Nigeria

Food safety measures have been intentionally or unintentionally ignored by most food businesses and consumers alike in Nigeria. However, other factors such as regulatory failures, food prices, choice of products, lack of consumer information, and educational and cultural influences may also be responsible for Nigeria's existing food safety issues. It is common knowledge that regulators focus on big manufacturers, whereas small and artisanal food processors that make the majority of foods consumed by a large number of the population are ignored. Nigeria is a heterogeneous society with over 250 ethnic groups [38][39]. As such, where people come from plays the biggest role in their food safety practices because each person has their own food safety practices based on their traditional background. For instance, in Nigeria, popular food businesses—informal food vendors—are mainly owned by and employing people from diverse ethnic backgrounds. Therefore, if conventional food safety culture values are not instilled in the employees, employees from various ethnic and cultural backgrounds would likely perform food safety practices according to their traditions. Without a doubt, this could negatively impact the level of food safety and hygiene.

It is important also to note that some informal food vendors want to improve the food safety culture in their businesses [40][41][42]. However, they have been unable to do so due to financial constraints and/or having hired temporary staff, thereby experiencing challenges in instilling conventional food safety culture among their employees. Various studies have assessed the personal practices and hygiene of food business and the knowledge of food safety cultures among consumers and informal food vendors [18][33][43][44][45][46][47][48]. Interestingly, these studies concluded that further research is still needed in order to quell Nigeria's poor food safety culture. Some studies have evaluated the knowledge of food safety protocols by food handlers in Southeast Nigeria [43][44]. Unsurprisingly, these studies revealed a lack of knowledge of pathogens and hygienic food safety practices relevant to tropical environments [43][44]. What was somewhat surprising was the lack of knowledge around how allowing a sick person to cook or handle food could expose others to risk and/or result in foodborne illness. Likewise, another study revealed a general lack of knowledge about food safety, contamination, poisoning, control measures, and hygiene practices among formal and informal food vendors in Garki, Abuja [45]. Fortunately, it is feasible and promising to strengthen food safety culture and knowledge and behaviors of food handlers within food handling organizations [49]. There are some strategies that managers, owners, and directors can employ to promote a proactive food safety culture. Some of these strategies include: supplying appropriate infrastructure; creating reliable food safety management systems; and being understanding of employees' fatigue, job difficulty, and employees' dissatisfaction within the organization [49]. Interestingly, just as other such as managerial commitments can affect employees' behavior, intentions, and morale towards food safety practices, these aforementioned factors can also affect food safety and the climate within a food handling organization [49].

### 4. Limitations in Promoting Food Safety Culture in Nigeria

Issues around food preparation, safety, sale, and the consumption of street foods in inappropriate places are on the rise in Nigeria, making it exceptionally challenging to promote food safety culture in Nigeria. Although most of these informal food vendors provide cost-friendly alternative sources of food, the safety of foods sold in these places is substandard due to unhygienic ways of handling foods and a lack of sanitation, running water, refrigeration, and disinfection [17][30][34]. Sadly, the publics' laissez-faire attitude to food safety measures, uncoordinated approach to food control, and poor enforcement of legislation and regulatory limits has exacerbated issues related to food safety practices and foodborne toxicants in Nigeria [50]. Furthermore, an inefficient food supply chain, poor traceability, and a lack of understanding of food safety and quality standards have contributed to these challenges [51]. The lack of data on the incidence of foodborne disease outbreaks in Nigeria and lack of awareness of the socioeconomic consequences of food safety issues have not helped either [43][39].

Other key obstacles to food safety in Nigeria include the lack of a positive attitude towards risk management and an unwillingness to learn from accidents, near misses, and safety performance indicators [52][53][54][55]. As reported in several studies, foods are often prepared in unsanitary conditions, regular washing of hands is somewhat rare, and foods are often exposed to flies and other insects [18][35][36][37][43][44][47][50][51][55]. Among certain ethnic groups, keeping and preparing foods in advance for consumption is a common practice, while in some communities, food poisoning is often associated with evil spirits and ancestral curses [56]. All of these fundamental challenges have crippled efforts to promote food safety practices among Nigerians [39], and the relaxed attitudes of the consuming public and the regulators have gained worrying traction. Efforts to overcome these challenges with an intensive public education campaign on food safety have also not yielded the expected results, because most food handlers and consumers preferred their cultural food safety practices passed on to them through previous generations. In addition, climate change presents an emerging threat to global food safety and security [57][58][59] and will also negatively impact consumers in Nigeria. Therefore, there is a great need to employ adaptive strategies, such as establishing a food safety management program in Nigeria which would expound on the need to detect food hazards and promote food safety culture. A starting point maybe for the government to show more regulatory oversight. There is a consensus that regulatory oversight and better relationships with food producers could improve the current food safety deficiencies in Nigeria [60]. The government should constantly review food safety elements such as leadership, communication, risk perception, self-commitment, and management support.

## References

1. De Boeck, E.; Jaxsens, L.; Vanoverberghe, P.; Vlerick, P. Method triangulation to assess different aspects of food safety culture in food service operations. *Food Res. Int.* 2019, 116, 1103–1112.
2. Fontannaz-Aujoulat, F.; Frost, M.; Schlundt, J. WHO Five Keys to Safer Food communication campaign- Evidence-based simple messages with a global impact. *Food Control* 2019, 101, 53–57.
3. Griffith, C.J.; Livesey, K.M.; Clayton, D.A. Food safety culture: The evolution of an emerging risk factor? *Br. Food J.* 2010, 112, 426–438.
4. Nwankwo, E.; Agbasiere, D. Who is right? Examining the state of safety in selected medium-class hotels in Nigeria. *J. Hosp.* 2021, 3, 101–115.
5. Sharman, N.; Wallace, C.A.; Jespersen, L. Terminology and the understanding of culture, climate, and behavioural change—Impact of organisational and human factors on food safety management. *Trends Food Sci. Technol.* 2020, 96, 13–20.
6. Jespersen, L.; Griffiths, M.; Wallace, C.A. Comparative analysis of existing food safety culture evaluation systems. *Food Control* 2017, 79, 371–379.
7. de Andrade, M.L.; Stedefeldt, E.; Zanin, L.M.; da Cunha, D.T. Food safety culture in food services with different degrees of risk for foodborne diseases in Brazil. *Food Control* 2020, 112, 107152.
8. Zanin, L.M.; Stedefeldt, E.; da Silva, S.M.; da Cunha, D.T.; Luning, P.A. Influence of educational actions on transitioning of food safety culture in a food service context: Part 2-Effectiveness of educational actions in a longitudinal study. *Food Control* 2021, 120, 107542.
9. Jespersen, L.; Butts, J.; Holler, G.; Taylor, J.; Harlan, D.; Griffiths, M.; Wallace, C.A. The impact of maturing food safety culture and a pathway to economic gain. *Food Control* 2019, 98, 367–379.
10. de Andrade, M.L.; Stedefeldt, E.; Zanin, L.M.; Zanetta, L.D.A.; da Cunha, D.T. Unveiling the food safety climate's paths to adequate food handling in the hospitality industry in Brazil. *Int. J. Contemp. Hosp. Manag.* 2021, 33, 873–892.
11. European Food Safety Authority and European Centre for Disease Prevention and Control (EFSA and ECDC). The European Union summary report on trends and sources of zoonoses, zoonotic agents and

- food-borne outbreaks in 2017. *EFSa J.* 2018, 16, e05500.
12. Griffith, C.J. Food safety: Where from and where to? *Br. Food J.* 2006, 108, 6–15.
  13. Nayak, R.; Waterson, P. The Assessment of Food Safety Culture: An investigation of current challenges, barriers and future opportunities within the food industry. *Food Control* 2017, 73, 1114–1123.
  14. Griffith, C.J.; Livesey, K.M.; Clayton, D. The assessment of food safety culture. *Br. Food J.* 2010, 112, 439–456.
  15. Powell, D.A.; Jacob, C.J.; Chapman, B.J. Enhancing food safety culture to reduce rates of foodborne illness. *Food Control* 2011, 22, 817–822.
  16. Yiannas, F. *Food Safety Culture: Creating a Behavior-Based Food Safety Management System*; Springer Science & Business Media: Berlin, Germany, 2008.
  17. Ezirigwe, J. Much ado about food safety regulation in Nigeria. *J. Sustain. Dev. Law Policy* 2018, 9, 109–132.
  18. Fasoro, A.; Faeji, C.; Oni, O.; Oluwadare, T. Assessment of food safety practices in a rural community in Southwest Nigeria. *Food Public Health* 2016, 6, 1–6.
  19. Ortega, D.L.; Tschirley, D.L. Demand for food safety in emerging and developing countries: A research agenda for Asia and Sub-Saharan Africa. *J. Agribus. Dev. Emerg. Econ.* 2017, 7, 21–34.
  20. Amolegbe, K.B.; Upton, J.; Bageant, E.; Blom, S. Food price volatility and household food security: Evidence from Nigeria. *Food Policy* 2021, 102, 102061.
  21. Aworh, O.C. Food safety issues in fresh produce supply chain with particular reference to sub-Saharan Africa. *Food Control* 2020, 123, 107737.
  22. Oranusi, S.; Onyike, E.; Galadima, M.; Umoh, V. Hazard Analyses Critical Control Points of foods Prepared By Families in Zaria Nigeria. *Niger. J. Microbiol.* 2004, 18, 346–362.
  23. Egbule, O.S.; Iweriebor, B.C.; Odum, E.I. Beta-Lactamase-Producing *Escherichia coli* Isolates Recovered from Pig Handlers in Retail Shops and Abattoirs in Selected Localities in Southern Nigeria: Implications for Public Health. *Antibiotics* 2021, 10, 9.
  24. Ifiora, G.C.; Chukwunwejim, C.R.; Ejikeugwu, C.P.; Egbuna, R.N.; Ifiora, F.C.; Abonyi, I.C.; Eze, P.M.; Arzai, A.H.; Mukhtar, M.D. Microbiological safety assessment of food handlers in Wudil Local Government Area of Kano State, Nigeria. *MicroMedicine* 2020, 8, 22–27.
  25. Anyogu, A.; Olukorede, A.; Anumudu, C.; Onyeaka, H.; Areo, E.; Adewale, O.; Odimba, J.N.; Nwaiwu, O. Microorganisms and food safety risks associated with indigenous fermented foods from Africa. *Food Control* 2021, 129, 108227.
  26. Daniels, N.A.; Mackinnon, L.; Rowe, S.M.; Bean, N.H.; Griffin, P.M.; Mead, P.S. Foodborne disease outbreaks in United States schools. *Pediatr. Infect. Dis. J.* 2002, 21, 623–628.
  27. Hedberg, C.W.; Smith, S.J.; Kirkland, E.; Radke, V.; Jones, T.F.; Selman, C.A.; Group, E.-N.W. Systematic environmental evaluations to identify food safety differences between outbreak and nonoutbreak restaurants. *J. Food Prot.* 2006, 69, 2697–2702.
  28. Onyeaka, H.; Agbugba, I.; Ekwebelem, O.; Anumudu, C.; Anyogu, A.; Odeyemi, O.; Agbagwa, S. Strategies to Mitigate the Impact of COVID-19 on Food Security and Malnutrition in Nigeria. *Eur. J. Nutr. Food Saf.* 2021, 13, 103–109.
  29. Ekwebelem, O.C.; Ofielu, E.S.; Nnorom-Dike, O.V.; Iweha, C.; Ekwebelem, N.C.; Obi, B.C.; Ugbede-Ojo, S.E. Threats of COVID-19 to Achieving United Nations Sustainable Development Goals in Africa. *Am. J. Trop. Med. Hyg.* 2020, 104, 1–4.
  30. Iyadi, R.C. *Consumers' Perception of Safety of Food In South–South And South–East of Nigeria*. Ph.D. Thesis, Department of Marketing, University of Nigeria, Nsukka, Nigeria, 2015.
  31. Ogundugbe, S. Ensuring Food Safety and Environmental Hygiene. *J. Food Saf. Hyg.* 2011, 4, 14–21.
  32. Isaac Adewole Food Safety as an Important Global Public Health and Economic Concern. Available online: <http://healthnewsng.com/food-safety-important-global-public-health-economic-concern/> (accessed on 28 April 2021).
  33. Kundu, S.; Banna, M.H.A.; Sayeed, A.; Akter, S.; Aktar, A.; Islam, M.A.; Proshad, R.; Khan, M.S.I. Effect of vendors' socio-demography and other factors on hygienic practices of street food shops. *J. Foodserv. Bus.*

Res. 2021, 24, 445–456.

34. Okojie, P.W.; Isah, E.C. Food hygiene knowledge and practices of street food vendors in Benin City, Nigeria. *Int. J. Consum. Stud.* 2019, 43, 528–535.
35. Gali, A.; Umaru, G.; Adamu, S.; Hamza, I.; Jibrin, M. Assessment of operational facilities and sanitary practices in Zangon Shanu abattoir, Sabon Gari Local Government Area, Kaduna State, Nigeria. *J. Vet. Med. Anim. Health* 2020, 12, 36–47.
36. Abejegah, C.; Abah, S.; Awunor, N.; Duru, C.; Eluromma, E.; Aigbiremolen, A.; Okoh, E. Market sanitation: A case study of Oregbeni market Benin-city Edo State, Nigeria. *Int. J. Basic Appl. Innov. Res.* 2013, 2, 25–31.
37. Adeolu, A.; Opasola, A.; Salami, O.; Iyanda, A.; Omenta, R. Sanitary Status and Compliance with the Standard Slaughter Practices in Karu Abattoir Abuja Municipal Area Council of the FCT, Nigeria. *Int. J. Curr. Innov. Adv. Res.* 2019, 2, 1–14.
38. Adeyemi, B.A.; Adeyemi, B.B.; Omiyefa, O.M.; Oyekan, O.A. Diversity in religion and culture in nigeria: A blessing or a curse? *J. Pedagog. Thought* 2019, 14, 24–40.
39. Kilders, V.; Caputo, V.; Liverpool-Tasie, L.S.O. Consumer ethnocentric behavior and food choices in developing countries: The case of Nigeria. *Food Policy* 2021, 99, 101973.
40. Idiaye, C.O.; Ogidan, O.A.; Oluwatayo, I.B. Perception, risk attitude and willingness to pay for safety and innovative attributes of processed chicken meat in Oyo State, Nigeria. *Ital. J. Food Saf.* 2020, 9, 8506.
41. Akinbode, S.; Dipeolu, A.; Okuneye, P. Willingness to pay for street food safety in Ogun State, Nigeria. *J. Agric. Food Inf.* 2011, 12, 154–166.
42. Alimi, B.; Oyeyinka, A.; Olohungbebe, L. Socio-economic characteristics and willingness of consumers to pay for the safety of fura de nunu in Ilorin, Nigeria. *Qual. Assur. Saf. Crops Foods* 2016, 8, 81–86.
43. Onyeneho, S.N.; Hedberg, C.W. An assessment of food safety needs of restaurants in Owerri, Imo State, Nigeria. *Int. J. Environ. Res. Public Health* 2013, 10, 3296–3309.
44. Iwu, A.C.; Uwakwe, K.A.; Duru, C.B.; Diwe, K.C.; Chineke, H.N.; Merenu, I.A.; Oluoha, U.R.; Madubueze, U.C.; Ndukwu, E.; Ohale, I. Knowledge, attitude and practices of food hygiene among food vendors in Owerri, Imo State, Nigeria. *Int. J. Occup. Med. Environ. Health* 2017, 5, 11.
45. Pepple, N. Environment and food poisoning: Food safety knowledge and practice among food vendors in Garki, Abuja–Nigeria. *J. Health Educ. Res. Dev.* 2017, 5, 217.
46. Chukwuocha, U.; Dozie, I.; Amadi, A.; Nwankwo, B.; Ukaga, C.; Aguwa, O.; Abanobi, O.; Nwoke, E. The knowledge, attitude and practices of food handlers in food sanitation in a metropolis in south eastern Nigeria. *East Afr. J. Public Health* 2009, 6, 243–246.
47. Ehiri, J.E.; Azubuike, M.C.; Ubbaonu, C.N.; Anyanwu, E.C.; Ibe, K.M.; Ogbonna, M.O. Critical control points of complementary food preparation and handling in eastern Nigeria. *Bull. World Health Organ.* 2001, 79, 423–433.
48. Ifeadike, C.; Ironkwe, O.; Adogu, P.; Nnebue, C.; Emelumadu, O.; Nwabueze, S.; Ubajaka, C. Prevalence and pattern of bacteria and intestinal parasites among food handlers in the Federal Capital Territory of Nigeria. *J. Niger. Med. Assoc.* 2012, 53, 166.
49. da Cunha, D.T. Improving food safety practices in the foodservice industry. *Curr. Opin. Food Sci.* 2021, 42, 127–133.
50. Omojokun, J. Regulation and enforcement of legislation on food safety in Nigeria. *Mycotoxin Food Saf. Dev. Ctries.* 2013, 10, 251–268.
51. Global Alliance for Improved Nutrition. Nigeria Policy, Monitoring Systems Analysis and Stakeholder Mapping Report. A USAID EatSafe Project Report. 2020. Available online: <https://agrilinks.org/sites/default/files/media/file/Report%20on%20Policy%20and%20Monitoring%20Systems%20Analysis%20and%20Stakeholder%20Mapping%20Report%20FINAL.pdf> (accessed on 5 May 2021).
52. Chikaire, U.; Atoma, C.; Oyem, A.; Akeni, T. Displaced Farmers Perception of Resource-Use Conflicts as an Obstacle to Household Food Security and Food Safety in Abia State, Nigeria. *J. Commun. Commun. Res.* 2020, 5, 228–233.
53. Ajayi, O.A.; Salaudeen, T. Consumer food safety awareness and knowledge in Nigeria. *Int. J. Food Saf.* 2014, 16, 17–24.

54. Odipe, O.E.; Raimi, M.; Deinkuro, N.S.; Funmilayo, A.A.; innocent Edewor, O.-P.; Lateefat, H.M.; Fadeyibi, M. Assessment of Environmental Sanitation, Food Safety Knowledge, Handling Practice among Food Handlers of Bukateria Complexes in Iju Town, Akure North of Ondo-State, Nigeria. *Act. Sci. Nutr. Health* 2019, 3, 186–200.
55. Okpala, C.O.R.; Nwobi, O.C.; Korzeniowska, M. Assessing Nigerian Butchers' Knowledge and Perception of Good Hygiene and Storage Practices: A Cattle Slaughterhouse Case Analysis. *Foods* 2021, 10, 1165.
56. Oyemade, A.; Omokhodion, F.O.; Olawuyi, J.F.; Sridhar, M.K.; Olaseha, I.O. Environmental and personal hygiene practices: Risk factors for diarrhoea among children of Nigerian market women. *J. Diarrhoeal Dis. Res.* 1998, 16, 241–247.
57. Oyedele, O.A.; Akinyemi, M.O.; Kovač, T.; Eze, U.A.; Ezekiel, C.N. Food safety in the face of climate change: Consequences for consumers. *Croat. J. Food Sci. Technol.* 2020, 12, 280–286.
58. Yakubu, S.M.; Musa, M.W.; Bamidele, T.E.; Ali, M.B.; Bappah, M.T.; Munir, R.T.; Manuwa, A. Effects of Farmer-Herder Conflicts on Rural Households Food Security in Gombe State, Nigeria. *J. Agric. Ext. Rural. Dev.* 2020, 25, 11–20.
59. Aluko, O.I. Agricultural policy and food security in Nigeria: A rational choice analysis. In *The Palgrave Handbook of Agricultural and Rural Development in Africa*; Springer: Berlin/Heidelberg, Germany, 2020; pp. 475–491.
60. Nwaiwu, O.; Itumoh, M. Chemical contaminants associated with palm wine from Nigeria are potential food safety hazards. *Beverages* 2017, 3, 16.

---

Retrieved from <https://encyclopedia.pub/entry/history/show/31499>