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'If fake food doesn't kill you, just eat it.': Consumer perceptions and normalisation of food fraud in Nigeria

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ABSTRACT

The Nigerian food supply chain is affected by food fraud which compromises food security, safety, integrity, and quality. This study aims to investigate consumers' awareness, perceptions, and experiences of food fraud in Nigeria using a mixed methods approach. A mixed methods approach involving questionnaire surveys and semi-structured interviews was conducted between July 2022-February 2023. Non-probabilistic sampling for survey and purposive sampling for interviews was employed. A total of 527 valid survey responses and 22 semi-structured interviews with consumers were conducted. The study targeted both rural and urban Nigeria. Chi-square test was conducted to identify associations between demographic variables and perceptions of food fraud. Qualitative data were analysed using Braun and Clarke's thematic analysis. Manufacturing and packaging of processed foods were perceived as the most vulnerable stages in the food supply chain with alcoholic beverages, herbs and spices, and fats and oils identified as the vulnerable categories. Chi-square analyses showed significant associations between education and employment and awareness of food fraud, and between gender and age and perceptions of food fraud as a threat to Nigeria. Perceived drivers included financial gain, ease of committing fraud, ineffective reporting channels, and regulatory inaction. Limited regulatory resources and corruption were perceived as significant barriers, highlighting the need for stronger inspections, better reporting systems, and stricter enforcement. Our key finding revealed a nuanced dimension of food fraud, i.e. the normalisation and tacit acceptance of fraudulent products by consumers due to financial constraints. This is among the first empirical mixed methods studies to explore the perceptions and insights of consumers on the drivers, challenges and mitigating strategies to address food fraud in Nigeria.

1. Introduction

Food fraud is a global issue that affects many countries. Food fraud is defined as any "*deliberate and intentional act of substitution, addition, tampering, or misrepresentation of food, food ingredients, or false or misleading statements made about a product, for economic gain*" (Spink & Moyer, 2011). It includes any intentional activity conducted on food for financial or economic benefit. Such activities include adulteration, counterfeiting, substitution, unlawful processing, smuggling, waste diversion, misrepresentation or mislabelling, document fraud, theft, artificial enhancement, diversion, and simulation (Spink & Moyer, 2011; Spink et al., 2013). Additional forms of fraud include transshipment, short-weighing and over-treatment of food products (GAO, 2009; Spink & Moyer, 2011). A recent food fraud report indicated a rise in fraud across nuts, dairy and cereals due to price pressures, climate change and complex food supply chains (FOODAKAI, 2026). Global estimates of food fraud showed that it cost between USD 10–15 billion annually in 2013, with more recent estimates suggesting losses of USD 30–40 billion per year (Robson et al., 2020). However, one of the biggest challenges with global estimates on the scale of food fraud is that it often goes undetected or unreported (Visciano & Schirone, 2021). This challenge is particularly pronounced in emerging economies such as Nigeria, where surveillance and reporting systems may be limited (Onyeaka et al., 2022). Similarly, the regulation of food fraud is difficult elsewhere in the region of Sub-Saharan Africa due to a lack of official controls and a high number and variety of informal marketplaces

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(Chukwugozie et al., 2024). The global challenge of food fraud also affects other developing regions including Southeast Asia (Owolabi and Olayinka, 2021). Examples include adulteration of palm oil with Sudan dyes in Ghana (Andoh et al., 2020), using highly toxic pesticides to kill and 'harvest' fish in Cameroon (Deudjui et al., 2020) and using inappropriate amounts of additives to prolong shelf-life of flatbread in Ethiopia (Neela and Fanta, 2020). Meanwhile, the sale of adulterated alcohol in Malaysia (Rahimi et al., 2021) and seafood species substitution in Indonesia (Abdullah and Rehbein, 2017), Thailand (Panprommin and Manosri, 2022) and Malaysia (Chin et al., 2016) were reported in Southeast Asia.

Nigeria's food supply chain has experienced both food safety and food fraud incidents that compromise food integrity, safety and quality and therefore diminish consumers' trust (Eze, 2019; Onyeaka et al., 2022; Cudjoe et al., 2022). This study is conceptually informed by food fraud vulnerability frameworks (Silvis et al., 2017; van Ruth et al., 2017) and routine activity theory (Cohen and Felson, 1979). According to Routine Activity Theory, crime (in this case food fraud) results from the convergence of three elements (i) a motivated offender such as a food business or distributor supplying fraudulent or mislabelled food products; (ii) a suitable target such as general consumers and (iii) absence of capable guardians such as weak or corrupted regulatory bodies. As food fraud is often committed within various stages of food supply chain especially during manufacturing, retailing and distribution (Soon and Abdul Wahab, 2022), it is thus committed at the workplace and directly arises out of the routines of work life. Additionally, most fraudulent activities are committed by insiders or staff who typically have greater access to information and processing facilities which provides more opportunities for food fraud activities (Soon, 2022; van Ruth et al., 2017).

Food producers in Nigeria operate within an increasingly competitive and demand-driven market, where intense competition and market saturation have been linked to economically motivated adulteration and other fraudulent practices (Onyeaka et al., 2022; Soon-Sinclair et al., 2023; Chukwugozie et al., 2024). Food fraud activities that were reported in Nigeria include the production and distribution of illegal alcoholic and non-alcoholic beverages (Daily Post Nigeria, 2024; NAFDAC 2023; The Guardian Nigeria News, 2022), food smuggling (Golub, 2012; Omodunbi et al., 2022), and artificial enhancements of ingredients and food products (Onyeaka et al., 2022; 2024). Despite these reported incidences, there is limitedempirical research available on food fraud in Nigeria. Existing studies based in Nigeria largely emphasise prevalence and awareness through quantitative surveys, with limited exploration of how consumers interpret the structural, economic, and cultural dimensions of food fraud. For example, studies by Onyeaka et al. (2024), Opia (2020), and Soon-Sinclair et al. (2023), have identified commonly adulterated foods such as alcoholic and non-alcoholic beverages, dairy products, rice, honey, and fats and oils. Most of these studies relied primarily on consumer surveys, with Opia's work additionally incorporating interviews with officials from the National Agency for Food and Drug Administration and Control (NAFDAC). This paper builds on earlier Nigerian food fraud studies but makes a distinct contribution in scope, design and interpretation. While Onyeaka et al. (2024) provided a large-scale survey of Nigerian consumers' knowledge and attitudes towards food fraud, the present study combines survey data with semi-structured interviews to examine not only awareness and attitudes, but also consumers' perceived drivers, barriers to control and suggested mitigation strategies. Building on previous works, the present study is among the first empirical investigations to adopt a mixed methods approach to investigate consumers' awareness, perceptions and experiences of food fraud in Nigeria. This study aims to address the following research questions: (1) How do consumers perceive and experience food fraud in Nigeria?; (2) Which food and drink products, and stages of the food supply chain are perceived as most vulnerable to food fraud?; and (3) What factors contribute to food fraud and what challenges hinder its prevention in Nigeria?

2. Methodology

2.1. Study design

An explanatory sequential mixed methods design was adopted, combining quantitative surveys (online and face-to-face) with semi-structured interviews. The survey findings were used to refine the semi-structured interviews. The qualitative findings were then integrated with the survey results to support interpretation. Additionally, the mixed methods approach offers richer insights into food fraud perceptions, improves the reliability of the data and supports the convergence of findings (Carugi, 2016).

2.2. Questionnaire Development

The survey questionnaire was developed based on previous studies by Charlebois et al. (2016) and Soon-Sinclair et al. (2023). It comprised three sections: (i) demographics (8 questions) (ii) perceptions of food fraud (7 questions); and (iii) personal experiences, perceived impact and mitigating measures (4 questions). The questionnaire consisted of closed-ended questions with pre-defined categorical response options such as yes/no/unsure and multiple-choice responses.

2.3. Pilot testing of questionnaire

A pilot study was conducted to assess the validity, reliability, and clarity of the questionnaire. Face and content validity were established to ensure that the questions adequately captured relevant food fraud concerns in the Nigerian context. The questionnaire was reviewed by four academics from Nigeria and the United Kingdom. Test–retest reliability was assessed by asking pilot participants to complete the survey in Week 1 and again in Week 3. A 2–3 week interval between administrations has been shown to provide strong reliability estimates (Kost and da Rosa, 2018; Mørkbak and Olsen, 2015). The pilot test participants were recruited through professional networks in Nigeria using convenience sampling and were required to meet the same eligibility criteria as the main study. Nine participants completed the initial pilot survey, of whom only five completed the re-test, representing an attrition rate of 44.4%. Selected items, including "Have you heard of food fraud?", "Are consumers responsible for food fraud?", and "Is food fraud a threat to Nigeria?", were analysed to evaluate score stability over time. Shapiro–Wilk tests were significant ($p < 0.001$), indicating non-normal data distribution. Therefore, Spearman's rank correlation coefficient (ρ) was used. The coefficient was $\rho = 0.72$ which exceeded 0.60, indicating acceptable test–retest reliability (Field, 2017). Minor revisions were subsequently made to improve clarity, including rephrasing "In your opinion, is food fraud a threat to the Nigerian economy?" and adding an optional "I don't know" response category. The average completion time was 8 – 12 min. The questionnaire is available in Supplementary Material 1.

2.4. Consumer survey

The online survey was hosted on www.onlinesurvey.ac.uk and conducted over four months (July–October 2022). It was distributed via social media platforms, including WhatsApp, LinkedIn, Facebook, and Instagram. A non-probabilistic sampling approach was used. Inclusion criteria were: (i) residence in Nigeria within the past three years; (ii) aged 18 years or above; (iii) responsibility for purchasing food and drink items; and (iv) willingness to participate in the survey and/or semi-structured interview. To ensure inclusion of participants from rural areas with limited internet access, purposive sampling among three community-based charity groups was engaged: Justice Forum Women Wing Ojo Chapter (Lagos), Great Grace Initiative (Abuja), and United Ladies of Omuma (Rivers State). These locations were selected to facilitate face-to-face data collection across different geographical regions of

Nigeria while remaining feasible within the study's resource constraints. Staff members were trained to administer the questionnaire. Hard copies were distributed and written or verbal informed consent was obtained prior to participation.

2.5. Development of semi-structured interview guide

The semi-structured interview guide was developed and refined based on Soon and Liu (2020) and Opia (2020). It was reviewed by three UK academics and one Nigerian academic during its development. A pilot interview was conducted to assess clarity and estimate interview duration which was approximately 30 min. The semi-structured interview guide is provided in Supplementary Material 1.

2.6. Consumers' semi-structured interviews

Interviews were conducted either face-to-face or online using Microsoft Teams. Purposive sampling was used to invite participants. Participants were required to meet the same eligibility criteria as the survey. Participants received an information sheet and provided signed informed consent before the interview commenced. A total of 22 participants from Lagos, Abuja, and Rivers State took part in the semi-structured interviews between November 2022- February 2023. Data saturation was considered to have been reached when no new themes or meaningful insights emerged from subsequent interviews. All interviews were audio-recorded using an encrypted dictaphone or Microsoft Teams. Recordings were transcribed verbatim and deleted following transcription.

2.7. Data analysis

Quantitative survey data were analysed using SPSS Version 28.0. Categorical variables were presented as frequencies and percentages. Chi-square (χ^2) tests were conducted to examine associations between demographic characteristics and whether participants (i) had heard of food fraud, (ii) perceived consumers as responsible for food fraud in Nigeria, and (iii) considered food fraud a threat to Nigeria. Effect sizes were evaluated using Cramer's V, where values below 0.19 were considered negligible, 0.20–0.29 weak, 0.30–0.50 moderate, and $\geq$ 0.50 strong associations (McHugh, 2018).

2.7.1. Qualitative analysis

Qualitative data were transcribed and analysed using thematic analysis following the six-phase framework outlined by Braun and Clarke (2006); (2022). Inductive coding was used thus allowing codes and themes to emerge from the data rather than being informed by pre-existing assumptions (Chandra and Shang, 2019). For example, '*Food sellers or food vendors want to make profits, in their effort or zeal to make profit they have to tamper with the quality of food*' was initially coded as 'profit-driven'. The codes were identified for recurrent patterns that suggest underlying themes. The initial coding and theme development were undertaken by the first author and subsequently reviewed and discussed with the last author to enhance the credibility and rigour of the analysis. Reflexivity was considered throughout the research process. The first author has an academic background in Microbiology and had prior awareness of food fraud issues within the Nigerian context. These experiences may have shaped the interpretation of participants' accounts, particularly regarding food safety implications. Thus, during data analysis, the first author regularly reflected on their assumptions and interpretations to ensure that themes were grounded in participants' accounts rather than pre-existing expectations regarding food safety and food fraud.

2.8. Ethics

Informed consent was obtained from all participants. The study received ethical approval from the University of Lancashire HEALTH Ethics Review Panel (Reference Number: HEALTH 0301).

3. Results

3.1. Consumer survey

The survey received 527 valid responses. The demographic characteristics of the participants, as shown in Table 1, reflected a good representation of both genders. Most participants had some form of education, ranging from school certificates to postgraduate studies. Also, most of the participants prepared their meals daily, and most would purchase food 1 – 2 times weekly. Participants were drawn from all 36 states of Nigeria and the Federal Capital Territory (Abuja), indicating broad geographical representation.

Table 2 shows that participants who were aware of food fraud referred to fraudulent activities as the addition, removal, or substitution of original food components. More than 80% of the participants attributed financial benefits as the top reason for food fraud activities in Nigeria, while more than 85% noted food adulteration as the most common type of food fraud activity. Furthermore, participants identified manufacturing and packaging as the most vulnerable stages of the food supply chain to fraudulent activities. Alcoholic beverages, herbs and spices, as well as fats and oils were considered the top three vulnerable foods associated with food fraud. Interestingly, one-third of the participants agreed that consumers encourage food fraud activities in Nigeria.

Chi-square (χ^2) analysis revealed significant associations with weak effect sizes between education level, ($\chi^2(8) = 51.806$, $p < 0.001$, Cramer's V = 0.222) and employment ($\chi^2(6) = 13.492$, $p = 0.036$,

Table 1
Demographic characteristics of participants (n = 527).

Variables	Items	Frequency	Percentage (%)
Gender	Male	269	51.0
	Female	257	48.8
	Prefer not to say	1	0.2
Marital status	Single	233	44.2
	Married	256	48.6
	Divorced	24	4.6
	Widowed	14	2.7
Age	18–30 years	162	30.7
	31–40 years	204	38.7
	41–50 years	92	17.5
	51–60 years	48	9.1
	60 and above	21	4.0
Education	School Certificate	50	9.5
	Undergraduate	303	57.5
	Postgraduate	142	26.9
	Not applicable	32	6.1
Employment	Student	75	14.2
	Unemployed	38	7.2
	Employed	310	58.8
	Self-employed	105	19.9
Frequency of food shopping	Daily	84	15.9
	1–2 times a week	302	57.3
	3–4 times a week	124	23.5
	5–6 times a week	17	3.2
Frequency of food preparation	Daily	232	44.0
	1–2 times a week	132	25.0
	3–4 times a week	117	22.2
	5–6 times a week	46	8.7
Residence (State)	Rivers	182	34.5
	Lagos	75	14.2
	Federal Capital Territory-Abuja	42	8.0
	Imo	21	4.0
	Delta	20	3.8
	Others	187	35.5

Table 2
Consumers' perceptions of food fraud in Nigeria (n = 527).

No.	Variables	Items	Frequency	Percentage
1	Have you heard of the term 'food fraud'?	**Yes**	**245**	**46.5**
		No	201	38.1
		Unsure	81	15.4
2	What are the types of food fraud in Nigeria? *	**Adulteration**	**455**	**86.3**
		Counterfeiting	404	76.7
		Substitution	368	69.8
		Unlawful processing	355	67.4
		Smuggling	365	69.3
		Waste diversion	310	58.8
		Misrepresentation/ mislabelling	300	56.9
		Theft	323	61.3
		Artificial Enhancement	325	61.7
		Diversion	339	64.3
		Simulation	298	56.5
3	What are the possible drivers of food fraud? *	**Financial benefits**	**441**	**83.7**
		The ease to commit food fraud	290	55.0
		The lack of control/ penalties	279	52.9
		The difficulty of detecting food fraud	263	49.9
		Pressure from the supply chain	253	48.0
		Competition from other businesses	230	43.6
		Cultural influences	128	24.3
		Others (e.g., conflicts in certain states)	19	3.6
4	Which stage of the food supply chain is most vulnerable to food fraud?*	Farm supplies	106	20.1
		Farm	120	22.8
		Manufacturers	338	64.1
		Packaging	**350**	**66.4**
		Storage	228	43.3
		Distribution	228	43.3
		Catering	138	26.2
		Agents / brokers	100	19.0
		Market sellers	223	42.3
		Others	2	0.4
5	Which food or drink categories are commonly associated with food fraud in Nigeria?*	**Alcoholic beverages**	**380**	**72.1**
		Herbs and spices	376	71.3
		Fats and oils	366	69.4
		Non-alcoholic beverages	330	62.6
		Honey	302	57.3
		Dairy products	295	56.0
		Baked goods and confectioneries	281	53.3
		Cereals, nuts and grains	268	50.9
		Meat and meat products	218	41.4
		Fruits and vegetables	217	41.2
		Dried ingredients	212	40.2
		Processed foods	206	39.1
		Poultry and poultry products	184	34.9
		Fish and fish products	160	30.4
		Egg and egg products	132	25.0
		Others	12	2.3
6	Do you think consumers are partly responsible for food fraud in Nigeria?	**Yes**	**186**	**35.3**
		No	182	34.5
		Unsure	159	30.2
7	Is food fraud a threat in Nigeria?	**Yes**	**436**	**83.0**
		No	11	2.0
		Maybe	57	11.0
		I don't know	23	4.0

Note: * participants could select more than one option

Cramer's V = 0.113) and whether participants had heard of food fraud. Those who had graduated or studied at the postgraduate level and who were employed were more likely to be aware of food fraud. Significant associations with weak effect sizes were also observed between gender ($\chi^2(6) = 27.974$, $p < 0.001$, Cramer's V = 0.163) and age ($\chi^2(12) = 21.356$, $p = 0.045$, Cramer's V = 0.116), and whether food fraud is a threat to Nigeria. Although a large proportion of males and females agreed food fraud is a threat in Nigeria, a higher percentage of males were uncertain while older consumers tend to agree food fraud is a threat. Meanwhile, there was no significant association between demographic characteristics and whether consumers were responsible for food fraud in Nigeria. Detailed contingency tables are provided in Supplementary Material 2.

Table 3 shows that food poisoning, food allergy reactions and paying more for reduced quality were perceived as the top negative impacts of food fraud activities among participants. For those who experienced food fraud, the most common fraudulent activities were purchasing expired food or drink products or mislabelled food or drink products with fake registrations. Participants suggested practical steps that government agencies could adopt to mitigate food fraud, i.e., by encouraging consumers as whistleblowers and to report suspected food fraud activities to the authorities (Table 3).

Table 3
Consumers' personal experience of food fraud, impact and mitigating measures (n = 527).

Variables	Items	Frequency	Percentage
What are your personal experiences of food fraud (if any)?*	**Purchased expired food product**	**290**	**55.0**
	Purchased mislabelled food products with fake registrations	228	43.3
	Observed fake packaging	175	33.3
	Purchased misrepresented products such as domestic foods re-branded as foreign goods.	170	32.3
	Purchased expired food product that was relabelled with a new expiry date	151	28.7
	Witnessed fraudulent activities (e.g., concealing / removing old expiry dates)	61	11.6
How does food fraud affect consumers?*	**Food poisoning**	**258**	**49.0**
	Allergic reactions due to unexpected ingredients	257	48.8
	More cost for less quality	236	44.8
	Dietary requirements may be compromised	233	44.2
	Reduce consumer's confidence	214	40.6
	Death	222	42.1
	Fear of purchasing premium food products	199	37.8
	Consumers' distrust in the food product	190	36.1
	Religious needs may be compromised	129	24.5
	All of the above	247	46.9
What measures can government agencies adopt to mitigate food fraud? *	**Encourage consumers to report suspected food fraud cases**	**445**	**84.4**
	Implement a food fraud assessment tool	433	82.2
	Conduct proactive and regular food fraud checks / inspection before a problem is reported	400	75.9
	Develop an anti-food fraud culture	393	74.6

Note: * participants could select more than one option

3.2. Consumers' interviews

Twenty-two participants from Abuja (capital), Lagos and Port Harcourt (Rivers State) participated in the semi-structured interviews.

3.2.1. Drivers of food fraud: Profit

All participants indicated that food fraud activities were motivated or driven by profit reasons. Furthermore, participants expressed that high inflation in the country, high costs of raw materials or use of low-quality and unauthorised raw materials or processes were commonly used by manufacturers or sellers during food processing and/or preparation to cut costs. These sub-standard products were sold at the same price (of other similar, authentic or original food products) or reduced price to generate potential sales.

> "I have also seen in the market where spoilt tomatoes and pepper were mostly reserved for roadside food vendors who buy them at a cheap rate, blend, then cook with it for the consumers to purchase. I asked some of them they said it is cheaper for them while some said because it gives a fine aroma after cooking." Participant 21 (Female, 30, Abuja).

> "As I have said the major aim is to make a profit since the price of things are high, and food producers want to make more money. If they continue at that same quality of food and increase its price, this might affect sales so what some of them do is that they reduce quality and maintain the same price." Participant 2 (Male, 36, Rivers State).

> "I think people are mostly out to make a profit and not just to see what people are taking in whether it is being poisonous or nutritious to their systems." Participant 7 (Male, 47, Rivers State).

3.2.2. Drivers of food fraud: Lack of reporting channels and/or action

Food fraud may be perpetuated by the lack of reporting channels to the appropriate regulatory authorities as well as by inadequate follow-up actions when complaints are made. The lack of action upon reporting may also be driven by the challenges outlined in Sections 3.2.4 and 3.2.5 below.

Additionally, underreporting by consumers may hinder regulatory agencies' ability to investigate and address incidents. This reluctance to report may stem from a sense of resignation, particularly where previous complaints have not resulted in visible action, or where fraudulent practices have become normalised within everyday market transactions. Some participants raised concerns about stakeholders' (e.g., food sellers) ineffective responses and/or actions after complaints were lodged. For example, Participant 2 (Male, 36, Rivers State) expressed that "*if you check and complain, they will sometimes apologise and change it. But this doesn't mean they don't sell these expired products anymore. They would still sell it to people who don't check the expiry dates to make profit*".

> "I think the major thing is that consumers don't report. Until we start raising concerns about food fraud, this issue will not end. But it has to start from somewhere." Participant 9 (Female, 35, Abuja).

> "The fear of reporting such cases with no actions from the enforcement or regulatory body discourages one from reporting." Participant 11 (Male, 45, Abuja).

> "We have experiences where some people who had reported, but nothing was done. Some of them feel that if they go through that stress, nothing will be done, so they just feel it is a normal thing, and this thing happens." Participant 13 (Male, 39, Abuja).

3.2.3. Drivers of food fraud: Acceptance of fraudulent food

Participants highlighted that consuming fraudulent food products was not perceived as immediately life-threatening, suggesting that consumers may continue to purchase such products despite awareness of potential risks. This indicates a degree of acceptance or normalisation of fraudulent food. According to one of the participants: '*Ahara dey cheap*' which implies that fraudulent food is cheap and readily available. This suggests consumers may knowingly purchase sub-standard or even compromised food products but accept this as a trade-off due to financial constraints.

> "You know we have this saying that 'bad food no dey kill person' (translated as bad food does not kill a person). So, one of the things I tell myself is in Nigeria if fake food doesn't kill you just eat it. But we know that it is not proper." Participant 9 (Female, 35, Abuja).

> "They say in Africa saying, 'something must kill a man'. They want the cheap and cheerful instead of looking for good quality." Participant 10 (Female, 42, Abuja).

> "Because of the economy and hardship in the country, many consumers will not be able to afford the quality food products so because of that many of consumers will want to go and get the lesser food product as long as it will just keep them alive at that moment." Participant 14 (Male, 48, Abuja).

3.2.4. Challenges to address food fraud: Lack of resources

Some of the challenges described by the participants include shortage of experienced and competent staff, inadequate remuneration for staff (e.g., high workload burden with low payment or incentives), lack of vehicles (e.g., for field travels and inspections), inadequate facilities and consumables for lab testing.

> "Lack of staff and insufficient payment of salaries creating a low motivation to carry out duties as expected." Participant 8 (Male, 42, Rivers State).

> "Another challenge would be insufficient resources for testing processed food being given to the laboratories of these regulatory bodies." Participant 7 (Male, 47, Rivers State).

3.2.5. Challenges to address food fraud: Corruption

Participants identified corruption as one of the major reasons food fraud activities cannot be mitigated in Nigeria. They highlighted that as a result of bribery and corruption, regulatory authorities were unable to fulfil their responsibilities effectively by concealing fraudulent acts and helping food fraudsters to avoid legal penalties.

> "In Nigeria, we have [authorities] who are supposed to go around to check these supermarkets. Yes, sometimes they do but most times some of the officials just go to a supermarket, meet with the managers, collect money, and go out not bothering what they sell or what happens to the consumer. At times some of them check and when they find out some of these things, they don't take it up. They threaten producers with penalties and prosecution and when they give them money all those things go. So, nobody takes responsibility for these things and that is why we still have it." Participant 2 (Male, 36, Rivers State).

> "One of the challenges I will say will be bribery once you have somewhere to or some factory to inspect and they know an inspector is coming, they prepare a particular amount of money to give the inspector and he doesn't give a just feedback about what they have seen in their locations." Participant 7 (Male, 47, Rivers State).

3.2.6. Mitigating strategies to prevent food fraud

Sixteen of the interviewed participants reported that they had been victims of food fraud incidents, whether through purchasing of expired or misrepresented food products. Several suggestions were provided as self-preservation strategies, including being more vigilant in checking the labels and packaging, including expiry date, price, evidence of product registration or certification and to avoid impulse buying of cheap food products. Participants also suggested that consumers should

be made aware of the risks of food fraud and report suspected or fraudulent food products by reporting to the authorities.

> "Before I buy any product, I now check to know the expiring dates especially when I see a product being sold or being offered below its cost price, that's like a red flag. I now check the product to know why." Participant 2 (Male, 36, Rivers State).

> "We should be more particular about each and all of the things we put into our bodies, if we find out also that it is going to be a problem with us, then we should also help our neighbours by reporting those issues in the areas where we find any negligence from the producers." Participant 7 (Male, 47, Rivers State).

Participants also suggested future strategies to prevent and/or control food fraud activities through improved agricultural policies to encourage home-based farming and price control, regular food inspections, appropriate prosecution and issuing of fines to fraudsters.

> "Basically, if the price of goods remains high and income remain the same, it will be difficult to stop the food fraud acts. So, the government must come up with policies that could reduce the prices of foodstuff. Maybe policies like agricultural policies will make people go back to farming, then we will have much production then the demand will be less than supply. I think the prices of goods will reduce and it will be affordable." Participant 1 (Male, 49, Rivers State).

> "They are supposed to go to all these stores to check products, check the expiry dates, and check if the products are original. If they are not, they are supposed to prosecute the vendors of that product or the suppliers but most times it is not being done." Participant 2 (Male, 36, Rivers State).

4. Discussion

Alcoholic beverages are known to be susceptible to various fraudulent practices, including illegal production, counterfeiting, and adulteration (Ibraheem and Adigun, 2018; Lin and Salcido-Keamo, 2021; Okolie et al., 2015). This vulnerability may be partly explained by the high demand for alcoholic beverages in Nigeria (Adeloye et al., 2019), which creates economic incentives for fraudsters to target high-value and widely recognised branded products (Lecat et al., 2017). Similarly, herbs and spices are considered highly vulnerable due to their high economic value and desirable health-related and sensory characteristics (Velázquez et al., 2023). Fats and oils, particularly vegetable oils, are widely used in Nigerian households, and their high consumption volume increases their attractiveness to fraudsters. Their similar physicochemical properties facilitate substitution with lower-value oils without obvious sensory differences (Guillaume et al., 2021). For example, palm oil has been reported to be adulterated with synthetic dyes such as Sudan IV to enhance colour intensity and perceived quality (MacArthur et al., 2020). In addition, regulatory enforcement actions have identified fraudulent herbs, spices, and edible oils, including expired, unregistered, smuggled, and counterfeit products circulating in Nigerian markets, further supporting the perceived vulnerability of these categories (Azubuike, 2019; Johnson, 2024; NAFDAC 2021; Olokor, 2021; Onyedinefu, 2024). Consumers' perceptions therefore align with documented fraud risks in this category, suggesting a degree of public awareness of fraud-prone products.

The primary drivers of food fraud identified by consumers were financial gain, ease of committing fraud, and absence of effective control measures. These findings are consistent with food fraud vulnerability frameworks based on routine activity theory (Cohen and Felson, 1979; van Ruth et al., 2017), which conceptualise fraud occurrence as the convergence of (i) motivated offenders, (ii) suitable targets, and (iii) absence of capable guardians. In this context, financial gain represents the motivation, while structural and product-specific characteristics increase target suitability and create opportunities that facilitate ease of committing fraud. The lack of effective regulatory control reflects weaknesses in guardianship (van Ruth et al., 2017). The convergence of these three elements highlights systemic vulnerabilities that facilitate fraudulent activity.

Previous research in Nigeria has similarly identified economic incentives as a key driver of fraudulent practices within food systems (Onyeaka et al., 2024). However, beyond economic incentives, the role of overpopulation, political instability, food insecurity, inflation, and poverty (FAO, 2025; UNICEF, 2023) cannot be overlooked. Overpopulation increases the demand for food, leading to strain on the food supply chain and creating opportunities for fraudulent activities (Aiyedogbon et al., 2022). More than 30 million people in 26 states and the Federal Capital Territory were affected by food insecurity in 2025 resulting in high levels of acute malnutrition (FAO, 2025). Furthermore, political instability due to violent conflict between herders and farmers in certain states poses a serious threat to food security and food prices by disrupting agricultural production and distribution networks (Nnam, 2025). All these factors potentially drive food fraud. Meanwhile, the perceived ease of committing fraud in the identified food categories (alcoholic beverages; herbs and spices; fats and oils) can be explained by their physical and compositional characteristics. Alcoholic beverages, particularly clear spirits such as vodka, are vulnerable because dilution or substitution may not be easily detectable by consumers due to minimal visual or sensory cues (Spencer et al., 2020). Herbs and spices are frequently sold in powdered or crushed forms, allowing substitution with lower-value plant materials or non-functional plant components during harvesting, processing, or packaging stages (BRC-FDF-SSA, 2016; Galvin-King et al., 2018). Similarly, vegetable oils may be adulterated through substitution with cheaper oils or the addition of colourants to enhance visual appeal and mimic higher-quality products (Guillaume et al., 2021; MacArthur et al., 2020).

These intrinsic product characteristics increase technical opportunities for fraud while reducing the likelihood of detection by consumers. The participants in this study identified manufacturing and packaging as the most vulnerable stages of the food supply chain. During manufacturing, raw materials may be mixed with cheaper or inferior ingredients or treated with chemical agents to enhance perceived quality without detection (Silvis et al., 2017). Processing techniques such as grinding, chopping, and milling further increase vulnerability, as the physical identity of the original material is lost, thus making it more difficult to verify authenticity through visual inspection alone (Everstine et al., 2013). Packaging also represents a critical point of vulnerability, as it provides opportunities for fraudulent misrepresentation of product information. Key label attributes, including weight, expiry date, country of origin, certification status, or regulatory registration may be altered to increase product marketability (Everstine et al., 2013; Soon and Abdul Wahab, 2022). This coincides with our participants' reported experiences as victims of food fraud, particularly involving the purchase of expired or mislabelled food and/or drink products. These findings highlight the importance of manufacturing and packaging stages as key control points where fraud prevention measures, traceability systems, and regulatory oversight should be strengthened to reduce food fraud vulnerability.

This study also identified the lack of effective control measures, which is consistent with previous reports highlighting structural challenges in Nigeria's food regulatory system (Okoruwa and Onuigbo-Chatta, 2021; Omojokun, 2013). Regulatory agencies face constraints such as limited funding, insufficient technical capacity, weak enforcement mechanisms, and broader governance challenges (Cudjoe et al., 2022; Olugbenga, 2013). These limitations reduce the effectiveness of surveillance (including the establishment and operation of reporting and whistleblowing mechanisms), enforcement, and deterrence, thereby increasing fraud vulnerability. The qualitative findings from this study further reinforce the perception that insufficient regulatory oversight, lack of resources and corruption contribute to the

persistence of food fraud. Corruption often thrives in sectors with a lack of transparency, weak governance structures, ineffective accountability mechanisms, inflation and when frontline workers are poorly paid (Adeleke et al., 2021; Onwujekwe et al., 2019). In the 2025 Corruption Perceptions Index (Transparency International, 2025), corruption remains a serious threat in Nigeria as the country was ranked 146th (out of 182 countries) with a score of 26 (where 0 = highly corrupt and 100 = very clean).

The thematic analysis further identified an interesting theme whereby food fraud was perceived as normalised or accepted in everyday consumption practices. This normalisation may reflect the tension between food safety awareness and economic realities. Our study participants described purchasing potentially fraudulent food products despite recognising the associated risks. This suggests that economic hardship may contribute to the normalisation of fraudulent food consumption, whereby consumers prioritise affordability and food access over concerns regarding authenticity and safety. Food inflation ranged between 22% and 25% during the data collection period (July 2022–February 2023) (Statista, 2026), thus consumers had to spend a significant portion of their income on food expenses. This is compounded by the high rate of poverty which affected 47.03% of the population in 2022 (World Bank, 2026). This potentially explains why consumers were willing to accept fraudulent food products. For instance, Nordhagen et al. (2022) reported that although consumers recognise the importance of food safety, price frequently competes with safety considerations when making food choices. Examples where certain practices were accepted as normal include buying rice and sorghum with stones or purchasing maize with remainder of cobs left in (Nordhagen et al., 2022). In economically constrained contexts, affordability may therefore take precedence over authenticity or regulatory compliance. The illicit alcohol market provides a clear example: lower-priced alcoholic beverages may incentivise consumers to knowingly purchase counterfeit or unregulated products despite recognised risks (Rehm et al., 2022). This interpretation aligns with the knowledge-behaviour gap described by Ajayi and Salaudeen (2014), where awareness of food-related hazards did not necessarily translate into safer consumption practices, suggesting financial constraints may override food safety preferences. Additionally, this key finding highlights how food fraud is not solely a regulatory issue but is also embedded within broader socioeconomic realities. When fraudulent food products become routinely encountered and consumed, consumers may gradually perceive such practices as an unavoidable aspect of the food system. This process of normalisation may reduce expectations and confidence in regulatory bodies to ensure product safety and integrity (Kendall et al., 2018). It raises ethical considerations in relation to food justice and consumer protection (Herman et al., 2018). Food fraud may disproportionately affect impoverished or economically vulnerable populations as they may have fewer opportunities to avoid potentially fraudulent food products (Coral and Mithöfer, 2025).

Our findings revealed several mitigation strategies to reduce or prevent food fraud, from a consumer perspective. Increased vigilance when purchasing food was viewed as an important preventive measure. Visible cues such as expiry dates, packaging integrity, and evidence of product registration or certification were perceived as practical tools to minimise exposure to fraudulent products. This aligns with the findings of Liu and Niyongira (2017), who reported that consumers rely on label information and packaging characteristics as visible indicators of authenticity and safety.

4.1. Limitations

This study has several limitations. The pilot study involved a small sample with substantial attrition at re-test, which may limit the strength of the reliability assessment. This was addressed by face and content validity in addition to the test-retest reliability assessment. The study did not carry out product testing to verify product authenticity. As such, the findings rely on self-reported perceptions and experiences, which are subject to recall bias and cannot verify actual exposure to food fraud incidents. The use of non-probabilistic and purposive sampling limits the representativeness of the sample and may have introduced selection bias, as participants with greater interest in food fraud, stronger social connections and higher educational attainment may have been more likely to participate. Combining online and face-to-face surveys may reduce comparability across responses. Online participants may differ from face-to-face respondents in literacy, internet access, socioeconomic status, and privacy when answering. Face-to-face administration may also have increased interviewer influence and social desirability bias. However, this mixed approach improved inclusion of harder-to-reach groups, especially those in rural areas or with limited digital access. Nevertheless, rural participants were only recruited from Lagos State, the Federal Capital Territory (Abuja), and Rivers State. Thus, the findings may not fully reflect the experiences and perspectives of rural participants residing in other Nigerian states. In the Chi-square analysis, a further limitation is that several demographic categories contained relatively few participants which resulted in sparse cells in some contingency tables. While these categories were retained to preserve meaningful demographic distinctions, the presence of small cell frequencies may have affected the robustness of certain chi-square test results.

4.2. Practical implications

Reducing food fraud requires action at both consumer and regulatory levels. Consumers could potentially make safer purchasing decisions by checking expiry dates, packaging integrity, prices, and evidence of product registration or certification. Public awareness campaigns and accessible reporting channels such as consumer hotlines may also strengthen consumer protection. At the policy level, stronger inspections, vendor licensing and registration systems, clearer enforcement mechanisms, penalties for offenders, and support for local agricultural production and price control are needed to reduce opportunities for food fraud. At the food supply chain level, the adoption of digital traceability systems, including QR code-based product authentication and traceability technologies may improve supply chain transparency and enable consumers and regulators to verify product origin and authenticity.

5. Conclusion

This study provides empirical insights into consumers' awareness and perceptions of food fraud in Nigeria, highlighting systemic vulnerabilities of the food supply chain in the country. The findings demonstrate that financial benefits, the relative ease of committing fraud and lack of regulatory control converge to create opportunities for fraudulent practices, particularly at the manufacturing and packaging stages. These stages represent highly vulnerable points where ingredient substitution, adulteration and mislabelling can occur with limited likelihood of detection. Alcoholic beverages, herbs and spices, and fats and oils were consistently identified as highly vulnerable food and drink categories, reflecting their economic value and intrinsic product characteristics that facilitate fraud. Our study also highlights a nuanced dimension of food fraud, i.e., the normalisation and acceptance of fraudulent products by consumers due to financial constraints. Economic hardship and price inflation contribute to the normalisation or even the acceptance of fraudulent products. At the same time, participants agreed that institutional reforms are needed to reduce or prevent fraud including improved inspections, whistleblowing or reporting channels and stricter prosecution of offenders. Softer strategies, including consumer education, labelling verification and support for local agricultural production may help to reduce vulnerability but these need to be embedded and supported by robust governance frameworks. Food fraud in Nigeria is not merely a regulatory issue but also reflects a

wider socioeconomic survival phenomenon shaped by economic constraints, inequality and weakened institutional trust.

CRediT authorship contribution statement

Okonji Blessing: Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Wallace Carol:** Writing – review & editing, Supervision, Methodology, Investigation. **Shingai Nyarugwe:** Writing – review & editing, Supervision, Methodology, Investigation. **Jan Mei Soon-Sinclair:** Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Ogbonda Kemka Humphrey:** Writing – review & editing, Supervision, Project administration, Investigation.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.foohum.2026.101318.

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