Garden Egg Farmers' Behaviour to Food Safety Practices in Nsukka Agricultural Zone, Enugu State, Nigeria

Ayogu, Chiebonam Justina, Onyenekwe, Chinasa Sylvia, Ezeugwu, Bonaventure Soromtochukwu, Nnadi, Onyinyechi Ifeanyi, Onah, Ogochukwu Gabriella

University of Nigeria Nsukka, Nigeria

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ABSTRACT

Foodborne illnesses remain a major global health concern, with fresh produce like the increasingly popular garden egg often linked to contamination outbreaks. Although garden egg is widely consumed in Nigeria, little is known about farmers' food safety behaviours, creating a gap in understanding and managing on-farm contamination risks. This study addresses that gap by examining the food safety practices of garden egg farmers in Nsukka Agricultural Zone, Enugu State, Nigeria. Using structured questionnaires, data were collected from 60 garden egg farmers chosen through a multi-stage sampling process. The data were analysed using percentages, average scores, and frequency. Most (76.7%) respondents demonstrated a high level of food safety knowledge. Significantly, their attitudes are very positive, with farmers agreeing that safety measures result in higher-quality garden eggs (M = 4.97, S.D. = 0.18) and can protect consumers from health risks (M = 4.97, S.D. = 0.18). They also opposed the idea that small-scale farmers should ignore regulations (M = 4.78, S.D. = 0.56), showing their commitment to compliance regardless of farm size. Practically, farmers focused on preventing cross-contamination (M = 3.87, S.D. = 0.39) and ensuring the use of clean, safe water for washing (M = 3.52, S.D. = 0.65). The study concludes that farmers' high knowledge and positive attitudes towards food safety practices are key factors that can promote the production of higher-quality garden eggs, protect consumers from health risks, and boost their economic well-being. It recommends that policymakers and extension workers provide regular monitoring and support to encourage adherence to food safety standards and practices.

Keywords — Food safety, garden egg, attitude, behaviour, and knowledge

INTRODUCTION

Foodborne diseases present a significant global public health issue, occurring daily in both developed and developing nations, and leading to considerable health and economic costs such as medical bills and sick leave [1; 2]. Millions of deaths are recorded each year due to foodborne illnesses, mainly caused by microbiological contamination of food and water [1]. Fresh fruits and vegetables are the primary sources of these outbreaks worldwide, with seeded vegetables like cucumbers, tomatoes, and garden eggs being most often implicated [1].

Studies show that outbreaks of foodborne illness are frequently traced to products sold at supply chain or farm gates, yet little research exists on farmers' on-the-farm food safety practices [3; 1]. Despite garden egg's growing popularity and consumption in Nigeria, there is insufficient research addressing farmers' behaviour regarding food safety. This knowledge gap limits effective risk assessment and mitigation.

Food safety is a multifaceted condition, and measures are necessary to ensure the safety of food from production to consumption [2]. Food safety is a broad concept, ensuring that food is free from all potential contaminants and hazards [2]. Food safety encompasses a range of practices and conditions necessary to prevent contamination and ensure food is safe. It is closely related to food hygiene, which involves all the required conditions and measures to ensure food safety from its production to its consumption [2].

In practice, the terms "food safety" and "food hygiene" are often used interchangeably. The World Health Organization (WHO) defines food hygiene as the comprehensive efforts taken during production, processing,

storage, distribution, and preparation to make sure food is safe, wholesome, and fit for human consumption [2]. Farmers play a critical role in ensuring the safety and quality of produce through their farming practices.

Garden egg safety is paramount for both the health of consumers and the economic well-being of farmers. Hence, a need to explore various practices employed by farmers to ensure the safety of their garden eggs throughout the production cycle. Many problems related to pesticide poisoning reported at both global and regional levels were due to limited access to information, training, and appropriate equipment for the safe application of chemicals on garden egg farms by farmers [4]. Poor food safety practices not only jeopardize consumer health but also undermine market confidence and economic opportunities for farmers [5].

[6] have linked the Outbreaks of foodborne illness to products sold at farm gates and farmers' markets. Much academic literature has noted that there is little or no research that addresses the food safety of on-farm food safety practices of farmers [6; 1]. Farmers' production practices have been linked to outbreaks of foodborne illnesses, with products sold at farm gates or farmers' markets to consumers [6].

Food safety problems may arise from various aspects of farm operations, including worker health and hygiene, water quality, animal management, and record keeping. The Food Safety Modernisation Act (FSMA) of 2011 emphasised the importance of Good Agricultural Practices (GAPs) and Good Handling Practices (GHPs) to ensure the safety of produce from farm to table [7]. Despite these efforts, many farmers face significant challenges in implementing effective food safety practices due to limited resources, lack of knowledge, and inadequate infrastructure [8].

Given the garden egg's cultural, nutritional, and economic importance, ensuring its safety is vital for consumer health and farmer livelihoods. Therefore, it is essential to investigate farmers' behaviour toward food safety practices and identify measures currently adopted in the Nsukka Agricultural Zone, Enugu State. This will help safeguard public health while enhancing the sustainability of eggplant production.

The primary objective of this study is to evaluate food safety behaviours among garden egg farmers in the Nsukka Agricultural Zone, Enugu State, Nigeria. The specific objectives of the study are to:

1. Determine their knowledge of garden egg food safety practices;
2. Assess farmers' attitudes towards garden egg food safety practices; and
3. Ascertain the food safety practices adopted by garden egg farmers in the Nsukka Agricultural Zone.

METHODOLOGY

Enugu State, located in South-eastern Nigeria, is one of the country's 36 states and lies within the tropical rainforest and derived savannah zones [9]. Covering about 7,161 square kilometres, with an estimated population of 4,690,100 as of 2022 [10]. The state is predominantly inhabited by the Igbo, whose main occupation is subsistence agriculture.

The State is divided into six agricultural zones: Agbani, Agwu, Enugu, Enugu-Ezike, Nsukka and Udi. The Nsukka agricultural zone was purposively selected for the study. The study population comprised all garden egg farmers in the Nsukka Agricultural Zone. A multi-stage sampling procedure was employed to select 60 garden farmers for the study. This sample size was used due to a limited budget and a short study duration. Direct observation and structured questionnaires were used to collect data for the study. The data were analysed using percentages, mean, and standard deviation.

RESULTS AND DISCUSSIONS

Farmers' knowledge of food safety practices

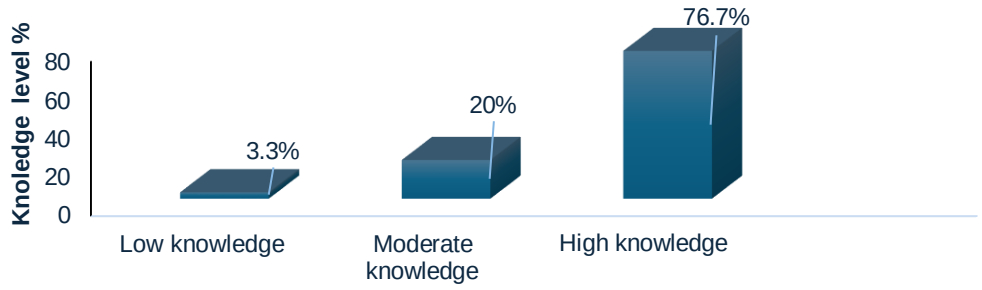
The result of the garden egg farmers' knowledge level of food safety practices shows that the majority (76.7%) of the respondents had high knowledge of food safety, about 20% had moderate knowledge, and 3.3% had low knowledge of food safety. The fact that a significant portion of the respondents have good knowledge of

garden egg food safety practices suggests that farmers could be conscious of food safety in their production of garden eggs.

This high knowledge of food safety practices could encourage farmer-to-farmer discussions on food safety, leading to the faster dissemination of information and reaching a considerable portion of the rural farming population, contributing to increased awareness and knowledge about food safety practices. This high knowledge could be because of the high farming experience and education obtained. This agrees with the findings of [11] that efforts should be geared towards promoting households' education-related intervention programs to improve their nutrition-related knowledge, which can enhance their food security status.

The study also suggests that while most farmers understand crucial food safety practices, a significant proportion still lacks full knowledge, which may pose risks to public health. The result also suggests that garden egg farmers with high knowledge could be more conscious of promoting and practising food safety in garden egg farming than those with low knowledge.

Figure 1: The respondent's knowledge level of garden egg food safety practices.



Attitude of garden egg farmers towards food safety practices

Table 1 shows the attitude of garden egg farmers towards food safety practices. The respondents agreed to the following statements: Proper food safety practices led to higher quality garden eggs (4.97±0.18, 99.4%), food safety guidelines will protect consumers from health risks associated with garden eggs (4.97±0.18, 99.4%), food safety practices will help in building trust with customers (4.92±0.28, 98.4%), and safe pesticide use contributes to the overall safety and marketability of garden eggs (3.93±1.16, 78.6%).

The farmer agreed to the following statements: Investing in food safety measures is worth the cost (4.47±0.50, 89.4%), adopting food safety practices improves their reputation in the marketplace (4.47±1.00, 89.4%), and safe pesticide use contributes to the overall safety and marketability of garden eggs (3.93±1.16, 78.6%).

They disagreed that small-scale garden egg farmers do not need to worry about food safety regulations (4.78±0.56, 95.6%). This result shows that the garden-egg farmers encourage food safety regulations, irrespective of their scale of production. They also disagreed that: Using unapproved pesticides on garden eggs has no significant effect on consumer health (4.35±0.80, 87.0%), food safety practices are unnecessary for garden egg farming (4.32±0.83, 86.4%), farmers are unconcerned about the potential health risks of not practicing food safety during garden egg cultivation(4.12±1.32, 82.4%), and contamination in garden eggs is not a serious issue for your farm(3.97±0.84, 79.4%).

The result suggests that farmers understand that food safety protocols enhance the quality of their produce. Thus, adopting safer farming methods could encourage better yields and market appeal. Farmers' agreement on the linkage between food safety practices and consumers' health is germane in reducing foodborne illnesses and ensuring safer food supply chains. Moreover, trust is vital in the marketing of agricultural products. Thus, the more food-conscious the farmers are, the more trust they attract from the consumers, leading to an increase in product demand.

The farmer's disagreement with some negative attitudinal statements reflects a growing awareness and positive outlook on food safety within the garden egg farming community. This agrees with the findings of [12] that

the maintenance of food safety standards is crucial for protecting public health and the economic integrity of the food industry. The farmers' disagreement with the statement that they do not need to worry about food safety regulations shows that all garden-egg farmers, irrespective of their scale of production, encourage food safety regulations.

Table I: Attitude of garden egg farmers towards food safety practices (N=60)

s/n	Attitude	Mean	S. D	%
1	Proper food safety practices lead to higher-quality garden eggs.	**4.97**	0.18	99.4
2	Confident that following food safety guidelines will protect consumers from health risks associated with garden eggs.	**4.97**	0.18	99.4
3	I believe that food safety practices help in building trust with customers.	**4.92**	0.28	98.4
4	Small-scale garden egg farmers do not need to worry about food safety regulations.	**4.78**	0.56	95.6
5	Adopting food safety practices improves your farm's reputation in the marketplace.	**4.47**	1.00	89.4
6	I think that investing in food safety measures is worth the cost.	**4.47**	0.50	89.4
7	Using unapproved pesticides on garden eggs has no significant effect on consumer health.	**4.35**	0.80	87.0
8	Food safety practices are unnecessary for garden egg farming.	**4.32**	0.83	86.4
9	Unconcerned about the potential health risks of not practising food safety during garden egg cultivation.	**4.12**	1.32	82.4
10	Contamination in garden eggs is not a serious issue for your farm.	**3.97**	0.84	79.4
11	Safe pesticide use contributes to the overall safety and marketability of garden eggs.	**3.93**	1.16	78.6

Cut off mean ≥3.05

Source: Field survey 2025

Food safety practices currently used by garden egg farmers

The result of Table 2 reveals the food safety practices currently used by the respondents. The result shows that the respondents do separate garden egg from other food items to avoid cross-contamination (3.87±0.39, 96.75%). The result of the study shows that the farmers adopt the following food safety practices: Ensuring that any water used in the washing process is clean and safe (3.52±0.65, 88.00%). Keeping records of cleaning schedules and maintenance for equipment and facilities (3.50, ±0.75, 87.50%) and inspect garden eggs for signs of spoilage before selling or consuming them (3.45±0.93, 86.25%). Regular inspection for spoilage is critical as fungal contamination could occur in stored vegetables. The garden egg farmers also implement pest control measures in the area where garden eggs are grown and stored (3.35±0.61, 83.75%), use protective clothing, such as gloves and aprons when handling garden eggs (3.25±0.88, 81.25%), and the practice of proper hand washing before handling garden eggs (3.05±0.62,76.25%). Hand hygiene is essential in preventing the transfer of pathogens.

The result shows that most farmers prioritize preventing cross-contamination, which is critical in maintaining food safety by avoiding the transfer of harmful microorganisms from other food products to garden eggs. Ensuring that the water used in the washing process is clean and safe is a crucial practice since contaminated water can introduce pathogens, leading to severe health risks.

Table 2: Food safety practices currently used by garden egg farmers

s/n	Food safety practices	Mean	S. D	%
1	Separating garden eggs from other food items to avoid cross-contamination.	3.87*	0.39	96.75
2	Ensuring that any water used in the washing process is clean and safe.	3.52*	0.65	88.00
3	Keeping records of cleaning schedules and maintenance for equipment and facilities.	3.50*	0.75	87.50
4	Inspecting garden eggs for signs of spoilage before selling or consuming them.	3.45*	0.93	86.25
5	Implementing pest control measures in the area where garden eggs are grown and stored.	3.35*	0.61	83.75
6	Use of protective clothing, such as gloves and aprons when handling garden eggs.	3.25*	0.88	81.25
7	Practice proper handwashing before handling garden eggs	3.05*	0.62	76.25
8	Regular review and update of your food safety practices and protocols.	2.37	0.61	59.25
9	Educating workers about food safety practices related to garden eggs.	1.98	0.39	49.5
10	Monitoring and recording the temperatures of storage areas for garden eggs.	1.70	0.77	42.5

Cut off mean ≥2.5

source: field survey 2025

Note: * = Currentfood safety practices

CONCLUSION

The overall purpose of the study was to assess the food safety attitudes of garden egg farmers in Nsukka Agricultural Zone, Enugu State. The study concludes that the majority of the farmers had a good knowledge of food safety practices, suggesting that the farmers could have been learning information about food safety from each other, without any contact with an extension agent. They apply many different food safety practices to boost the safety of garden eggs for the safety of the consumers and to make a profit. The study concludes that the farmers have positive food safety attitudes, which could enhance the quality of their produce.

RECOMMENDATION

Based on the study's findings, it is recommended that the government establish a strong framework for revitalising agricultural extension services, which would boost extension visits and improve farmers' access to information and new farming technologies.

Ethical approval: The study adhered to the highest ethical standards as approved by the Department of Agricultural Extension, University of Nigeria, Nsukka. The research instrument was validated by three lecturers before going to the field. Participation was entirely voluntary, with respondents fully informed about the research purpose before providing consent. Participant identities were kept confidential, ensuring both anonymity and privacy. Measures were implemented to protect participants from any physical, emotional, or psychological harm. In instances involving sensitive questions, participants were treated with respect and empathy, and the option to withdraw at any time was clearly communicated. Findings were reported with honesty and transparency, free from distortion or misrepresentation. The study was fundamentally guided by a commitment to fairness, respect, and the dignity of every participant throughout its design and execution.

Conflict of Interest: The authors affirm that no conflicts of interest exist that could have impacted the outcome or interpretation of this study. Every phase of the research—from data collection through analysis and reporting—was conducted with objectivity and independence. The authors did not receive any financial,

personal, or institutional support that could potentially bias the findings. This declaration underscores the authors' dedication to transparency, integrity, and the reliability of the research process.

Data Availability: The data that support the findings of this study are available upon reasonable request. To protect participants' privacy and confidentiality, identifying information has been removed from all shared materials. Researchers interested in accessing the dataset may contact the corresponding author, who will provide the data in a way that upholds ethical and institutional guidelines. This approach ensures transparency while respecting the trust and rights of all participants.

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