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# AN EVALUATION OF THE CONTRIBUTION OF RURAL WOMEN COOPERATIVE SOCIETIES TO FOOD SECURITY THROUGH SEED SYSTEM IN MOKWA, PAIKORO AND WUSHISHI LOCAL GOVERNMENT AREAS OF NIGER STATE

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## Abstract

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*Rural women in Niger State, Nigeria, are the backbone of local agricultural production and play a pivotal but underrecognise role in ensuring food security. Addressing food security challenges is linked to supporting and empowering these women. Thus, this study evaluates the contribution of rural women in food security. The study is supported by ecofeminism theory. The survey design was adopted and data were collected from 343 rural women cooperative societies in the Makwa, Paikoro and Wushishi local government areas using adopted structured questionnaire. Results using multiple regression analysis established that seed availability and quality are not only important but are insufficient to drive substantial improvements in household food security. The study recommends that seed system interventions should be integrated with complementary agricultural support such as access to fertilizers, storage facilities, and extension services to enhance their overall impact on food security.*

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**Keywords:** Food security, Rural Women, Seed System

## 1. Introduction

Food security has been a pressing issue of concern globally. Food and Agricultural Organisation (2019), defines food security as when people of particular area are food secure, when nutritious and safe food is available at all times and everyone has access to that by socio-economic and physical means, in addition to it available food should be according to nutritional necessities and preferences of the people for healthy and active life. From this definition, it can be inferred that food availability is not a sufficient criterion to secure food but socio-economic access is also important. Globally, approximately 828 million people face hunger, and food waste accounts for 30–40% of total production (FAO, 2020).

Rural women in Nigeria are the cornerstone of seed systems and agricultural sustainability. Their role encompasses every stage of the seed value chain, accounting for up to 70% of the agricultural labor force, and being responsible for 45-80% of seed selection, preservation, and distribution in informal systems, which supply about 80% of all seeds used in crop cultivation (National Bureau of Statistics, 2019). This immense contribution is managed through a vast repository of indigenous knowledge and adaptive strategies designed to ensure seed viability, crop diversity, and resilience to climate challenges throughout the year (FOA, 2021). Rural women work in selecting and cultivating staples like maize, sorghum, millet, and cassava, alongside managing community seedbanks and exchanges, directly determines the productivity and nutritional security of their families and communities (Harvest plus, 2025). A critical aspect of their contribution lies in preservation and storage techniques which are essential in mitigating seed losses and maintaining a reliable supply for planting seasons. It is estimated that these traditional methods mastered by rural women can reduce seed spoilage and maintain germination rates effectively for perishable. These techniques include sun-drying of seeds, mixing with herbs and ashes for pest protection, as well as storing in granaries or protected containers to create viable stocks (Nwanze et al., 2025).

women in Niger State, Nigeria, amplify their contributions to food security through active participation in cooperative societies and informal savings groups known as *adashi* or thrift contributions. These collective mechanisms serve as vital tools for enhancing access to quality seeds, improving agricultural productivity, and strengthening household and community-level food security (Uduji & Okolo-Obasi, 2023; World Bank, 2022). Membership in women's affinity groups and farmer-based organizations enables bulk purchasing of improved seeds and fertilizers, labor-sharing arrangements, joint processing ventures, and collective marketing of produce, thereby reducing input costs and mitigating risks associated with informal seed systems (FAO, 2023; Olaghere et al. 2024). Such participation has been shown to increase agricultural productivity by up to 20–30% and improve household food consumption scores by 10–15% through better resource mobilization and knowledge exchange (Nigeria for Women Project Baseline Report, 2022; World Bank, 2022). By facilitating greater control over resilient seed varieties and enabling timely access to planting materials, these groups empower rural women to sustain crop diversity, reduce seed-related vulnerabilities, and directly contribute to year-round food availability and nutritional stability in Niger State (Uduji & Okolo-Obasi, 2023; Nwanze et al., 2025). Their collective ingenuity in leveraging informal seed systems through these structures remains a primary driver of agricultural resilience and food security in the region.

Seed is one of the most important inputs in all crop-based agriculture and a pre-requisite for the majority of the world's food production. It provides the basis for crop improvement

allowing farmers and plant breeders to develop cultivars with high level of adaptation (Badstue, 2016). Seed in the context of most farmers, refers to any plant part which reproduces the same kind of seed or crop. It is a primary agricultural input and is the embodiment of the farmer's future harvest and productivity (Musa, 2022). Women who constitute a significant portion of the agricultural workforce Niger State are actively involved in managing traditional and informal seed systems, ensuring the availability, and accessibility of diverse crop varieties (Adetumbi et al., 2020). Their role in seed saving, preservation and exchange helps to maintain crop biodiversity, resilience to climate change and food availability (Mulema & Mazar, 2021). The objective of the study is to analyse how seed system enhance rural women role in promoting food security in Mokwa, Paikoro and Wushishi Local Government Areas of Niger State.

## **2.2 Conceptual Review**

### **2.2.1 Food Security**

Food security refers to a broader concept, defined as all elements and activities related to the production, processing, distribution, preparation, and consumption of food, the market and institutional networks for their governance, and socio-economic and environmental outcomes of these activities (Brouwer et al., 2020; HLPE, 2017). Abu and Soom (2016) conceived food security as when all people at all times have access to enough food for an active healthy life. According to World Food Summit (2018) food security exists when all people at all times have physical, and economic access to sufficient, safe, and nutritious food that meets their dietary needs food preferences for an active healthy life. Food and Agricultural Organisation (FAO, 2018) simply attached certain conditionalities in defining food security as the availability of food in terms of production, processing, marketing, distribution and consumption. It is only when these five conditions are in place that it can be said that a population is food secured.

Consequently, the absence of any of these conditions at international, national, regional, or household levels causes food insecurity (Foolorunso, et al., 2018). Abu and Soom (2016) further explain that making food available in sufficient quantity and quality is considered as a basic prerequisite for economic development, social interaction, political stability and security of the nation. Food security can either be at international, national, regional or household levels. Food security at one level does not necessarily imply food security at other levels. At the national level, food security exists when all people at all times have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Based on these definitions, four pillars of food security can be identified as Food availability, food accessibility, food utilisation and food stability (FOA, 2021). For this study food security can be defined as the ability of households to consistently obtain adequate, safe, and nutritious food through agricultural activities and support systems such as seed systems managed by rural women cooperative societies.

### **2.2.2 Seed System**

Seed system encompasses the comprehensive network of stakeholders, institutions, policies, and processes involved in the development, multiplication, processing, storage, distribution, and marketing of seed in any country (Ibawa et al., 2024). Galiè (2013) regards seed as a key to food security because seed is the first link in the food value chain." Galie goes on to suggest

that in order to understand seed systems, we need to understand the formal as well as informal rules (including customs and norms) that influence how different women will act and also whether they will benefit from the system. Thus, a simpler definition of seed systems refers to the rules (both formal and informal) that govern access to and use of seed. Seed systems are governed by both formal and informal rules that impact on the level of influence and participation for both men and women and their ability to benefit from the system (FAO, 2015).

Women have been the primary custodians of seeds, possessing extensive knowledge. This indigenous knowledge is vital to maintain the biodiversity of crops and ensuring resilient agricultural practices. Women participation in seed system thus support the stability and productivity of local food system (Idrisu & Kabir, 2023). Gibson *et al.*, (2011), summarised the role of women in seed systems to include providing farmers with planting material in sufficient quantities, at the right time, of an appropriate physiological state, vigor and health, of superior genotypes appropriate to the farmer's purposes, and at an affordable price." When successful, seed systems will ensure seed security for farmers.

There are four main seed system outcomes: availability, quality, access, and use and control of seeds. Availability ensure that women have enough seed physically present at the right time and in the right place, especially seed of preferred crops and varieties. Availability of seed is influenced by the type of delivery channel or seed system. Quality is a standard of excellence in seed attributes that determine the potential performance of a seed. It includes both physical qualities (e.g. size, weight, color) and appropriateness (i.e. genetic quality) that result in good seed viability. Access concerns the capacity to obtain reliable information about how and where to obtain quality seed, its price, and how best to use it. Access is influenced by the mobility/networks of seed users, which is partly reflected in the delivery mechanisms they are able to tap into, such as available transport and logistics of getting seed from point A to B. Affordability is defined as the ability of farmers to buy seed at a reasonable price; it can be affected by the market (Mulema, & Mazur 2021). Use and control of seed and the benefits arising from its use are influenced by the resources to which women and men have access and the power relations in the household and community (Ibawa *et al.*, 2024). The institutional structures/factors that are key in determining the enabling environment for seed systems by women are seed policy, seed system governance, and seed system management (Musa, 2022).

### **2.2.3 Role of Rural Women in Food Security**

Rural women are not just contributors but linchpins in food security. Their knowledge of local ecosystems, crop diversity, and traditional practices enhances resilience against food insecurity. Rural women contribute to food security through multiple dimensions: production, processing, distribution, and consumption (world Bank, 2015). These roles align with the four pillars of food security: availability, access, utilization, and stability (FAO, 2020). Rural women are primary producers in smallholder farming systems, particularly in sub-Saharan Africa and South Asia, where they account for 40–60% of agricultural labor (FAO, 2011). They cultivate staple crops (e.g., maize, rice, cassava) and engage in livestock rearing and vegetable gardening, directly contributing to household and community food availability. Women often prioritise diverse, nutrient-rich crops, enhancing dietary diversity (Doss, 2018). Women transform raw agricultural products into consumable forms through processing, storage, and preservation techniques. For instance, in West Africa, women process grains into flour or

ferment crops like cassava into gari, ensuring food safety and extending shelf life (Ejike et al., 2023). These activities enhance the nutritional quality and accessibility of food.

Rural women are typically responsible for household food preparation and distribution, directly influencing nutritional outcomes. Studies show that when women control household resources, they allocate more income to food and child nutrition, reducing malnutrition rates (World Bank, 2022). Women participate in local markets as traders, selling surplus produce or processed foods to generate income. This economic contribution enhances household purchasing power, improving access to diverse foods (Quisumbing et al., 2015). In many rural settings, women's income from small-scale trading is critical for food security during lean seasons. Rural women contribute to food system stability by diversifying income sources (e.g., through off-farm activities like handicrafts) and maintaining seed banks or indigenous knowledge of drought-resistant crops. Their adaptive strategies mitigate risks from climate change and economic shocks (Meinzen-Dick et al., 2019). Despite their contributions, rural women face barriers that limit their effectiveness in ensuring food security such as limited access to resources, gender-based violence and social norms, climate change impact, policy and institutional gap.

### 2.3 Review of Empirical Studies

Ibawa *et al.*, (2024) carried out a qualitative study through structure interview on an analysis of the role of women in seed security in Lamurde local government area, Adamawa State. The study found out that women devoted a large portion of their time to ensure that they have access to seed and to make it available both in quality and quantity but face serious difficulty in accessing seed and that certified seed is not readily available to them. The authors emphasised that easy access to certified seed sources by women should be created in good time and favourable land ownership policies should be formulated;

Similarly, De Guevara (2018) examined the impact of improved seeds on female farmers' food security in the Arsi Region of Ethiopia. The study adopted a qualitative approach using focus group discussions and key informant interviews to assess the adoption of improved seed varieties among female farmers and their effects on crop yields, agricultural productivity, and household food security. The findings revealed that the use of drought-resistant and high-yielding improved seeds significantly increased agricultural productivity and improved food security among female-headed households, with yield increases of about 30 percent compared to traditional varieties. The study concluded that improved seed adoption can enhance agricultural production and strengthen food security among women farmers. It therefore recommended the timely and equitable distribution of improved seeds, particularly to farmers in remote areas, as well as the development of gender-sensitive agricultural policies to address the challenges women face in accessing improved agricultural inputs.

Idrisu and Kabir (2023) examined the involvement of women in seed systems in Borno State. The study employed a multiple linear regression model to analyse the relationship between women's socio-economic characteristics and their participation in seed systems. The findings revealed a strong and statistically significant relationship, indicating that socio-economic factors play a key role in determining women's involvement in seed-related agricultural activities. Based on these results, the study recommended organising educational programmes, providing women with access to capital and storage facilities, and formulating agricultural

policies that support seed systems and other related activities. Such measures were suggested to improve women's productivity, expand farm sizes, enhance performance in seed systems and ultimately raise their standard of living.

Madu et al. (2022) investigated gender differences in the cassava seed system among entrepreneurs in Southern Nigeria using multi-stage and purposive sampling technique, the study selected respondents from village seed entrepreneurs (VSEs) and cassava farmers participating in the BASICS project across four states. Data were collected through individual interviews and focus group discussions (FGDs). The study found that male and female farmers play complementary roles within the cassava seed system. Key drivers of seed demand included root size and yield, reported by 67.56% of male and 60.97% of female farmers. Profitability analysis showed that for every ₦1.00 spent on cassava seed production, approximately ₦0.92 (male) and ₦0.90 (female) were generated, while root production generated ₦1.50 (male) and ₦1.32 (female). Seed flow analysis indicated that both male and female farmers obtained seeds through various channels, though the extent of access varied between genders. Based on these findings, the study recommended policies that enhance women's participation in cassava seed production, improve access to finance, and mitigate key production constraints such as drought, flooding, pests and diseases, limited access to fertilizer, spraying equipment, credit, and land to strengthen cassava seed system.

## 2.4 Theoretical Framework

For the purpose of this study, we review ecofeminism theory. Ecofeminism was first propounded in 1974 by the French feminist Françoise d'Eaubonne, and later developed by scholars such as Vandana Shiva, Karen Warren, Maria Mies, Carolyn Merchant, Ariel Sallah. Ecofeminism is an organic combination of feminist and ecological thoughts that are articulated through the work of women gardeners, botanists, animal welfare advocates, etc. It focuses on ecology and feminism into one point, and seeks to draw parallels between the exploitation of the environment and the exploitation of women. It is rooted in a reawakening of earth honoring and earth caring. It shows that women are closer to nature than men are (Anjum, 2014; Zhang, 2021). Ecofeminism is a philosophical and social movement that combine ecological concern and feminist perspectives. It argues that there is connection between exploitation and degradation of the natural world and the oppression of women.

Ecofeminists believe that the same patriarch systems that dominate and degrade the environment also subjugate women. Within the context of this study, ecofeminism provides a framework for understanding how rural women' interaction with their environment, contributes to food security through seed systems. Through ecofeminism lenses, the study acknowledges that strengthening seed systems directly support women's ecological knowledge and enhances their ability to contribute to food security. It also helps to identified how improved seed availability, quality, and access address gender-based inequalities. And empower women to take more active roles in food production. Ecofeminism therefore, support the study by highlighting the interaction between gender, environment, and food systems. It underscores that empowering rural women and valuing their environmental knowledge can enhance food security. By applying this theory, the study acknowledges women not only as victims of environmental and socio-economic pressures but as an active agent of sustainability and resilience in food systems.

## 2.4 Methodology

The study utilised quantitative research design because the aim of the study is hypothesis testing or causal research. In addition, a purposive sampling was used to collect data from the respondents because it allows researchers to intentionally select members of rural women cooperative societies who have relevant knowledge and experience in seed system activities related to food security. The population of the study comprises rural women cooperative societies from Mokwa, Paikoro and Wushishi Local Government Areas of Niger State. The choice of this local government was because they have more registered women cooperative societies in the area and are predominantly agrarian communities where women play a vital role in farming, food processing and food nutrition, making their contributions essential to understanding and promoting food security. The total population of rural women cooperative societies in the selected local government areas are 2,614 according Niger State ministry of commerce and cooperative development (2024). The study used a sample size of 346, as determined from the table developed by Krejcie and Morgan (1970) and in order to mitigate non-response rate, 10% was added (Isreal, 2013) making the sample 381 which were distributed. 343 were retrieved which form the basis of this study.

### 2.4.1 Measurement of Variables

Seed systems is measured using six items adopted from (Almekinder & Louwars, 2002; Coomes et al., 2015). Measurement scale items are rated on a five-point Linkert scale. Food security is measured using six items adopted from Gulliford et al., (2004). The adopted items are also rated on a five scale. The study therefore measures the relationship between the independent variable seed system on the dependent variable food security in Niger State. Descriptive statistics was used while inferential statistics using Multiple Regression analysis was used to determine the type of regression coefficient between the variables in the stated hypothesis.

#### Research model:

$$\gamma = \beta_0 + \beta_1\chi_1 + \text{U} \text{-----} (1)$$

Where: The regression model goes in this format;

The  $\gamma$  in the model above represent the dependent variable,  $\beta_0$  is known as the regression constant,  $\beta_1$  is called the regression coefficient and  $\chi_1$  is refers to as the independent variable.

The model specification for this study in its functional form is stated below;  $\gamma = \beta_0 + \beta_1\chi_1 + \text{U}$

Where  $\gamma$  = Food security in Niger State Nigeria

$\alpha$  = Regression Constant

$\beta_1$  = Coefficient of Seed System

$\chi_1$  =Seed Systems

$\gamma$  = the dependent variable of the regression equation (Food security)

$\beta_1$  = slope of the regression

$\chi_1$  = Independent variable of the regression equation

$\beta_0$  = constant of the equation.

$\epsilon$  = Random error term (Residual)

The test of hypotheses of this study was carried out using multiple linear regressions. This statistical method was applied to test for significant role of rural women on seed system, on food security in Niger State. Some of the basic assumptions of the multiple linear regression analysis like; test for Normality, linearity and outliers were met. The variables used for the analysis were extracted from the questionnaires and all the analysis were carried out using Statistical Package for Social Science (SPSS) version 20. The decision rules applied in this study are;

Reject  $H_0$  if P-value is less than or equal the level of significance = 0.05.

Accept  $H_0$  if P-value is greater than the level of significance = 0.05

### Results and Discussion

For easy understanding, the collected data was analysed with the descriptive statistics while multiple linear regression was utilised to test the hypotheses under the inferential statistics.

**Table 1** Descriptive Statistics

	Mean	Std. Deviation	N
FS	15.43	2.57	343
SS	18.05	1.87	343

Source: Authors Computation from SPSS output, 2025.

Table 1, presents descriptive analysis for 343 respondents. This indicated that The observation obtained shows that food security has a mean score of 15.43 with a standard deviation of 2.57, while seed system (SS) has a higher mean score of 18.05 and a t standard deviation of 1.87. This indicated that respondents rated seed systems more positively than food security. The standard deviation values (both > 1) suggest moderate variability in the responses with food security showing greater dispersion than seed systems. The analysis above confirms that seed systems performance tends to be more consistent across respondents, whereas, food security conditions, vary more widely

**Table 2:** Diagnostic Test for Regression Assumption

Assumption	Test	Value	Decision
Normality	Shapiro-Wilk (P)	0.182	Residuals are normally distributed
Autocorrelation	Durbin-Watson	1.894	No autocorrelation
Multicollinearity	VIF	1.000	No multicollinearity
Homoscedasticity	Breusch-Pagan (P)	0.164	Homoscedasticity confirmed

Note: All assumptions for linear regression were satisfied (P value > 0.05: Durbin-Watson within 1.5 to 2.5: IVF < 10).

Source: Authors Computation from SPSS output, 2025.

Table 2 present the diagnostic test conducted to ensure compliance with regression, preliminary analysis confirmed that the assumptions of normality (Shapiro-Wilk,  $P = 0.182$ ), autocorrelation error of (Durbin Watson = 1.894), absence of multicollinearity (IVF = 1.000), and homoscedasticity (Breusch-Pagan,  $P = 0.164$ ) were satisfied.

**Table 3 Model Summary of seed system and Food Security**

Model	R	R Square	Adjusted R Square	Std Error
1	.101 <sup>a</sup>	.010	.007	2.46

**Source: Authors Computation from SPSS output, 2025.**

Table 3 shows model summary and indicates that the correlation between seed system and food security is  $R = .101$ , indicating a very weak positive relationship. The  $R^2 = .010$  means that ly 1% of the variation in food security is explained by seed systems and adjusted R square = .007 remain very small, confirming that the predictive power of seed system on food security is minimal within this sample. The standard error of 2.46 suggests that some degree of unexplained variability. The decision reached from this result is that, seed systems do not significantly affect food security in Molwa, Paikoro and Wushishi local government areas of Niger State.

**Table 4 ANOVA result on seed system on Food Security**

Model	Sum of Squares	Df	Mean Square	F	Sig
Regression	23.185	1	23.185	3.535	.061b
Residual	2236.689	341	6.589		
Total	2259.854	342			

**Source: Authors Computation from SPSS output, 2025.**

The ANOVA results in table 4 shows that the regression model is not statistically significant ( $F = 3.535$ ,  $P = .061$ ). Since the P value is greater than .05 threshold, the effect of seed systems on food security is not considered statistically significant. This means that the seed systems do not have a meaningful linear influence on food security within Makwa, Paikoro and Wushishi Local Government Areas of Niger State when considered alone.

**Table 5 Multiple Linear Regression on seed system and Food Security**

Variable	Unstandardised Coefficients	Standardised Coefficient	T	Sig
	B	Beta		
Construct	12.908		9.558	.000
	Std. Error			
	1.346			

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Seed System	.140	.074	.101	1.880	.061
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a. Dependent Variable: Food Security

**b. Source: Authors Computation from SPSS output, 2025.**

Table 5 presents the variables, their coefficients and p-value. The regression coefficient shows that the construct value is 12.908 at 0.05 level of significance indicating the baseline level of food security when seed system influences is absent. The coefficient for seed system is  $B = .140$ , with a corresponding Standardised Beta of  $.101$ . Although the direction of the coefficient is positive. This implies that seed systems are associated with slightly food security. This effect is not statistically significant ( $T = 1.880$  and  $P \text{ Value} = .061$ ). Therefore, the null hypothesis is accepted, and the alternative hypothesis is rejected.

This suggests that seed systems alone do not significantly predict food security among rural women cooperative societies in Makwa, Paikoro and Wushishi local government Areas of Niger State.

**Discussion of Findings**

The study found that rural women cooperative societies in Mokwa, Paikoro and Wushishi Local Government areas of Niger State rate seed system very high (Mean = 18.05), food security showed greater variability (Mean = 15.43), indicating uneven food conditions across households. This is supporting the ecofeminist view of women as primary custodians of agricultural biodiversity and ecological knowledge (Shiva, 1989). Regression results showed a very weak positive relationship between seed systems and food security ( $R = .101$ ), with seed systems explaining only 1% of the variation in food security outcome ( $R^2 = .010$ ). This result challenge studies such as De Guevara (2018), in Ethiopia, which found that improved seed access directly enhanced women’s food security and align with Ibawa et al., (2024) in Adamawa State, who documented women intensive labour in seed systems alongside persistent barriers to complementary resources. From the prospective of ecofeminism theory, the result highlights the central role of rural women as custodians of indigenous seed knowledge and agricultural biodiversity. While their participation in seed systems reflects strong ecological engagement, the weak influence of seed systems on food security suggests that structural constraints such as limited access to resource and institutional support hinder the full realization of their contributions. Overall, the findings show that although seed systems point in a positive direction, they do not exert a meaningful or statistically significant influence on food security in Mokwa, Paikoro and Wushishi Local Government areas of Niger State.

**Conclusion**

The study concludes that seed systems, despite being moderately well-developed among Rural women cooperative societies, have a weak and statistically insignificant effect on food security in in Mokwa, Paikoro and Wushishi Local Government areas of Niger State. This suggests that while seed availability and quality are important, they alone are insufficient to drive substantial improvements in household food security. The limited predictive power of seed systems indicates that food security in Mokwa, Paikoro and Wushishi Local Government areas of Niger State is influenced by a broader set of socio-economic and agricultural factors such as income levels, access to markets, preservation methods, climate-related challenges, and other

livelihood strategies. Consequently, seed-related interventions must be complemented with more holistic approaches if meaningful improvements in food security are to be achieved.

### **Recommendation**

Based on the findings, the study recommends that government agencies and microfinance institutions should develop gender sensitive financial schemes characterised by flexible collateral requirements and concessional interest rates to strengthen women capacity.

There is also need to integrate seed system interventions with complementary agricultural support including access to fertilizer, storage facilities, and extension services to enhance their overall impact on food security as well as strengthen capacity building programmes.

The study further recommends the need for improved certified seed accessibility and affordability while strengthening women farmers training on seed production and farming techniques.

### **Contribution to the Study**

The study provides empirical evidence from Niger State, extends ecofeminist theory by demonstrating that rural women's ecological knowledge requires supportive structural conditions to translate into food security, and challenges assumptions about direct seed system and food security linkages through quantitative analysis.

### **Research Gap**

The study reveals a critical disconnection between well developed seed systems and actual food outcomes, highlighting a gap in understanding the structural, institutional, and socio-economic intervening variables that mediate this relationship.

### **Suggestion for Further Studies**

Further studies should employ multi-variable, mixed methods, comparative, longitudinal, and impact evaluation designs to investigate the structural, institutional and climate related factors mediating the seed system and food security relationship across different contexts.

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