Global Journal of Agricultural Research, 13 (1), 19-35, 2025
Print ISSN: 2053-5805(Print),
Online ISSN: 2053-5813(Online)
Website: https://www.eajournals.org/
Publication of the European Centre for Research Training and Development -UK

Factors Influencing the Adoption of Traditional and Orthodox Methods of Pests Control Among Vegetable Farmers in Akwa Ibom State, Nigeria

I. J., Udousung[1], C.E., Umoh[2] and S.B., Akpan[1]
[1] Department of Agricultural Economics and Extension
Akwa Ibom State University, Obio Akpa Campus, Akwa Ibom State, Nigeria
[2]Department of Agricultural Technology.
College of Science and Technology, Nung Ukim

doi: https://doi.org/10.37745/gjar.2013/vol13n11935 Published March 15, 2025

Citation: Udousung, I. J., Umoh C. E., and Akpan, S. B. (2025) Factors Influencing the Adoption of Traditional and Orthodox Methods of Pests Control Among Vegetable Farmers in Akwa Ibom State, Nigeria, *Global Journal of Agricultural Research*, 13 (1), 19-35

Abstract: *Pests remain a crucial challenge for vegetable farmers in Akwa Ibom State, Nigeria, necessitating evaluation of traditional and Orthodox methods of pest control. Utilizing survey data from 120 vegetable farmers—60 practicing indigenous pest control methods and 60 relying on modern techniques. The findings reveal a significant gender disparity, with 65.00% of indigenous method users and 61.67% of modern method users being female. The farming experience was 45.00% years for indigenous farmers and 50.00% years for modern farmers, highlighting a reliance on experience in pest management decisions. The study found that modern methods, particularly pesticides (1.86%) and insecticides (1.80%), were more frequently utilized than indigenous approaches such as hand-picking (4.96%) and wood ash application (1.88%). However, economic barriers (high cost of pesticides), awareness issues, and limited extension services hindered the adoption of both methods. Correlation analysis indicated that education negatively influenced indigenous pest control adoption ($r = -0.439$, $p = 0.000$), while extension contact significantly reduced reliance on both methods ($r = -0.347$, $p = 0.000$; $r = -0.222$, $p = 0.000$). The study recommends the need for integrated pest management (IPM) strategies and improved access to extension services to enhance sustainable farming practices.*

Keywords: Pest control, farmers, traditional and orthodox methods,

INTRODUCTION

Agriculture plays important role in shaping the economy of many countries (Nkeme et al., 2018; Umo et al., 2018, Udousung et al., 1018). In Nigeria, it is the highest employer of labour and serves as a major means of livelihood to about 70% of its population (World Bank, 2001). Agriculture provides over 90% of the food consumed locally and contributes about 41.5% of the Gross Domestic Product (GDP) of Nigeria (Oluigbo, 2012). It is a major source of

household income and provides raw materials for agro-based industries. Agriculture enhances food security and impacts on the overall economic growth of the country. It also provides food for domestic animals and most of its by-products are of economic importance (Udousung et al., 2020).

According to the United Nation Food and Agriculture Organization (FAO), agriculture needs to increase production by 50-70% by 2050 to meet the growing demand for food (FAO, 2021). Again agriculture remains a significant sector in many countries, particularly in developing nations where it is a major source of employment and income generation (Akpabio et al., 2007). It contributes to the national economy through exports, trade, and agribusiness industries, fostering economic growth and reducing poverty (World Bank, 2017). Agriculture is primarily practiced in rural areas, and its development has a direct impact on rural communities (Udousung and Udeme, 2018). By improving agricultural practices, infrastructure, and access to markets, rural livelihoods can be enhanced, leading to improved living standards, reduced migration to urban areas, and balanced regional development (Nkeme *et al.*, 2017; Pretty, 2018). However, agricultural production is heavily affected by climate change which enhances intensification of weeds, pests and microorganisms (Udousung et al., 2024a; Udousung et al., 2024b).

Sustainable agriculture focuses on reducing the environmental impact of farming techniques. Proper land management, conservation practices, and agroecological approaches can protect natural resources, prevent soil erosion, conserve water, and maintain biodiversity (Nkeme *et al.*, 2017; Udousung et al., 2019). Sustainable farming practices are crucial to combat climate change and promote ecosystem health (Udousung and Ekerete 2018, Prowse *et al.*, 2018). Boosting agricultural productivity, the use of pesticide has been employed to mitigate losses of crops due to pest attack. Management of pests and vector borne diseases has been highly dependent on pesticide use, which has significantly impacted food production for the increasing population of the world. Pesticide are chemicals usually synthetic sometimes biological used to kill or contain the activities of pests (Alhassan *et al.*, 2012). According to World Health Organization (2020), 500,000-1,000,000 people per year around the world suffer from health effects due to pesticide poisoning. Vegetables are important component of our food and are rich in vitamins, minerals and fibre essential for human health. Many vegetables are considered as protective food items which prevent many diseases and ailments. Many patients of some permanent diseases are advised to take seriously vegetable diets to cushion the effects of the diseases and vegetable are grown all year round majorly as homestead crops, in garden or backyard farm for common uses which yield high economic and domestic returns.

But vegetable production is seriously attacked by pests which resulted to farmers' use of pesticide (chemicals). Pesticide can prevent large crop losses and protect crops against insects, weeds, fungi and other pests and as such they play a significant role in food protection by also increasing yields but pesticide is potentially toxic to humans and can have both acute and chronic health effects depending on the quantity and way in which a person is exposed. Pests are organisms, like insects and rodents that damage crops, livestock, or human health. They encompass a variety of species including insects, ticks, mites, and other arachnids; nematodes and other parasitic worms; weeds and other unwanted plants; fungi, bacteria, viruses, and other harmful microorganisms, as well as some vertebrates such as certain birds and rodents.

(Miriam, 2022). Large number of insects may be external or temporarily internal pests of man and other animals. Most have alternate hosts which compounds problems of their eradication. Insect parasites generally weaken their hosts and make susceptible to attacks of disease causing organisms. Others as a result of feeding may cause irritation or sores which may be infected.

The global losses due to various categories of pests vary with the crop, the geographical location and the weather. Despite the plant protection measures adopted to protect the principal crops, 42.1 % of attainable production is lost as a result of attack by pests. However, if no control measures were used to protect crops, the figure would be 69.8% (Miriam, 2022). To minimize the detrimental effects of these pests' farmers are obliged to use different pesticides. Majority of the modern synthetic insecticides have detrimental effects on beneficial insects including natural enemies of crop pests. It is necessary to have some knowledge on the safety of different insecticides to the natural enemy complex occurring in a given ecosystem.

Many insecticides when used in agro ecosystems target insect pests along with beneficial or natural enemies. Insecticides should not only suppress the insect pest population but also be safe to their natural enemies. Application of pesticides to crops that are in bloom can kill honeybees which act as pollinators (Cornell University, 2020). Hence, it is imperative to screen the insecticides before incorporating them into the insect pest management programme. Screening is imperative to safeguard the beneficial from the hazardous effects of insecticides (George and Ambrose, 2024). Some beneficial insects have economic value that acts as biological control agents, may be exposed to the insecticides which are indiscriminately used to control the insect pests and consequently their physiological and behavioral functions get affected.

Information on the impact of insecticides on the non-targeted beneficial is imperative for the researchers as well as farmers to select the most suitable insecticides with least damage to beneficial (George and Ambrose, 2021). Indigenous methods are often referred to as traditional medicine. Both plants and animals have been used as sources of medicine since pre-civilization period. Even in modern times, animals and plants continue to play an indispensable role in pest and disease control. Plants and animals parts, form important ingredients in preparing medicines, which can be curative or preventive. Thus, a considerable percentage of currently available non-synthetic and/or semi-synthetic pharmaceuticals used in Modern method, comprises of drugs originating from higher plants followed by microbial, animal mineral products.

Modern method is defined as medicine based on scientific method and taught in western medical schools. Nigerians have depended almost exclusively on indigenous method for pest and disease control and there were enough plants to sustain its practice. As Orthodox method received official and government promotion and funding, people were made to believe that it was a better alternative to traditional method (Nwakwasi, 2014). Indigenous method was therefore adjudged by colonial authorities to be dangerous and inimical to health. Furthermore, some deficiencies inherent in the practice of indigenous method such as lack of standardization of the prescribed dosage, are making a growing number of elites to disdain it. As a result, the practice of indigenous method was completely left unorganized and scientifically undeveloped. Traditional medicine is part of the culture of the people that use it and as a result, it is closely

linked to their belief. Majority of the practitioners of the traditional method in Nigeria are people without western education who had the practice handed down to them by their forefathers through informal training, verbal communication and folklore. A large proportion of Nigerians, especially those living in rural areas, continue to patronize traditional medicine. Traditional medicine has continued to grow, because traditional healers are considered successful in curing a large number of diseases (Mafimisebi and Oguntade, 2010). It is against this background that this study aims to evaluate the traditional and Orthodox methods of pests control among vegetable farmers in Akwa Ibom State, Nigeria.

THEORETICAL FRAMEWORK

Theory of Planned Behavior (TPB)

This study is based on Theory of Planned Behavior propounded by Icek Ajzen in 1985. The Theory of Planned Behavior posits that individual behavior is driven by behavioral intentions, which are influenced by attitudes towards the behavior, subjective norms, and perceived behavioral control. Attitudes refer to the positive or negative evaluations of performing the behavior. Subjective norms involve the perceived social pressure to perform or not perform the behavior. Perceived behavioral control reflects the individual's perception of the ease or difficulty of performing the behavior, based on past experiences and anticipated obstacles. The TPB can be applied to understand the factors influencing vegetable farmers' decisions to adopt specific pest control methods. By assessing farmers' attitudes towards different control methods, the social norms within the farming community, and their perceived control over implementing these methods, extension agents and policymakers can tailor their strategies to address the identified barriers and enhance adoption rates. For instance, if farmers perceive biological control methods as difficult to implement, targeted training and support could be provided to improve their confidence and capability.

METHODOLOGY

Study Area

The study was carried out in Akwa Ibom State, which formed a part of the core States in the "oil palm belt" of the Niger Delta region of Nigeria. The State is located at latitude $4^{0}33^{1}$ and $5^{0}53^{1}$ North and longitude $7^{0}25^{1}$ and $8^{0}25^{1}$ East and occupies a total land area of 8,421 square kilometres. There are two distinct seasons – rainy and dry seasons, with the rain evenly distributed throughout the year and decreasing from over 3,000mm in the south to about 2,700mm in the North (Udofia and Inyang, 1987). It has an estimated total population of 3,920,203 people (NPC, 2006). The predominant occupation of the people in the study area is farming where the major land use pattern is rain fed tree and food crop production including oil palm and livestock rearing while fishing is conducted in the riverine areas of the State.

Sampling Techniques / Analytical Techniques

A multi-stage sampling technique was adopted in the study. At the first stage, a simple random sampling technique was used to select three (3) agricultural zones from Akwa Ibom State out of her six (6) ADP zones; at the second stage simple random sampling technique was used to select 12 extension blocks from each of the zones, the third state was a purposive selection of two (2) cells from each of the selected 12 blocks giving a total of 24 cells. Finally, five (5)

cassava farmers were randomly selected from each of the cells, giving a total of 120 cassava farmers as the respondents which served as the sample size.

In order to analyze factors influencing the adoption of traditional and orthodox methods of pests control. It was analyzed using factor analysis procedure.

$$Z_a = W_{a1}F_1 + W_{a2}F_2 +, \dots, +W_{a3}F_3 +, \dots, +W_{ak}F_k \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Hypotheses of the study: they were stated in null form
Hypotheses 1 and 2 was analyzed using Pearson Product Moment Correlation (PPMC) and chi-square.

MODEL SPECIFICATION

Factor Analytic Procedure: Factor analytic procedure was analysed using factor analysis procedure by principal component approach or method. The principal components method an exact mathematical transformation of the original set of variable to a new set, with the later summarizing linear relationships exhibited in the data. The basic question to ask is: what is the best linear combinations of the original variable that would account for most of the relationships of variance in the data. When we say best, we mean that this particular linear combination of variable would account for more of the variance in the data than any other linear combination. The best linear combination of the variable gives the first component or factor of the variables. It means that this factor, more than any other, accounts for most of the variance or relationships observed in the data and hence is the best summary of the original data. The second component is similarly defined as the next best linear combination of the variables that would account for the relationships observed in the data after the effect of the first component or factor has been removed, provided both components are uncorrected (orthogonal). Subsequent components are similarly defined until the relationships or variance in the data have been accounted for. The principals components methods can result in as many components as will be required to exhaust all the variance in the data. If one component exhaust all the variance, then the relationship in the entire set of data can be explained by one component or factor. If more than one factor is required to explain the relationships in the entire set of data, then the number of components required is said to explain the relationship between the variables in the entire set of data. From what has been said so far, a factor can therefore be defined as:

$$F_a = aWA + bWB +, \dots, +kWK \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Where = factor a, being the best linear combination of all the variable A-K
aW-kW = are weight attached to variables
A-k = variable A-k
Other factors can be similarly defined, as explained earlier. When the factors are uncorrelated, they are said to be orthogonal and a variable "a" in the original data can be defined as:

$$Z_a = W_{a1}F_1 + W_{a2}F_2 +, \dots, +W_{a3}F_3 + W_{ak}F_k \dots\dots\dots\dots\dots\dots\dots\dots (3)$$

Where Z_a = variable a in standard score format (mean = 0 and variance = 1), W_{a1} to W_{ak} = weights (normally called factor loadings) attached to factors, and F_1-F_k = factors 1-K. formula 2 simply means that in factor analysis employing the principal components methods, a variable is viewed as the sum of weighted factors derived from the data. When the data is initially factored, the concern is more on the possibility of reducing the data to a smaller composite set of factors. At this stage, the factors may not make any meaning until they are rotated to a final solution.

Pearson's Product Moment Correlation (PPMC).
In the 19th century, Sir Francis Galton and Karl Pearson developed the theory of correlation analysis. Pearson's correlation coefficient summarizes the magnitude (strength) and direction of the relationship between variables.
The Pearson Product-Moment coefficient of correlation measures the degree of correlation that exists between two variables. The method is used to obtain a quantitative precision in the measurement of the degree of relationship between two variables. If the relationship between X and Y is linear, a precise quantitative measure of the degree of correlation between the two variables is known as product-moment correlation coefficient. This coefficient could be determined through any of the following methods:
(i) The Actual Observation method
(ii) The Deviation Method and
(iii) The Standard Deviation Method.

Using the actual observation method to determine the exact degree and direction of correlation, we compute what is referred to as the Pearson's Product-Moment correlation coefficient, denoted by r, using the formula:

$$r_{xy} = \frac{\sum XY - \sum X \sum Y}{\sqrt{n\sum X^2 - (\sum X)^2}\ \sqrt{n\sum Y^2 - (\sum Y)^2}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

However, the application of these three methods of finding Pearson's product moment coefficient of correlation; the deviation methods, the standard deviation method and the actual observation method must produce the same answer otherwise your working is wrong.

Chi-square: The chi-Square technique compares the deviation of the sample frequencies per class or category from the hypothetical frequencies for each class or category studied. The greater the difference between sample frequencies and hypothetical frequencies per class, the lesser the probability that the differences are attributable onto chance errors of sampling and measurement. The value of Chi-square for a given case having been computed, the probability of differences between the sample frequencies per category and the hypothetical frequencies per category occurring on the basis of chance alone can then be estimated. The greater the differences between sample and hypothetical frequencies, the grater the value of chi-square and the less the likelihood of their chance occurrences.
By the formula, the **Chi-square** (X^2) given as:

$$X^2 = \frac{\sum(OF - EF)^2}{EF}$$

Where
X^2 = the Chi-Square
Σ = Summation sign
Of = the observed frequencies in each cell
EF = the expected frequencies in each cell

RESULT AND DISCUSSIONS

Socioeconomic Characteristics of the Respondents

The socioeconomic characteristics of Traditional and Orthodox methods of pests control in the study area is presented in 1. The result for sex distribution shows that the majority of indigenous (65.00%) and Modern (61.67%) vegetable farmers were female. This implies that vegetable farming in the study area is female dominated, and it satisfies aprori expection that women are more involved in vegetable production . Studies by FAO (2020) emphasize that women contribute significantly to food production and processing in rural communities, particularly in sub-Saharan Africa, although, their limited access to resources and decision-making authority often constrains their productivity.

Majority of the respondents (41.67%) and (38.3) were in the age bracket of 41-50 years for traditional and Orthodox based vegetable farmers respectively. vegetable farmers in the age bracket of 31-40 years made 31.67% and 21.7% of traditional and Orthodox based vegetables farmers respectively .Farmers between the age range of 20-30 years comprised a small portion of the population (3.4% and 8.3% respectively) of traditional and orthodox based vegetable farmers. this means that many traditional and Orthodox based farmers are in their active farming age. The mean age of the respondents was 45.25% and 44.67% This is in line with the findings of Ubokudom and Idiong (2016), Fasina (2016), and Kesit *et al.*,(2014).

The result of the marital status of the respondents shows that majority of the indigenous modern methods (38.33%) and modern method (46.67%) were married while divorced were (6.67%) and (6.67%) respectively. This is an indication of possibility of having more children and farm labour that will aid in the farming activities in the study area. Also married people dominated the vegetable farming production since it was intended for income generation, employment creation and provision of food for the people. The result also showed that marriage is an important institution in the study area, the greater number of married people may have meant that there would be greater family Cohesion in taking decisions on agricultural activities. This findings corroborates with Udousung *et al.*, 2015 that most poultry farmers in Akwa Ibom and Cross River States were married.

Education refers to acquisition of knowledge which bequeaths an individual with a widen horizon and better understanding of issues of life. Education is of tremendous influence on the behaviour and personality of individuals and group (Akpanbio, 2005).

The distribution according to level of education attained reveals that a significant portion of indigenous (23.33%) and modern method (23.33%) respectively had tertiary education, indicating a relatively high level of literacy among both groups. This result confirms with the a – priori expectation that most individuals that hold fast to traditional therapy are those that do not go through the tertiary educational system due to the exposure. This result collaborates with Tiku, *et al.,* 2015 who reported that majority of cassava farmers in Cross River State stopped their academic pursuit at the secondary school level.

Table 4.1a: Socioeconomic Characteristics of Respondents

	Indigenous		**Modern**	
Variable	Frequency (60)	%	Frequency (60)	%
Sex (dummy)				
Male	23	38.33	21	35.00
Female	37	61.00	39	65.00
Age (years) ($\bar{x}$ = 37.3)			**($\bar{x}$ = 36.2)**	
20-30	2	34.4	5	8.3
31-40	19	31.67	13	21.7
41-50	25	41.67	23	38.3
51-60	12	20.0	16	26.7
>60	2	3.33	3	5.0
Marital Status (dummy)				
Single	23	38.33	22	36.67
Married	23	38.33	28	46.67
Widowed	7	11.67	4	6.67
Widower	3	5.00	2	3.33
Divorced	4	6.67	4	6.67
Education (years)				
No formal	8	13.33	4	6.67
Primary	13	21.67	10	16.67
Secondary	25	41.67	32	53.00
Tertiary	14	23.33	14	23.33
Farming Experience ($\bar{x}$ = 14.4)			**($\bar{x}$ = 14.25)**	
1 – 5	7	11.67	6	10.00
6 – 10	13	21.67	12	20.00
11 – 20	27	45.00	30	50.00
>20	13	21.67	12	20.00
Monthly Income (naira)				
<10,000	22	36.7	18	30.0
10,000-50,000	28	46.7	30	50.0
50,000 - 100,000	7	11.7	8	13.3
>100,000	3	5.0	4	6.7

Extension contact (dummy)				
None	22	36.67	18	30.00
Occasionally	15	25.00	14	23.33
Frequently	15	25.00	20	33.33
Most frequently	8	13.33	8	13.33

Source: Field Survey, 2024

The result of the farming experience of the respondents shows that majority of the indigenous methods (45.00%) and (50.00%) of the Modern method had 11 – 20 years of farming experience. This implies that majority of traditional and Orthodox farmers are experienced farmers who have practiced vegetable farming for a number of years. This finding aligns with Adekunle *et al.,* (2021), who found that experienced farmers are better equipped to handled production challenges and make effective use of resources. The distribution of traditional and Orthodox based vegetable farmers revealed that a greater proportion of indigenous (46.7%) and Modern (50%) based vegetable farmers earn between ₦10, 000 to ₦50, 000 monthly. About 36.7% and 30% of traditional and Orthodox based vegetable farmer in the study area earn less than ₦10, 000. Farmers who earn between ₦50, 000 to ₦100, 000 comprised 11.7% and 13.3% of indigenous and modern based vegetable farmers respectively. This implies that many of the respondents are within the poverty marginal line, poverty is much more endemic in the rural areas and the agricultural sector as statistics shows that about seven (7) out of every Ten (10) rural dwellers are poor in Nigeria, compared with only six (6) of ten (10) urban dwellers (Yusuf and Omonoma, 2002). According to World Bank reports 2.5 billion of the world's population, six billion people live on less than $2 a day while one billion live on less than $1 a day. Over the years, Nigerian government has adapted various measures to alleviate poverty in the country (Ikechi, 2006). These measures include operation Feed the Nation in 1971, the Green Revolution in 1979, the Directorate of food, Roads and Rural Infrastructure (DIFFRI) in 1986. The Better Life programme for rural woman in 1987, the people's Bank of Nigeria in 1989, the National Agricultural Land Development in1993, the Family Economic Advancement programme (FEAP) in 1997 the Poverty Alleviation Programme in 2000. The National Poverty Eradication Programme (NAPEP) in 2001 and the Economic Empowerment Development strategies (NEEDS) in 2004.

The distribution of according to extension contacts reveals that a higher proportion of indigenous method and modern method (36.67%) and 30% of the respondents respectively were not visited by the extension agent. This probably suggests that extension outreach to these farmers was highly minimal and hence, the level of awareness of innovation would be negatively affected. This finding aligns with Olaleye *et al.,* (2016), who emphasized that inadequate extension services hinders the dissemination knowledge on improve farming technique. The limited access to extension services underscores the need for more of sustainable pests control practices.

Factors Influencing the Use of Indigenous Methods of Pests Control

Table 2. shows factors Influencing the use of indigenous methods of pest control were identified through a rigorous analysis employing principal component technique. This method allowed for the extraction of underlying dimensions from the original items generated during

the instrument validation phase. The analysis focused on items with an Eigen value criterion of >1, ensuring the selection of meaningful components. The factor analysis revealed four main components (factors) influencing the use of indigenous methods of pest control. The total variance explained by the four factors is 81.39%, indicating a strong ability of these factors to explain the variability in the data. The KMO measure of 0.813 suggests that the data is adequate for factor analysis, as it is well above the minimum threshold of 0.5, indicating that the sample is suitable for identifying underlying factors. The significance level (Sig. = 0.000) indicates that the correlation matrix is not an identity matrix, and the data is appropriate for factor analysis, suggesting meaningful relationships between the variables. A Cronbach's Alpha value of 0.871 shows a high level of internal consistency and reliability of the factors identified, suggesting that the variables within each factor are closely related.

Factor Extraction and Interpretation

Factor 1: Knowledge and Awareness Issues (39.14% of variance): This factor includes variables such as inadequate knowledge, lack of awareness, and lack of proper diagnosis. These results suggest that a lack of understanding of pest control techniques and insufficient awareness about traditional methods are major barriers to their use. This factor highlights the importance of educating and raising awareness among the population to encourage the adoption of traditional pest control methods.

Factor 2: Cultural and Normative Factors (19.02% of variance)
This factor is comprised of cultural belief and conformity with norms and values. The high loadings on these variables suggest that cultural beliefs and social norms play a significant role in influencing the use of traditional pest control methods. It indicates that people's adherence to traditional customs and values, which may be favorable or unfavorable toward pest control practices, strongly shapes their decision-making.

Factor 3: Accessibility and Economic Factors (13.84% of variance)
The variables little or no cost of treatment, level of educational attainment, lack of government patronage, and inadequate funds load highly on this factor. This highlights economic and accessibility barriers—low cost of treatment, education, and inadequate funding for pest control initiatives as factors that encourage the use of traditional methods. These factors emphasize that cost-effective methods are more likely to be adopted by people with fewer resources, especially when governmental support is lacking.

Factor 4: Institutional and Organizational Barriers (9.40% of variance)
This factor includes variables like lack of standard documentation and lack of standardization, which suggest that organizational factors—such as the absence of formalized documentation and standard procedures for implementing pest control practices—act as a barrier. The lack of structured approaches to traditional methods limits their wider acceptance and application. The factor analysis identifies four key dimensions influencing the use of traditional pest control methods: 1) knowledge and awareness, 2) cultural and normative beliefs, 3) economic factors and accessibility, and 4) institutional and organizational barriers. These factors explain a large portion of the variance (81.39%) in the data, demonstrating their significant role in shaping the use of traditional pest control methods

The results of the factor analysis on factors influencing the use of traditional methods of pest control reveal several key insights, which are consistent with existing empirical findings on the topic. The first component, which focuses on knowledge and awareness, has the highest variance (39.14%) and aligns with previous studies highlighting the importance of education and awareness in the adoption of agricultural practices (Oladele, 2013; Nwachukwu *et al.*, 2020). Lack of knowledge and awareness about effective pest control methods remains a significant barrier in many rural communities, thus requiring interventions like community-based education and outreach programs to improve understanding and promote the benefits of traditional pest management techniques. The second component, reflecting cultural and normative factors, accounts for 19.02% of the variance. This finding resonates with empirical research suggesting that cultural beliefs and social norms significantly influence the acceptance of agricultural innovations, including pest control methods. Studies such as those by Muralidharan *et al.*, (2019) have highlighted that cultural beliefs can either hinder or promote the adoption of certain agricultural practices, particularly traditional methods. This underscores the importance of aligning pest control programs with local customs and beliefs to ensure their effectiveness and sustainability. Economic factors and institutional barriers, identified in the third and fourth components, also significantly contribute to the variance in the data, with 13.84% and 9.40% of the variance, respectively. These findings align with research that has shown how economic constraints, such as limited access to funding and resources, impact the adoption of both traditional and modern pest control practices (Akinbile *et al.*, 2016). Furthermore, the lack of formalization and standardization of traditional pest control methods, as identified in the analysis, mirrors the challenges noted in other studies, where the absence of proper documentation and institutional support limits the widespread use and effectiveness of such methods.

Table 2: Factors Influencing the Use Of Traditional Methods Of Pests Control

Variables	Component				
	Factor 1	Factor 2	Factor 3	Factor 4	CEI
Inadequate knowledge	0.845				.604
Lack of awareness	0.798				.594
Lack of proper diagnosis	0.776				.588
Lack of standard documentation	0.751				.863
Cultural belief		0.821			.751
Conformity with norms and values		0.792			.687
Little or no cost of treatment			0.862		.702
Level of educational attainment			0.815		.662
Lack of government patronage				0.867	.575
Inadequate fund				0.834	.632
Lack of standardization				0.798	.610
KMO	0.813				
Bartlett's test of spherecity	Sig. = 0.000				
Cronbach alpha	0.871				
Initial Eigenvalues	4.305	2.092	1.523	1.034	
% of variance	39.14	19.02	13.84	9.40	
Cumulative %	39.14	58.16	71.99	81.39	
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.					
a. Rotation converged in 9 iterations.					

Source: SPSS 22, (2024)

Factors Influencing the Use of Orthodox methods of Pests Control

The factor analysis results for the factors influencing the use of orthodox methods of pest control reveal four key components, with each addressing different challenges in adopting these methods. The diagnostic statistics indicate that the factor analysis is valid and the data is suitable for this method. The high KMO value, significant Bartlett's test, and good Cronbach's alpha suggest that the factor model is reliable and meaningful. The fact that a substantial percentage of variance is explained by the factors (79.06% in total) further confirms that the model provides a strong explanation of the data's structure.

Factor 1 (Economic and Accessibility Challenges), which explains 34.37% of the variance, focuses on issues related to the high costs of drugs, veterinary services, and the inadequacy of funds to purchase necessary treatments. Variables such as "high cost of drugs" (0.842), "high cost of veterinary services" (0.828), and "inadequate money to buy drugs" (0.811) load heavily on this factor, emphasizing that economic constraints significantly hinder the use of orthodox pest control methods. These findings are consistent with previous studies (Akinbile *et al.,* 2016) that highlight the financial burden on small-scale farmers as a primary barrier to adopting these methods, leading many to revert to cheaper, traditional alternatives.

Factor 2 (Logistical and Procedural Inefficiencies), explaining 21.22% of the variance, reflects challenges related to delays and inefficiencies in the orthodox pest control system. The variables that load strongly on this factor include "long procedure before drugs are administered" (0.865), "prevalence of fake drugs" (0.827), and "registration procedure" (0.811). These variables suggest that bureaucratic processes and the presence of counterfeit products reduce the trust and reliability of orthodox pest control methods. Farmers may perceive these methods as unreliable and time-consuming, which could explain their preference for more immediate and accessible alternatives, as noted in research by Rahman *et al.*, (2018).

Factor 3 (Communication and Service Accessibility), explaining 14.16% of the variance, includes variables like "poor communication facilities" (0.873), "inaccessibility of service providers" (0.849), and "long distance to offices" (0.892). These findings highlight that communication and logistical barriers, such as inadequate access to pest control services and information, further discourage the use of orthodox methods. This aligns with existing literature that points to limited extension services and poor infrastructure in rural areas as significant obstacles (Kirsten *et al.,* 2016). Farmers are less likely to adopt new technologies when they have insufficient access to information and expert advice.

Factor 4 (Lack of Expertise and Technical Know-How), explaining 9.31% of the variance, includes variables such as "lack of technical know-how" (0.844) and "lack of expert" (0.621), suggesting that the absence of adequate expertise and training further limits the effective use of orthodox pest control methods. This reinforces findings from previous research, which indicates that a lack of knowledge and skilled personnel in rural areas undermines the adoption and success of such methods (Nkansah *et al.,* 2020).

In summary, the results indicate that economic, logistical, and knowledge-related factors are the primary barriers preventing the widespread use of orthodox pest control methods. Improving affordability, streamlining procedures, enhancing communication and service

access, and providing better training and expertise are essential to overcoming these barriers and encouraging the adoption of modern pest control strategies.

Table 3: Factors Influencing the Use of Orthodox Methods of Pests Control

Variables	Component				
	Factors 1	Factors 2	Factors 3	Factors 4	**CEI**
High cost of drugs	0.842				.656
High cost of veterinary services	0.828				.806
Inadequate money to buy drugs	0.811				.701
Inadequate supply of drugs	0.798				.659
Long procedure before drugs are administered		0.865			.816
Prevalence of fake drugs		0.827			.476
Registration procedure		0.811			.662
Poor communication facilities			0.873		.615
Inaccessibility of service providers			0.849		.831
Long distance to offices				0.892	.719
Inadequate veterinarian in rural areas				0.873	.633
Lack of technical know-how				0.844	.689
Bad government policies				0.810	.720
Lack of expert	0.621	0.593			.632
KMO	0.798				
Bartlett's test of spherecity	Sig. = 0.000				
Cronbach alpha	0.889				
Initial Eigenvalues	4.812	2.971	1.982	1.304	
% of variance	34.37	21.22	14.16	9.31	
Cumulative %	34.37	55.59	69.75	79.06	
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.					
a. Rotation converged in 10 iterations.					

Source: SPSS 22 (2024)

Hypotheses of the Study

H0: There is no significant relationship between socio economic characteristics of vegetable farmers and methods of pests control among vegetable farmers.

The correlation analysis results (Table 4.) show the relationship between socio-economic characteristics and the use of pest control methods among vegetable farmers. For example, sex showed a positive correlation with the use of orthodox methods ($r = 0.270$, $p = 0.001$) but no significant correlation with the use of traditional methods ($r = 0.078$, $p = 0.364$). This finding suggests that male farmers are more likely to adopt orthodox pest control methods, which might be due to their involvement in more commercialized farming practices. This finding aligns with literature indicating gender influences agricultural practices, with women more likely to use traditional pest control methods while men tend to use more formal methods (Adebayo, 2021). This contrasts with the lack of significant correlation with traditional methods, possibly due to the cultural and communal factors that often lead both genders to use traditional pest control practices in small-scale farming.

The analysis also shows that education has a significant negative correlation with the use of traditional pest control methods (r = -0.439, p = 0.000), suggesting that higher levels of education lead to a reduced reliance on these methods. This is consistent with studies that show educated farmers are more likely to adopt modern and more efficient pest control practices, such as integrated pest management (IPM) or chemical solutions, due to their better understanding of agricultural technologies (Minde et al., 2017; Asfaw *et al.,* 2016). However, the lack of a significant correlation between education and orthodox pest control methods (r = -0.069, p = 0.424) suggests that other factors, like cost or availability, may have a greater influence on the use of formal pest control methods than education alone.

Annual income also showed a significant negative correlation with orthodox pest control methods (r = -0.279, p = 0.001), indicating that farmers with higher incomes may be less reliant on orthodox methods, likely due to their ability to access alternatives, such as IPM or organic farming practices, which might be more affordable or sustainable. This supports findings from studies like those of Baker *et al.,* (2019), which suggest that farmers with lower incomes tend to use orthodox methods, as they may not have access to alternative solutions. Higher-income farmers, however, may prefer more integrated and sustainable pest management approaches, thus reducing their reliance on expensive orthodox methods like chemical pesticides or veterinary services.

Extension contacts showed a significant negative correlation with both traditional (r = -0.347, p = 0.000) and orthodox pest control methods (r = -0.222, p = 0.000), implying that more frequent contact with agricultural extension services encourages farmers to adopt alternative pest management strategies rather than relying on either traditional or orthodox methods. This supports the findings of Dube *et al.,* (2020), which highlight the role of extension services in promoting integrated pest management, a sustainable approach that reduces the use of both traditional and orthodox methods. Extension services provide farmers with knowledge about more environmentally friendly and cost-effective pest control practices, leading to a shift away from both traditional and orthodox pest control practices, thereby fostering more sustainable farming systems.

Table 4. Correlation analysis results of relationship between the socio-economic characteristics vegetable farmers and methods of pests control among vegetable farmers

	Traditional Method			**Orthodox Method**		
Variables	**Correlation Coefficient (r)**	**Prob. Value**	**Remark**	**Correlation Coefficient (r)**	**Prob. Value**	**Remark**
Sex	0.078	0.364	Accepted	0.270	0.001**	Rejected
Age	0.139	0.105	Accepted	-0.139	0.104	Accepted
Marital Status	0.015	0. 866	Accepted	-0.115	0.178	Accepted
Education	-0.439**	0.000**	Rejected	-0.069	0.424	Accepted
Farming experience	0.156	0.067	Accepted	-0.294	0.000**	Rejected
Household Size	0.090	0.295	Accepted	0.167	0.051	Accepted
Annual Income	-0.032	0.709	Accepted	-0.279	0.001**	Rejected
Extension Contacts	-0.347	0.000**	Rejected	-0.222	0.000**	Rejected

Source: Field data (2024). ** *Significant at 0.01 level*

CONCLUSION

The study indicated the prevalence and significance of both traditional and orthodox pest control methods among vegetable farmers in the Ikot Ekpene Agricultural Zone. While traditional methods such as hand-picking and the use of wood ash are widely known and utilized, the awareness and application of more modern techniques, including pesticides and biopesticides, are also prominent. However, the study identified several barriers to the full utilization of both approaches, such as high costs, inadequate knowledge, and limited access to necessary resources and services. Despite the high awareness of orthodox pest control methods, factors such as the high cost of inputs, poor access to services, and limited technical know-how hinder their widespread adoption. On the other hand, while traditional methods are more culturally accepted and cheaper, they may not always be as effective in managing pests, especially in large-scale farming operations. Additionally, there is a need for improved extension services to educate farmers about both methods, particularly in the areas of integrated pest management and emerging pest control technologies. The correlation analysis further emphasizes that socio-economic factors, such as income levels and extension contact, play a significant role in determining the choice of pest control methods. While the study found little impact of socio-economic factors on the use of traditional methods, it revealed a more substantial relationship with orthodox methods, particularly in terms of farmers' ability to afford and access modern pest control inputs.

RECOMMENDATIONS

Based on the major findings of the study, the following recommendations were made:

- There is need to encourage and upgrade the activities of traditional methods medicine healers by integrating them into orthodox methods medicine research in order to improve our local base technologies in controlling pests and diseases rather than depending solely on conventional method that might be rejected by farmers.
- Traditional methods should be introduced into extension education curriculum, so as to educate and acquaint the extension agents on the knowledge.
- There is need to get more extension agents on the field to continue to sensitize farmers on the effect of pest on production and possible means of adjusting some of the cultural belief they have about pests and diseases control methods.
- There is need to get more extension agents to disseminate information on both traditional and orthodox method of pests control to significantly improve pests management practices.
- Extension agents, research institutes and other agricultural stakeholders should advocate for government policies that supports farmers by subsidizing sustainable pests control methods such as IPM and biological control methods.

REFERENCES

Adebayo, S. A. (2021). Factors influencing adoption of integrated pest management strategies among farmers in southwestern Nigeria. *International Journal of Agricultural Research*, 9(2), 108-118.

Akpabio, I A., Umoh, E. E., Udousung, I. J., and Okon, D. (2007). Level of Utilization of Agroforestry Practices in Akwa Ibom State, Nigerian Journal of Agriculture Food and Environment, 4(l-4), l – 7).

Alhassan Y. J., Unashi Y. B, Sanchi I. D, Dorh L. E, Abubakar H, Sunday J. (2012). Farmer Perception on Pesticides usage and safety practices in Danko/Wasagu Local Government Area Kebbi State, Nigeria. *World Journal of Innovative Research* (WJIR), II (1); 2454 – 8236.

Fasina O. O. (2016). Comparative analysis of the use of organic and inorganic fertilizers by arable crop farmers in Ondo State, *Nigeria. Journal of Organics*, 3(1): 1-15.

George, R. W., & Ambrose, D. K. (2024). Innovative pest management strategies for sustainable vegetable farming. *International Journal of Agriculture and Biology*, 20(1), 34-50.

Kesit K. N., Otu, W. I., Idaresit, U. U. and Okon, T. U. (2014). Factors Influencing the Use of Organic Manure by Female Vegetable Farmers in Cross River State, Nigeria. *Asian Journal of Agricultural Extension, Economics and Sociology* 4(1): 21-28.

Mafimisebi, T. E, and Oguntade, A. E (2010). Preparation and use of plant medicines for farmers' health southwest Nigeria Socio-cultural, magico-religious and economic aspects *Journal of Ethnobiology and Ethnomedicine*, 6:1doi10.1186/1746-4269-61.

Miriam, J. T. (2022). Assessment of methods of pests s control among vegetable farmers. *Journal of Agricultural Research*, 15(2), 145-158.

National Population Commissions (2006). National Population Commission Report on 2006 Census Result. 31st December, Abuja, Government Press.

Nkeme K.K, Udo U. J. and Udousung I. J (2017). Sustainable environmental management practices used by farmers in Oron Agricultural Zone of Akwa Ibom State, Nigeria. Nigerian Journal of Agricultural, Food and Environment, 13(3), 40-45.

Nkeme, K. K, Udousung, I. J., and Umoh, I. U. (2018) Farmers Utilization of Mass Media as Channels of Agricultural Information in Akwa Ibom State, Nigeria. Journal of Agriculture and Food Sciences,1(1), 89-98.

Nwakwasi R. N (2014). Evaluation of Traditional and Orthodox Methods of Malaria Treatment for enhanced Rural Household Food Security in South-East Nigeria. ph.D thesis, Michael Okpara University of Agriculture. Umudike. Abia State, Nigeria.

Oluigbo, C. (2012) Achieving Food self sufficiency in Nigeria. Business Day Newspaper. 29th Feb. 2012.

Pretty, J. N. (2018). Agricultural Sustainability: Concepts, principles and evidences philosophical Transactions of the Royal Society B: Biological Sciences; 363(1491):447 – 465.

Prowse, M, Dwyer, J. and Butler, A. (2018). Agriculture, Rural development and pro-poor growth: Country experiences in the post-reform era. World Development, 38(10),1407-1418.

Ubokudom E. O. and Idiong C. I. (2016). Factors Influencing *Adoption of Organic Vegetable Farming among Farm Households in South-South Region of Nigeria. American-Eurasian J. Agric. and Environ. Sci*., 16(5): 852-859.

Udofia, W. E. and O. B. Inyang (1987), "Land and People of Akwa Ibom State and Cross River State" In: M.B. Abasiatai, Akwa Ibom and Cross River States: The Land, People and Culture, Calabar: Wusen Press Pp. 1-10.

Udousung I. J. (2015). Level of Utilization of traditional and Orthodox Methods of Poultry Disease Control among Farmers in Akwa Ibom State and Cross Rivers State. Nigeria. VEF *Journal of Agricultural, Rural and Community Development*, 2(1).

Udousung, I. J., 1, Ekerete, B. I. (2018). Extent of Utilization of Indigenous Methods of Organic Farming Practices among Cassava Farmers in Akwa Ibom State. Nigeria. Journal of Agriculture and Food Sciences, 1(1), 89-98.

Udousung, I. J., 1, Udeme, S.O. (2018). Factors Influencing the Adoption of Indigenous Methods of Organic Farming Practices among Cassava Farmers in Akwa Ibom State, Nigeria. Journal of Agriculture and Food Sciences, 1(1), 89-98.

Udousung, I. J., Udoumoh I. D and Effiong, U. U. (2018). Extent of Adoption of Indigenous Methods for the Treatment of Malaria among Cassava Farmers in Akwa Ibom State, Nigeria. AKSU Journal of Agricultural Economics, Extension and Rural Development, 1 (1), 49 – 56.

Udousung, I. J., Umoh, C. E., and Umoh, O. T. (2019). Perceptions of Factors affecting adoption of sustainable agricultural practices among cassava farmers in Akwa Ibom State, Nigeria. Journal of Community and Communication Research, 4(2), 175-181

Udousung, I. J., Umoh, I. U and Sylvanus, B (2024a). Indigenous methods of adapting to climate change impact among cassava farmers in Akwa Ibom State, Nigeria. Journal of Community & Communication Research Vol. 9 No. 1 Pp.112-120.

Udousung, I. J., Umoh, I. U and Sylvanus, B (2024b). Climate change and adoption of indigenous methods of coping strategies among cassava farmers in Akwa Ibom State, Nigeria. AKSU Annals of Sustainable Development, 2(1), 80-93.

Udousung, I. J., Umoh, I. U., Okon, U. E, (2020). Determinants of use of Information and Communication Technologies (ICT) by *Gnetum africanum* Farmers in Akwa Ibom State, Nigeria. AKSU Journal of Agricultural Economics, Extension and Rural Development, 3(1), 57-65.

Umo, U. E., Udousung, I. J., and E. R. Udoh, (2018). Herdsmen/Farmers Crisis and Rehabilitation of Victims: A study of middle belt – Nigeria. Uyo Journal of Sustainable Development, 3(2), 163-169.

World Bank (2017). World Development Report (2008). Agriculture for Development.

World, B. (2001). Towards the development of an environmental action plan for Nigeria (World Bank Report). West African Department, Washington (PP.1105-115).