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Significance Of Information Sources To Integrated Pest Management Usage Among Poultry Farmers In Kwara State, Nigeria

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ABSTRACT

Sources of information on the use of combined pest control measures for a sustainable, eco-friendly environment are germane in poultry production. A multistage sampling procedure was used to select 120 respondents using an interview schedule. Data collected on socioeconomic characteristics, sources of information, pest prevalence, constraints, and utilization of Integrated Pest Management (IPM) in Kwara State were analyzed with percentages, frequency, weighted mean score, mean, Chi-square, and Pearson's Product Moment Correlation at a 0.05. The result shows respondents were members of the Poultry Association of Nigeria (PAN) (96.7%) with mean age and years of business experience of 43.0±9.9 and 7.3±5.8years respectively. Most of the respondents had tertiary education (84.2%) and produced broilers (51.7%) in four cycles a year (57.5%). The most utilized IPM information sources were from co-farmers (68.3%) and workshops (67.5%), with the most prevalent pest being flies ($\bar{x}$=1.48) and low for 54.2% of the respondents. The respondents' most utilized IPM method was the prompt elimination of dead birds from the flock ($\bar{x}$=2.86), which was high at 60%. However, respondents' most prominent constraint to IPM usage was the government's insufficient pesticide subsidy ($\bar{x}$=2.69), which was high for 60.0%. A significant relationship existed between respondents' IPM usage and sources of information like family (X^2=0.938; p=0.005) and internet (X^2=1.000; p=0.000); years of education attainment (r=0.022; p=0.021), prevalent pest (r=0.577; p=0.051) and constraints to IPM usage (r=0.186;

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p=0.012). IPM information sources positively influence its utilization. Hence, relevant stakeholders should empower such sources for a sustainable, eco-friendly environment.

Keyword: *eco-friendly environment, pesticide usage, poultry association of Nigeria*

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INTRODUCTION

Poultry are domestic fowls globally raised for economic and social benefits (Farell & Nia, 2023; Ajala et al., 2021). The contributions of the sector to national development in Nigeria are germane as it has been accountable for one quarter (25%) of GDP that comes from the livestock segment of agriculture (Ibrahim, 2020) and the employment offered to about 14 million of Nigeria's population (Netherlands Enterprise Agency, 2020). In Nigeria, the contributions of the sector to food security cannot be over-emphasized, even as poultry foods have been said to be the cheapest source of high-quality vitamins, minerals, and protein compared to other meat and egg sources (Gavriel, 2019; Fomi et al., 2023). Nigeria's commonly reared poultry birds include chickens, guinea fowls, quails, ducks, pigeons, turkeys, and ostriches. They are dominated by chicken raised at subsistence and commercial levels (Adeniyi et al., 2021). According to Yusuf & Aliu (2016), the sub-sector is the best commercialized, the fastest growing, and most profitable (with the highest and quickest gross revenue rate on the amount invested) within the short production cycle for meat and egg production; even as Nigeria has emerged to be the largest producer of egg (Sahel Newsletter, 2015). However, one of the greatest threats and challenges faced by poultry farmers in developing countries is the menace of pests, which reduces the quality and quantity of poultry birds' productivity (Jeffery & Bart, 2021). Poultry pests have been responsible for the spreading of diseases, suck the birds' blood, cause irritation, are known to be vectors of diseases, destroy the pens, and cause the feed to waste, among others (Mark al., 2016; Ojo, 2016). According to Phillip et al. (2018) and Gavriel (2019), the major pests associated with poultry rearing may be categorized into endoparasites (roundworm, Tapeworm, and Gape worm) and ectoparasites (mites, lice, house flies, beetles, cockroaches, bedbugs, fleas, rats, flies, wild bird and rodents among others) which must be needed to be prevented and fully control for optimum productivity of the enterprise (Jeffery & Bart, 2021). Ectoparasite, as asserted by Gene et al. (2019), always retards the growth of poultry birds, reduces vitality, causes a reduction in egg production,

and damages the comb and plumage of the birds. Hence, there is a need to control the pests to fulfil he mandate of poultry keeping. However, there are conventional means to control poultry pests (use of pesticides), and the method repels or destroys the pests (Jacob, 2018). The system was said to be effective and labor-saving. Still, it was found to be toxic, contaminate the environment, be a secondary pest outbreak, kill the pests' natural enemy, and cause pest resistance and resurgence, negatively affecting farmers' income and the ecosystem (Ojo, 2016).

According to Rezaei et al. (2019), IPM is the use of an ecological and holistic approach (Biological, chemical, mechanical/physical, and cultural methods) to reduce the menace of pests to the barest minimum while maintaining an excellent environment even for the future generations. It further involves carefully combining all available pest control measures and efficient selection of the best technique that keeps the pest population at the most economical level by preventing the excessive use of chemicals (Phillip et al., 2018). Nevertheless, for the IPM technique to be effective, the pest must be detected and identified, and understudy the economic implications must be. It will reduce the cost of controlling/preventing pests, improve flock performance, and reduce environmental pollution (Murillo & Mullens, 2020 & Adebayo, 2021).

However, several factors determine poultry farmers' use of IPM. These include educational status, marital status, number of birds raised, age (in terms of years) of keeping the poultry, household size, years of experience, sources of finance, labor sources, farmers' attitude towards sustainable livestock practices, innovative prowess, extension contact with the farmers and IPM information sources among others (Adesiji et al., 2018). Information is synonymous with power and knowledge, as opined by VAPS (2016). Hence, information channels are meant to inform, educate, inspire, encourage, motivate, and disseminate information to broaden an individual's knowledge for empowerment (Adedapo, 2023). Nevertheless, the channels and formats through which information gets disseminated to an individual could impact the message's effectiveness and utilization, eventually projecting the message's importance (Diffusion of information) (Adeniyi & Yekinni, 2023).

Furthermore, the various means through which IPM information could be disseminated include interpersonal sources (fellow farmers, friends, family, neighbors, extension officer) and via Information and communication technologies channels (Radio, Television, Mobile phone, internet, books, journals, newspaper, bulletin, magazine) (Business News, 2019). Studies have shown that information obtained through interpersonal sources is reliable, specific, and easily accessible, but it can come with bias and discouragement as it is subjective (Zimmer & Raymond, 2015). In the same vein, the IPM information from ICT printed format sources could be easily accessed, processed, stored, and disseminated since its message is portable, more current,

reliable, and with greater scope and depth, but could be outdated, expensive to source, and might be shallow (Adebayo, 2021; Adesiji et al., 2018). However, the ICT information has been said to be up-to-date, valuable, easily accessible, come with feedback, cheap, time-saving, accurate, universally available, user friendly but on the other way round, not available, network-driven and needs expertise oriented (Mohammad, 2018; Adeniyi, 2020).

It is, therefore, essential to investigate the significance of information sources to the use of IPM among poultry farmers. This study seeks to assess the relevance of information sources to poultry farmers' use of integrated pest management in Kwara state, Nigeria. The study is set to investigate the socio-economic characteristics, sources of information, prevalent pests, constraints to the use of IPM, and the level of usage of IPM by poultry farmers. The study hypothesized that there is no significant relationship between the information sources and the respondents' selected socioeconomic characteristics and the use of IPM by poultry farmers.

RESEARCH METHOD

The study was conducted in Kwara State, Nigeria, one of the six States in the North Central regions of Nigeria, between latitude 7° 45' N and 9° 30' N and longitude 2° 30' E and 6° 23' E. The state's economy mainly depends on Agriculture. The state is called the "gateway" between the country's north and south, making it rich in ecological diversity, an essential factor influencing IPM (Wikipedia, 2024).

A multistage sampling procedure was employed to select respondents for this study. The first stage involved the purposive selection of five (5) of the 16 Local Government Areas (LGAs) in the study area due to the predominance of poultry farmers; the selected LGAs were Ilorin South, Ilorin West, Ilorin East, Asa, and Moro LGAs. The second stage involved randomly selecting two (2) wards from the five (5) selected LGAs, resulting in 10 wards. The third stage involved the generation of a list of poultry farmers in the selected wards using snowballing techniques. The fourth stage randomly sampled 12 poultry farmers from the list generated in the selected wards, giving one hundred and twenty (120) poultry farmers. The respondents' socioeconomic characteristics, such as age, sex, marital status, educational attainment, type of poultry enterprise, business experience, stock size, and number of production cycles, were measured accordingly.

Respondents' 13 possible sources of IPM information were captured using the response options of" available" and "not available" with scores of 1 and 0, respectively. The information source with the highest frequency was ranked first in that order. Respondents' pest prevalence on their farm was measured from 15 possible poultry pests, such as lice, mites, moths, soldier ants, and wild birds. This was indicated using the response options always, occasionally, and never,

with scores of 2, 1, and 0, respectively. Weighted mean was used to rank the pest in descending order; respondents' level of pest prevalence was categorized into high and low using the above or below means criterion. Respondents' level of usage of IPM was measured using 18 statements using the response options of "To a greater extent," "To a lesser extent," and "To no extent," with scores of 2, 1, and 0, respectively. An index of the level of IPM usage was determined by adding all the responses and finding the average, which was then used to categorize the respondents into high and low levels of usage using the above and below mean criterion. Respondents were asked to indicate the constraints to using IPM from the list of 10 possible constraints using the response option of severe constraint, mild constraint, and not a constraint with scores of 2, 1, and 0, respectively. The respondents' level of constraints was categorized using the above and below means criterion. The mean was used to rank the constraints in order of severity.

RESULT AND DISCUSSION

Socioeconomic Characteristics of the Poultry Farmers

The result in Table 1. reveals that most of the respondents were married (81.7%), male (65.0%), and had tertiary education (84.2%), with the mean year of age and farming experience being 41.4 and 7.3 years, respectively. This implies that the poultry sector was dominated by experienced, literate, young married males who respected the institution of marriage. The result of this study aligns with the findings of Benjamin et al. (2018), Egwuma et al. (2018), Sani et al. (2023), Adesiji et al., 2018, Ogba et al. (2020) in which most poultry farmers married and young, experienced poultry farmers. The respondents' average age and year of experience imply that they were the active young generation who have amassed much knowledge in poultry keeping, which would have assisted them in acquiring much skill and knowledge that could enhance IPM utilization. However, being young and educated could best position them for having the skills needed in IPM application as age, years of farming experience, and education do affect the adoption rate of the recommended management practices among poultry farmers (Egwuma et al., 2018). Hence, the respondents' higher educational achievement might also position them for the adoption of the IPM technology. This agrees with the result of Alalade et al. (2017) and Oyebode & Adebisi (2014), who found a similar result in the age, sex, and marital status of poultry farmers.

Table 1. Distribution of Respondents by Socioeconomic Characteristics (n=120)

Variables	Frequency	Percentage	Mean
Age			41.43
23-32	26	21.7	
33-42	43	35.8	
43-52	32	26.7	
53-62	17	14.2	
Above 63	2	1.7	
Sex			
Male	78	65	
Female	42	35	
Marital status			
Single	18	15.0	
Married	98	81.7	
Divorced	1	0.8	
Widowed	3	2.5	
Forms of education			
No formal education	2	1.7	
Primary education	7	5.8	
Secondary education	10	8.3	15.62
Tertiary education	101	84.2	
Type of poultry enterprise			
Broilers	62	51.7	
Layers	32	26.7	
Both	26	21.7	
Production cycle			
1 cycle	1	0.8	
2 cycles	11	9.2	
3 cycles	25	20.8	
4 cycles	69	57.5	
6 cycles	14	11.7	
Stock size			
25-671	65	54.2	809.33
672-1318	27	22.5	
1319-1965	18	15.0	
≥1966	10	8.13	
Business experience			
1-6	72	60.00	
7-12	32	26.67	
13-18	8	6.67	
19-24	4	3.33	
Above 25	4	3.33	

Variables	Frequency	Percentage	Mean
Finance source			
Self	95	79.17	
Loan	18	15.00	
Remittance from friends and family	7	5.83	

Source: Field Survey, 2019

The result in Table 1 further shows that most of the respondents self-financed (79.2%) their enterprise, reared broilers (51.7%), and had four cycles of production per year (57.5%) with average stock size of 809.3 birds per cycle. The sources of their finance suggest that the respondents plow back their profit for the continuity of the commercial enterprise. The raising of broilers by the respondents and the number of annual production cycles might be due to its short production cycle, thereby offering a quicker return on investment, as Fomi et al. (2023) asserted. The result of the average number of birds raised in the study by Benjamin et al., 2018 was fewer than the average number of birds raised in this study, which might suggest the levels and scales of the operation among poultry farmers. However, the average large stock size probably implies that the farmers operate at a commercial level at which risk on the adoption of new practices could be taken as farm size is one of the economic factors that influence the farmers' extent for IPM adoption (Charles et al., 2018 & Egwuma et al., 2018).

Membership of PAN

The result in Figure 1 reveals that most (96.7%) of the respondents belong to the poultry farmers association. This result aligns with Adeniyi et al. (2021), Oyebode & Adebisi (2014), and Adesiji et al., 2018), who found that most respondents belong to PAN. The group is known for its suitable means of disseminating information on agricultural management practices, including awareness of technical know-how and the provision of improved services on IPM. However, being a PAN member could indicate getting social and training support as a member of PAN, as asserted by Oyebode and Adebisi, 2014. Meanwhile, being a Poultry Association of Nigeria (PAN) member has been said to be significant to the strategies adopted by farmers for pest and disease control (Adesiji et al., 2018).

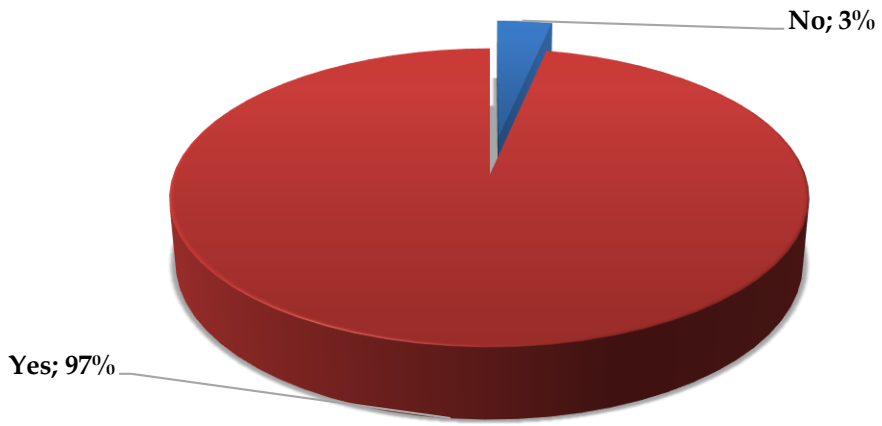

Figure 1.
Distribution of Membership of PAN
Source: Field survey, 2019

Poultry Farmers' Sources Of Information On IPM

The result in Table 2. shows that most (68.3%) of the respondents obtained IPM information from fellow poultry farmers, 67.5% got information from workshops organized by the poultry farmers association, and 66.7% sourced the information from the Internet. This implies that poultry farmers have a wide range of information sources on IPM, from interpersonal to ICT sources, as information is crucial to excellent poultry management processes. The first three respondents' interpersonal sources of information were fellow farmers, workshops organized by PAN, and Extension agents, which ranked 1st, 2nd, and 4th positions, respectively. This shows that the interpersonal sources were the primary sources where the respondents received the IPM information, which might be due to the quality of the information received and the proximity of such information as opined by (Zimmer & Raymond, 2015; Adesiji et al., 2018; Obazi et al., 2022). The study report of Tikwe et al. (2015) was in line with the result of this study that fellow farmers were the primary information source among poultry farmers, while it was different from the finding of Benjamin et al., 2018 and Bello et al. 2022 in which family and friends were identified as the primary source of information dissemination among poultry farmers. However, the first three ICT sources were the internet, television, and newspapers, which ranked 3rd, 6th, and 7th, respectively. These indicate that the respondents learned and desired to get more IPM information besides the one from interpersonal sources and that poultry management information was sought by respondents using multiple sources. Hence, the result suggests the channels with which the IPM

information could successfully be passed to poultry farmers for effective adoption. The result of this study aligns with the most ranked interpersonal source of information (Family) and, at the same time, in contrast with the internet, ranked first among the ICT sources, where television was ranked first in a similar study conducted by Alalade et al. (2017). However, the Internet ranked first among the ICT sources of information accessed by the respondents was affirmed by the study of Abasi et al. (2022) and Benjamin et al. (2018), while the mobile phone and radio identified by Tikwe et al. (2015) and Oyebode & Adebisi, (2014) respectively as the most prominent information source utilized by poultry farmers did not agree with the result of this study. Hence, it could be suggested that respondents will continue to look for relevant, appropriate, and timely poultry management information from various sources as much as such information is needed.

Table 2. Distribution Of Respondents By Sources Of Information On IPM (N=120)

Source of information	Frequency	Percentage	Rank
Poultry farmers	82	68.3	1st
Workshops by PAN	81	67.5	2nd
Internet	80	66.7	3rd
Extension agents	62	51.7	4th
NGOs	55	45.8	5th
TV	53	44.2	6th
Newspaper	47	39.2	7th
Friends	42	35.0	8th
Family	42	35.0	8th
Neighbours	36	30.0	10th
Radio	36	30.0	11th
Posters	27	22.5	12th
Magazine	25	20.8	13th

Source: Field Survey, 2019

Prevalent Pests On Respondents' Poultry Farms

The result in Table 3. shows that flies, rodents, and beetles ranked 1st (WMS=1.48), 2nd (WMS=1.24), and 3rd (WMS=1.16) among the prevailing pests of poultry (Ectoparasite). In contrast, the pest that attacks poultry birds occasionally were roundworms (13th) (WMS=0.42), Tapeworm (14th) (WMS=0.32), and Gape worms (15th) (WMS=0.32) which are endoparasites of poultry birds. The result was in line with the outcome of Adesiji et al. (2018) in a similar study where rodents were the most prevalent pest, and gape worms were the least frequently encountered pest. The results suggest that the most prevalent

pest attacked the poultry birds externally. However, the advent of pests in poultry birds has been associated with the transmission of diseases among the poultry birds, economic loss for farmers, irritation, and annoyance for poultry birds; hence, the need for poultry farmers to be well equipped with the information that can help them to prevent or control the pest (Anosike et al., 2018).

Results in Table 4 reveal that more (54.2%) of the respondents had a low level of pest prevalence in the poultry farms. The low pest prevalence suggests a level of knowledge and skills in poultry farming the respondents have obtained and gained over the years, as they have 7.29 years of enterprise experience (Table 1.). It should be noted that adequate knowledge, skill, and attitude in adopting the management practices of poultry farming could be responsible for the lower rate of disease prevalent among the respondents. However, Abasi et al. (2022), Fadimu et al. (2020), and Tikwe et al. (2015) opined that poultry farmers need updated information on the prevention and control of diseases and pests that may attack poultry birds during a particular period, as a pest of poultry is one of the major problem facing poultry production.

Table 3. Distribution Of The Prevalent Pest On Respondents' Poultry Farms (N=120)

Pests	Always	Occasionally	Never	Weighted mean score (WMS)	Rank
Flies	77.5	22.5	0.0	1.48	1st
Rodents	50.8	47.5	1.7	1.24	2nd
Beetles	41.7	55.8	2.5	1.16	3rd
Soldier ants	31.7	64.2	4.2	1.06	4th
Mite	29.2	59.2	11.7	0.98	6th
Cockroaches	30.8	45.8	23.3	0.90	7th
Bedbugs	28.3	47.5	24.2	0.87	8th
Fleas	25.8	39.2	35.0	0.76	9th
Lice	37.5	50.8	11.7	0.74	10th
Mosquitoes	18.3	44.2	37.5	0.67	11th
Wild birds	18.3	38.3	43.3	0.63	12th
Roundworm	5.0	40.0	55.0	0.42	13th
Tapeworm	5.0	35.0	60.0	0.38	14th
Gape worm	3.3	31.7	65.0	0.32	15th

Source: Field Survey, 2019

Table 4. Categorization of respondents based on pest prevalence on their poultry farms (n=120)

Pest prevalence	Frequency	Percentage	Mean	S.D
High	55	45.8	28.33	3.6
Low	65	54.2		

Source: Field survey, 2019

Respondents' Usage of IPM

There is a need for a method that will be eco friendly (least destructive to the ecosystem), economical, and sustainable for combating pest infestation in poultry (Adebayo, 2021). The result in Table 5. indicates that quick removal of dead birds from pens ($\bar{x}$=2.86), maintaining a clean, safe, and healthy environment ($\bar{x}$=2.80), and hand destruction of pests ($\bar{x}$=2.80) ranked 1st, 2nd, and 3rd, respectively of the IPM strategies employed by the respondents.

Table 5. Distribution Of Respondents' Usage Of IPM (N=120)

IPM utilisation statements	To a greater extent (%)	To a lesser extent (%)	Never (%)	Mean	Rank
Prompt removal of dead birds from the farm	85.8	14.2	0.0	2.86	1st
Maintain a clean, safe, and healthy environment	80.8	19.2	0.0	2.80	2nd
Hand destruction of pests	81.7	16.7	1.7	2.80	3rd
Fumigate poultry house at the appropriate time	73.3	24.2	2.5	2.71	4th
Eliminating breeding sites of pests	68.3	30.8	0.8	2.68	5th
Good space management (stocking density, feeds, & drinks)	70.8	25.0	4.2	2.67	6th
Sanitize equipment	66.7	30.0	3.3	2.64	7th
Quarantine of new birds	65.8	31.7	2.5	2.63	8th
Restriction of peoples' movements into the farm	65.8	31.7	2.5	2.63	8th
Ventilation managements	66.7	29.2	4.2	2.62	10th
Quick removal of poultry waste from the farm	70.8	20.0	9.2	2.62	11th
Moisture management	64.2	30.8	5.0	2.59	12th
Composting or burial of dead birds	64.2	30.0	5.8	2.58	13th
Provision of foot-dip	60.0	36.7	3.3	2.57	14th
Use of botanical pesticides	41.7	54.2	4.2	2.38	15th
Restriction of the amount of contaminant that can spread in poultry farms	41.7	51.7	6.7	2.35	16th

IPM utilisation statements	To a greater extent (%)	To a lesser extent (%)	Never (%)	Mean	Rank
Use of pests' natural predator	36.7	58.3	5.0	2.32	17th
Use of light trap to attract and kill pest	25.0	69.0	5.8	2.19	18th
De-worming birds		30.0	59.2	10.8	2.19

Source: Field survey, 2019

The packing away of the dead birds was the IPM practice most frequently observed by the respondents. The reason for this might be to prevent the spread of pests or diseases associated with the death of the birds. Jeffry & Bart (2021) assert that some pests transmit diseases, though some are zoonotic, while others could quickly spread among the flock when left unparked. Also, the practice that was mainly linked with the second IPM practice was the cleanliness of the pens, which might ward off some pests and keep the environment free of germs. Removing the pest with a physical hand shows that the respondents are willing to make the poultry bird free of pests, not minding the rigor and the time it could take. Hence, the first to the third method implies that the physical control aspect of IPM has been the most utilized IPM practice.

Table 6. Categorization Of Respondents Based On Their Level Of IPM Usage

Usage level	Frequency	Percentage	Mean	S. D
High	72	60.0	48.83	4.44
Low	48	40.0		

Source: Field survey, 2019

It is worth noting that the use of organic pesticides ($\bar{x}$=2.38) ranked 15th, indicating that the practice is yet to be popular among poultry farmers. Nevertheless, this should be encouraged as it is environmentally friendly and safe (Mark et al., 2016). However, the IPM strategies that were least utilized by the respondents include the use of pest' natural enemy ($\bar{x}$=2.32), use of trap ($\bar{x}$=2.19), and deworming of the birds ($\bar{x}$=2.19), which ranked 17th and 18th, respectively. The second to the least IPM practiced indicates that using the natural enemy for the flies (Table 3.) that primarily affects the poultry birds might be challenging, considering the small sizes. However, Trap will likely control the Rodents (The second most prevalent pest (Flies); Table 3). However, this shows that the respondents have alternative and more effective means of controlling the rodents on their farm. This implies that biological pest control is yet to be fully activated among poultry farmers. The result in Table 6. shows a high level (60.0%) of IPM usage, which has justified the low prevalence of pests (Table 3.) among the respondents. This implies that the high use of IPM might have been responsible for the low level of Pest prevalence, as opined by Adebayo

(2021), Jeffery & Bart (2021), and Adesiji et al. (2018) that IPM is the best and the safest way of poultry pest control. However, Alalade et al. (2017) assert that the IPM is a practice introduced previously for poultry farmers. The strategy is the best global approach to pest control as it has been an effective means of controlling pests due to its environmental sustainability, though with a low adoption rate among farmers in developing nations (Rezaei et al., 2019).

In summary, it could be said that IPM methods have been identified as the all-inclusive technique that suppresses the insect to a level that does not cause economic damage to the poultry birds, enhances the productivity of the farmer, and does not jeopardize the safety of the environment even for the future generation (Jeffery & Bart., 2021). Nevertheless, for the IPM technique to be effective, the pest must be detected and identified, and understudy the economic implications must be. When correctly done, it will reduce the cost of controlling/preventing the pest, improve flock performance, and reduce environmental pollution (Murillo & Mullens, 2020).

Constraints to the use of IPM

The result in Table 7. reveal that the most severe constraint to using IPM was subsidy removal on pesticides by the government (high cost) ($\bar{x}$=2.69). This was followed by the perception that pesticides are highly ineffective and straightforward ($\bar{x}$=2.65) and that the IPM methods are highly complex ($\bar{x}$=2.57). The government's removal of the subsidy causes the input price to go up drastically, which may affect the farmers' income. The ineffectiveness of the pesticides and the technicality of their usage also prevented the respondents from using IPM.

Table 7. Distribution of The Constraints to the Use of IPM (N=120)

Statements	Serious constraint	Mild constraint	Not a constraint	Mean	Rank
Subsidy removal of pesticides by the government (High cost)	72.5	24.2	3.3	2.69	1st
The perception that pesticides are not highly effective and not simple to use	70.0	25.8	4.2	2.65	2nd
High complexity of IPM methods	61.7	33.3	5.0	2.57	3rd
Poor extension services	60.8	33.3	5.8	2.55	4th
Difficulty in accessing the necessary information about IPM	59.8	35.0	5. 8	2.53	5th
Inadequate information on IPM	59.2	35.0	5.8	2.53	5th

Statements	Serious constraint	Mild constraint	Not a constraint	Mean	Rank
High cost of selective pesticides	40.8	51.7	7.5	2.33	7th
Unavailability of labour	36.7	56.7	6.6	2.30	8th
Inadequate technical know-how	26.7	65.8	7.5	2.20	9th
Environmental factors such as high relative humidity, rainfall, and temperature	30.0	55.0	15.0	2.15	10th
Poor access to credit facilities	23.3	66.7	10.0	2.13	11th
The problem of pest identification	16.7	78.3	5.0	2.12	12th
Inadequate availability of biological pesticides	55.2	30.8	14	2.01	13th

Source: Field survey, 2019

The thought that using IPM is a complex method may not allow some poultry farmers to embark on it to control pests. However, it should be noted that despite the report of the complex IPM method, the use was high for most of the respondents, which means they could cope with the complexity of the pest control method. The result of this study was in line with the findings of Bello et al. (2022), in which the respondents affirmed the complexity of biosecurity practices among poultry farmers. The fourth constraint that did not allow the adequate use of IPM was poor extension services, which affirms the assertion of Oyebode and Adebisi (2014) that few extension workers are available for disseminating agricultural information. However, the last constraint identified by the respondents was the insufficient availability of biological pesticides ($\bar{x}$=2.01). This result agrees with Alalade et al. (2017), who reported that farmers faced the main constraints of expensive inputs like pesticides.

Table 8. Categorization of respondents based on the factors militating against the use of IPM (n=120)

Usage level	Frequency	Percentage	Mean	S.D
High	72	47.5	31.42	3.30
Low	48	52.5		

Source: Field survey, 2019

The result in Table 8. shows that the constraints were low for 52.5% of the respondents, which might be due to the high utilization of the IPM, as earlier affirmed by this study (Table 6.). The low constraints also mean they could mitigate and cope with them based on the experience they have gained over the years.

Relationship Between Some Selected Variables And The Use Of IPM

The result in Table 9. shows that years of educational attainment (r=0.209, p<0.05), prevalent pest (X^2=1.000, p<0.05), constraints and sources of information like family (X^2=0.938, p<0.05), and internet (X^2=1.000, p< 0.05) show a significant relationship with the use of IPM; While there was no significant relationship between respondents' age (X^2=0.462, p> 0.05), sex (X^2=0.390, p>0.05) and membership of PAN (X^2=0.678, p> 0.05) and sources of information such as radio (X^2=0.329, p>0.05) and workshop (0.524, p> 0.05) and the use of IPM among poultry farmers. This indicates that years of educational attainment, prevalent pests, constraints, and information sources like family and the internet are some factors that enhance the use of IPM. In contrast, the use of IPM is not influenced by the respondent's age, sex, membership of PAN, and sources of information like radio and workshops and the use of IPM. The result of this study is in line with the outcome of Alalade et al. (2017), in which educational level is significant to the use of pest control methods. However, the prevalent pest will determine the type of IPM strategies to adopt, and the higher the infestation, the more strategies will be combined to prevent or control the pests. This aligns with the assertion of Anosike et al. (2018) and Fadimu et al. (2020) that pest control is an essential factor in the poultry management system.

Table 9. Relationship between some selected variables and the use of IPM

Variables	**r-value**		**P -value**
Age	0.462		0.68
Education attainment index	0.022		0.021*
Prevalent pest index	0.577		0.051*
Constraint index	0.186		0.012*
Variables	**X^2-value**	**Df**	**p-value**
Family	0.938	1	0.006*
Internet	1.000	1	0.000*
Radio	0.329	1	0.842
Workshop	0.524	1	0.405
Membership of PAN	0.678	1	0.172
Sex	0.390	1	0.735

Source: Field survey, (2019)
* Significant at P≤0.05

Furthermore, the study deduced that information sources are directly proportional to the IPM adopted and used by poultry farmers, as the information has been said to be critical to the successful management of poultry pests using IPM. In addition, the sources of information like friends and family can quickly disseminate effective IPM to each other. Hence, such information will determine

the kind and the type of IPM methods that will be adopted mainly by poultry farmers in such locations for a particular invaded pest based on the tested and trusted method (Zimmer & Raymond, 2015). The significance of educational level was in line with the study report of Adesiji et al. (2018) but in contrast with the result of being a PAN member that was not significant to using IPM.

CONCLUSION AND SUGGESTION

Conclusion

The study concludes that poultry farmers' characteristics, like being elite and active males who produce broilers all year round, position them to adopt and use IPM. However, interpersonal and ICT information sources contributed immensely to disseminating IPM information to the end users, although interpersonal sources were the most prominent ones. There was a low pest prevalence of ectoparasite, a low level of constraints with high utilization of IPM, and the use of organic pesticides, with the natural enemy being unpopular. Hence, forms of education, level of prevalent pests, level of constraints, and information sources like family and the internet are some factors that enhance the use of IPM.

Suggestion

The study recommends that platforms that could be used to sensitize the female gender about poultry farming should be created for gender balance in the poultry industry. Hence, the Poultry Association of Nigeria (PAN) should always organize workshops for their members to be abreast with the current trends of the event in the enterprise and disseminate good quality information to each other. Also, organic pesticides should be given more attention since they are eco-friendly. However, the factors enhancing the use of IPM should be strengthened and empowered by the relevant stakeholders for a sustainable environment.

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