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Assessment of Pesticide Use among Commodities Merchants in Oyo and Kwara State, Nigeria

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ABSTRACT

The rise incidents of food-borne poison due to abuse of agrochemicals triggered this survey. Multiple samplings were used to choose respondents from commodities merchants in Oyo and Kwara states. Two local government areas (LGAs) were further selected from each of the two states using a simple random sampling technique. Subsequently, a purposive selection strategy was used to identify two (2) markets in each of the LGAs. Ultimately, a sample of eighty (80) questionnaires were randomly administered in each of the markets making a total of 640 respondents, out of which 605 were returned valid. The study found that pesticide users in the two states are predominantly female. The findings further revealed that 80.8 % and 59.4% of respondents in Oyo and Kwara States respectively know and applied Phostoxin. Conversely, less than 3% of the respondents from the two states know and applied the other pesticides investigated. About 59.5% source for information from agro-dealers. Also 62.9% and 76.8% respondents in Oyo and Kwara States respectively strongly agreed that their usage of pesticides was profit-driven. The study concluded that there is abuse in usage and handling of pesticides among respondents in the study area especially with regards to the disposal of unwanted pesticides and pesticide containers. The study recommended that relevant food safety regulatory agencies should carry out sensitization and training programmes on appropriate usage and handling practices of pesticides among commodities merchants aimed at ameliorating abuse and achieving safety of agricultural commodities.

INTRODUCTION

Global consumption of agrochemicals continues to rise, despite growing evidence of their adverse effects on environmental quality and human health (Devi *et al.*, 2022). The extent of increase varies across nations, by type of chemical compounds and by severity of the detrimental impacts. The differential impacts are largely attributable to the level of technology adoption and regulation as well as their enforcement and compliance. Approximately 30% of pesticides marketed in developing countries, particularly in Africa, reportedly do not meet internationally accepted quality standards, posing a serious threat to human health and the environment.

Studies have documented those unscientific practices in selection and use of agrochemicals are common, especially in developing economies (Khanal & Singh 2016; Rahaman *et al.*, 2018). Regular preventive sprays of pesticides without considering the chances of infestation or threshold of pest population are very common. Issues related to concentration, mixing methods, periodicity

of spray, and use of appropriate protective gear are also common. Often, the end users rely on information provided by pesticide retailers in developing countries. The dispensers are also typically not aware of the best practices for use and are driven by a desire to increase the volume of sales resulting in violations of the laws governing their dispensation and use thereby posing serious danger to the environment and body of users. Concerted actions are, therefore, required to mainstream the regulation and sound management of HHPs and contribute to the achievement of the Sustainable Development Goals by 2030.

The main objective of the survey is to assess pesticide usage among commodities merchants in Oyo and Kwara state, Nigeria. Specifically, the study sought to:

i. identify various pesticides used and their level of application in the study area
ii. ascertain the stages of usage and handling practices of pesticides in the study area
iii. investigate respondents' sources of knowledge on pesticide usage
iv. determine factors influencing pesticide usage decision.

METHODOLOGY

A three-stage selection procedure was used to choose respondents from Value chain actors (Farmers, processors, agricultural commodity marketers, consumers) in both states. Two local government areas (LGA) were randomly sampled during the first phase in each of the two states. These were Pategi, Ilorin South, Gambari, and Ogbomoso Local Government Areas (LGAs). Subsequently, a purposive selection strategy was used to identify two (2) markets in each of the Local Government Areas (LGAs) where the various categories of the agricultural stakeholders constantly interfaced. Following that, a sample of eighty (80) questionnaires were randomly administered in each of the markets making a total of 640 people in the study. However, 605 (307 and 298 in Oyo and Kwara State respectively) of the questionnaire disseminated were found valid.

RESULTS AND DISCUSSIONS

The findings of the socio-demographic characteristics of the sampled respondents in this survey as represented in table 1 above revealed that majority of the pesticide users were females in the pooled result for both Oyo and Kwara states (56.4%). However, the result showed contrasting pesticide usage by gender when the states were factored independently. There are more female pesticides users in Oyo (54.40%) while on the contrary there were more male pesticides users (67.40%) in Kwara State. The findings indicate that most of the respondents from both states were females and this might not be unconnected with the fact that pesticides are mostly applied during the marketing stage of the agricultural value chain where the female folks seem to be predominant. This finding corroborates that of Rita and Dorathy (2024) who posited that, globally, the number of women is higher than men in all areas of endeavor including business organizations and workplaces. Similarly, Ukegbu, Uwaegbute and Emezue (2015) asserted that women constitute the greatest percentage of traders found in various markets where they stay from dawn to dusk.

The distribution of marital status in the table showed that 9.1% and 30.9% of pesticides users are single, 89.3%and 68.8% were married, and 1.6% and 0.3% of the respondents were divorced in both Oyo and Kwara States respectively. For the pooled data, the result of marital status showed that 19.8% of the respondents were single, 79.2% were married and 1% of the respondents were widowed. This result indicated that majority of the respondents in both States were married.

Table 1: Socio-Demographic Characteristics of Pesticide Users

Variable	**Oyo**		**Kwara**		**Pooled**	
Gender	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Female	167	54.4	97	32.6	341	56.4
Male	140	45.6	201	67.4	264	43.6
Marital status						
Single	28	9.1	92	30.9	120	19.8
Married	274	89.3	205	68.8	479	79.2
Widowed	5	1.6	1	0.3	6	1.0
Categories						
Farmers	57	18.6	114	38.3	171	28.3
Marketers	150	48.9	121	40.6	271	44.8
Processors	45	14.7	20	6.7	65	10.7
Consumers	55	17.9	43	14.48	98	16.2
Member of association						
No	99	32.2	116	38.9	215	35.5
Yes	208	67.8	182	61.1	390	64.5
Academic status						
Non-formal	43	14.0	32	10.7	75	12.4
Primary	138	45.0	76	25.55	214	35.4
Secondary	67	21.8	71	23.80	138	22.8
OND/NCE	43	14.0	75	25.20	118	19.5
HND/BSc.	13	4.2	41	13.80	54	8.9
Postgraduate	3	1.0	3	1.0	6	1.0
Source of usage						
Print						
Electronic	17	5.5	106	35.8	123	20.4
Social	12	3.9	68	23	80	13.3
Agro-dealer	253	82.4	106	35.8	359	59.5
Access to extension						
Yes	162	52.80	200	67.10	362	59.80
No	145	47.20	98	32.90	243	40.20
Total	307	100.00	298	100	605	100.00

Source: Field Survey 2023

The distribution of respondents by categories of respondents in the table above showed that 48.9 % and 40.6% of respondents are marketers in Oyo and Kwara States respectively while 18.6% and 38.3% are farmers in Oyo and Kwara States respectively. For the pooled data, the result revealed that 44.8% of the respondents are marketers while 16.2 % of the pesticides users in the study area are consumers. This result indicated that majority of the respondents in both States using pesticides are marketers.

The table further revealed the education status of the respondents. About 14% respondents in Oyo State have non-formal education while other 86.0% were educated with at least primary school certificate, compared to that of Kwara State where 10.7% were non-literate and the remaining 89.3% were educated with at least primary school certificate. Thereafter, the pooled result revealed that only 12.4% of the pesticides users have non-formal education while other 87.6% were educated with at least primary school certificate. This findings from this study indicate the majority of the pesticides users in the study area have formal education implying that reduction in pesticides usage abuse is achievable if the right extension strategy is adopted to educate pesticides users. Also, the

study revealed that the pesticide users in Oyo state have almost identical number of formal and non-formal education in comparison to that of Kwara state. This further implies that there is high tendency that similar results can be achieved with the same approach to educating pesticides users in the two states. The present finding is in line with previous studies (Mignouna *et al*., 2011; Lavison, 2013; Namara *et al*., 2013) which reiterated that educational level of farmers increases their ability to obtain, process and use information relevant to adoption of a new technology.

The distribution of respondents by source of information further showed that 82.4 % and 35.8% of respondents in Oyo and Kwara States respectively secure their information on pesticide usage from agro-dealers. About 5.5% and 35.8% source for information through the electronic media in Oyo and Kwara States respectively. For the pooled data, the result revealed that 59.5% of the respondents source for information from agro-dealers while 6.8 % of the pesticides users secure information from the print media. This result indicated that majority of the respondents in both States have the agro-dealers as their major source of information on pesticides usage

The distribution of respondents by access to extension services in the table showed that 52.8 % and 67.1% of respondents have no access to extension services in Oyo and Kwara States respectively while 47.2% and 32.9% have access to extension services. For the pooled data, the result revealed that 59.8% of the respondents have no access extension services while 40.2 % have access to extension services. This result indicated that access to extension services is low among commodity merchants on pesticides usage. Nakwe, Mahmood, Ndaghu, Bashir and Kyaru (2018) reported a similar finding of a low level of contact with extension among farmers in Taraba State. Obviously therefore, lack or low level of access to extension services is a major challenge in Agriculture and without access to extension services, agricultural stakeholders may miss out on crucial information about new technologies, market trends, and best practices, hindering their ability to innovate and adapt.

Knowledge and application of pesticides in Oyo and Kwara states were presented in Table 2 above. The findings showed that 80.8 % and 59.4% of respondents in Oyo and Kwara States respectively know and applied phostoxin. Conversely, less than 3% of the respondents from the two states know and applied the other pesticides investigated in this study. The result of this survey corroborates the findings from the study carried out by Sheilla *et al.* (2023), that pest control in stored grain crops in southern Africa is largely dependent on the use of phosphine generating fumigant, aluminium phosphide (AIP), albeit using blanket dosages, regardless of storage system type. This implies that the use of phostoxin is a popular choice among commodities merchants globally.

The findings of the stage of application of pesticide by the sampled respondents in this survey as represented in the table 3 revealed that majority 398 (65.9%) apply pesticide during postharvest in the pooled result for both Oyo and Kwara states. Similarly, when the two states were factored independently, the findings, Oyo 198 (62.9%) and Kwara 205 (69.0%) revealed that pesticide usage is carried out more at the postharvest stage across the value chain. This indicate that more people apply pesticide during the postharvest stage than at any other stage. Pesticides are reportedly becoming a crucial part of modern life and are used to preserve food storage facilities and to get rid of pests that spread infectious diseases that are dangerous to humans (Asiegbu, Ezekwe, and Mo, 2022; Hussain, Morufu and Henry, 2021)

Table 2: Knowledge and Application of Pesticides

Knowledge and application	Oyo		Kwara		Pooled	
	Freq.	%	Freq.	%	Freq.	%
			Mancozeb			
Not known	299	97.4%	241	80.9	540	89.3
Known	4	1.3	38	12.8	42	6.9
Known&applied	4	1.3	19	6.4	23	3.8
			Maneb			
Not known	300	97.7	247	82.9	547	90.4
Known	4	1.3	36	12.1	40	6.6
Known&applied	3	1.0	15	5.0	18	3.0
			Nabam			
Not known	299	97.4	250	83.9	549	90.7
Known	5	1.6	41	13.8	46	7.6
Known&applied	3	1.0	7	2.3	10	1.7
			Atrazine			
Not known	218	91.2	92	30.9	372	61.5
Known	15	4.9	120	40.3	135	22.3
Known&applied	12	3.9	86	28.9	98	16.2
			Round up			
Not known	227	86.6	67	22.5	339	56.0
Known	12	3.9	94	31.5	106	17.5
Known&applied	23	7.5	137	46.0	160	26.4
			Diuron			
Not known	290	94.5	114	38.3	404	66.8
Known	8	2.6	110	36.9	118	19.5
Known&applied	9	2.9	74	24.8	83	13.7
			Butach			
Not known	294	95.8	144	48.3	438	72.4
Known	5	1.6	102	34.2	107	17.7
Known&applied	6	2.6	52	17.4	60	9.9
			Carbofuran			
Not known	292	95.1	174	58.4	466	77.0
Known	7	2.3	88	29.5	95	15.7
Known&applied	8	2.6	36	12.1	44	7.3
			Phostoxin			
Not known	51	16.6	50	16.8	101	16.7
Known	8	2.6	71	23.8	79	13.1
Known&applied	248	80.8	177	59.4	425	70.2
			Dimethoate			
Not known	297	96.7	156	52.3	453	74.9
Known	5	1.6	92	30.9	97	16.0
Known&applied	5	1.6	50	16.8	55	9.1
Total	307	100	298	100	605	100

Table 3: Stage of Usage and Handling Practices of Pesticides

Variable	Oyo				Kwara				Pooled			
	Yes		No		Yes		No		Yes		No	
	N	%	N	%	N	%	N	%	N	%	N	%
Stage of Application												
Cultivation	82	26.7	225	73.3	108	36.2	190	63.8	190	31.4	415	68.6
Pre-harvest	41	13.4	266	86.6	85	28.6	212	71.4	126	20.9	478	79.1
postharvest	193	62.9	114	37.1	205	69.0	92	31.0	398	65.9	206	34.1
Site of application												
On the farm	76	24.8	231	75.2	112	37.6	186	62.4	188	31.1	417	68.9
Within the house	55	17.9	252	82.1	66	22.1	232	77.9	121	20.0	484	80.0
Within the market	91	29.6	216	70.4	78	26.2	220	73.8	169	27.9	436	72.1
Secluded location	79	25.7	228	74.3	50	16.8	248	83.2	129	21.3	476	78.7
Designated location	11	3.6	296	96.4	18	6.1	278	93.9	29	4.8	574	95.2
Disposal of unwanted pesticides												
Bury	83	27.0	224	73.0	98	32.9	200	67.1	181	29.9	242	70.1
Dump in a hole	53	17.3	254	82.7	76	25.5	222	74.5	129	21.3	476	78.7
Public	43	14.0	264	86.0	80	26.8	218	73.2	123	20.3	482	79.7
Indiscriminate disposal	102	33.2	205	66.8	27	9.1	271	90.9	129	21.3	476	78.7

Toilet/drains	5	1.6	302	98.4	52	17.4	246	82.6	57	9.4	548	90.6
Water ways/rivers	10	3.3	297	96.7	2	0.7	296	99.3	12	2.0	593	98.0
Disposal of pesticide containers												
Bury	96	31.3	211	68.7	62	20.8	236	79.2	158	26.1	447	73.9
Burn	48	15.6	259	84.4	104	34.9	194	65.1	152	25.1	453	74.9
Public	47	15.3	260	84.7	162	54.4	136	45.6	209	34.5	396	65.5
Indiscriminate disposal	95	30.9	212	69.1	35	11.8	262	88.2	130	21.5	474	78.5
Domestic use	7	2.3	300	97.7	43	14.4	255	85.6	50	8.3	555	91.7
Source of guidance												
Follow label instruction	41	13.4	266	86.6	229	76.8	69	23.2	270	44.6	335	55.4
Extension officer guidance	84	27.4	223	72.6	49	16.4	249	83.6	133	22.0	472	78.0
Agrochemical guidance	95	30.9	212	69.1	223	74.8	75	25.2	318	52.6	287	47.4
Friend's advice	42	13.7	265	86.3	169	56.7	129	43.3	211	34.9	394	65.1

Source: Field Survey 2023

The findings further indicate that more of the respondents 169 (27.9%) apply pesticides in the market in the pooled results for both states. The finding however showed contrasting results when the two states were factored. While more of the respondents in Oyo 91(29.6%) apply pesticide within the market, application of pesticide in Kwara 112 (37.6%) is carried out mainly on the farm.

The distribution of respondents with regards to the disposal of unwanted pesticide pesticides in the table showed that most of the pesticide users in Oyo state 33.2% indiscriminately disposed the unwanted pesticides while most of the respondents in Kwara state 26.8 % admitted to disposing unwanted pesticides at public locations. This indicate that pesticide users in the study area disposes unwanted pesticides as they see fit without any cognizance taken of the implications of such action.

In terms of disposal of pesticide containers, 31.3% bury and 30.9 dispose indiscriminately in Oyo state while in Kwara state 34.9% of the respondents burn unwanted pesticide containers and 54.4% indiscriminately disposed them. As per source of guidance, 30.9%, 27.4% secure information on pesticide usage guidance from agro-chemicals and extension officers respectively in Oyo state. However, in Kwara state, 76.8%, 74.8%, 56.7% sourced for guidance from pesticide label instruction, agro-chemical guidance and friends respectively. Studies have reported that pesticide exposure and poisoning in developing countries are more due to usage and availabilities of arrays of active ingredients increasing with limited policy controls, lack of adequate understanding of necessary information on the pesticide hazards, risks, safe use, dosage, handling storage, and disposal (Eddleston *et al.*, 2002, Mathews 2008; Atreya *et al.*, 2012; Karunamoorthi *et al.*, 2012).

Table 4: Sources of Knowledge on Pesticide Usage

Categories	Oyo Frequency	Percentage	Kwara Frequency	Percentage	Pooled Frequency	Percentage
Print	25	8.1	16	5.4	41	6.8
electronic	17	5.5	106	35.8	123	20.4
Social	12	3.9	68	23.0	80	13.3
Agro-dealer	253	82.4	106	35.8	359	59.5
Total	307	100.00	298	100.00	485	100.00

Source: Field Survey 2023

The distribution of respondents by source of information Table 4 showed that 82.4 % and 35.8% of respondents in Oyo and Kwara States respectively secure their information on pesticide usage from agro-dealers. About 5.5% and 35.8% source for information through the electronic media in Oyo and Kwara States respectively. For the pooled data, the result revealed that 59.5% of the respondent source for information from agro-dealers while 6.8 % of the pesticides users secure information from the print media. This result indicated that majority of the respondents in both States have the agro-dealers as their major source of information on pesticides usage. Many studies have suggested that farmers take advice from agro-input dealers seriously and adopt the suggested practices (Alam and Wolff, 2016; Rutsaert and Donovan, 2020). The role of agro-input dealers in pesticide risk advice is underlined by the fact that farmers often prefer them as a source of information over alternatives such as extension services due to closer proximity and higher accessibility (Kwaye, Mengistie, Ofosu-Anim. Nuer & Van den Brink, 2019).

The distribution of respondents by factors influencing pesticide usage in Table 5 showed that 193(62.9%) and 229 (76.8%) of respondents in Oyo and Kwara States respectively strongly agreed that they were influenced by quest for profit. About 30(9.8%) and 68(11.3%) in Oyo and Kwara states respectively were influenced by extension officers' recommendation. The result further revealed that 66 (21.5%) and 48 (16.1 %) in Oyo and Kwara states respectively strongly agree that friends and families influence their usage of pesticides. Also, 71 (23.1%) and 82 (27.5 %) of the respondents in Oyo and Kwara States respectively strongly agree that they apply pesticides based on personal experience.

Table 5: Factors Influencing the Decision for Pesticide Usage

Influencing factors	Oyo				Kwara			
	SD	**D**	**A**	**SA**	**SD**	**D**	**A**	**SA**
Quest for profit	36 (11.7%)	7 (2.3%)	71 (23.1%)	193 (62.9%)	8 (2.7%)	2 (0.7%)	59 (19.8%)	229 (76.8%)
Ext. officers	86 (28.1%)	60 (19.6%)	130 (42.5%)	30 (9.8%)	184 (30.5%)	167 (27.6%)	185 (30.6%)	68 (11.3%)
Friends & family	58 (18.9%)	28 (9.1%)	155 (50.5%)	66 (21.5%)	34 (11.4%)	32 (10.7%)	184 (61.7%)	48 (16.1%)
Personal experience	28 (9.1%)	24 (7.8%)	184 (59.9%)	71 (23.1%)	16 (5.4%)	44 (14.8%)	156 (52.3%)	82 (27.5%)
Agrodealers	32 (10.4%)	16 (5.2%)	156 (50.8%)	103 (33.6%)	24 (8.1%)	24 (8.1%)	154 (51.7%)	96 (32.2%)
Desire for quality	31 (10.1%)	7 (2.3%)	146 (47.6%)	123 (40.1%)	9 (3.0%)	15 (5.0%)	159 (53.4%)	115 (38.6%)
Customers' preference	66(21.5 %)	33(10.7 %)	92(30.0 %)	116(37. 8%)	6(2.0%)	28(9.4%)	153(51.3 %)	111(37.2 %)

Source: Field Survey 2023

CONCLUSION AND RECOMMENDATIONS

The study concluded that pesticide is mostly applied at the postharvest stage of the agricultural value chain in the study area. There is abuse in usage and handling of pesticides among respondents in the study area especially with regards to the disposal of unwanted pesticides and pesticide containers. It is therefore recommended that the Nigerian Stored Products Research Institute (NSPRI) should carry out sensitization and training programmes on appropriate usage and handling practices of pesticides among the value chain actors with a view to achieving one of the major cardinal missions of ensuring the safety of agricultural commodities.

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