International Journal of Agriculture Innovations and Research
Volume 2, Issue 6, ISSN (Online) 2319-1473
Manuscript Processing Details (dd/mm/yyyy) :
Received : 29/05/2014 | Accepted on : 13/06/2014 | Published : 20/06/2014

Empirical Analysis of Factors Associated with Awareness of Pesticide Safety Measures among Pesticide Users in Oil Palm Farms in Edo, Delta and Ondo States, Nigeria

Omoregbee, F. E. and Osabuohien J. I.

Abstract – **The study analyzed the socio-economic characteristics of pesticide users and their influence on awareness of safety measures in Edo, Delta and Ondo States. Data were collected from two hundred six-eighty respondents using questionnaire and analyzed using descriptive and tobit regression model. The results of this study showed that most of the respondents (75.4%) were males, mean age of 39 years and more than half of them (56.6%) had secondary education. Results showed that respondents were aware of each of the 28 identified pesticide safety measures and awareness of safety measures was highest among Delta State respondents and least among Ondo State respondents. Tobit results for the individual coefficients indicated that respondents' age at 1% ($p<0.01$) level had negative significant relationship with oil palm pesticide users' awareness of pesticide safety measures. It is recommended that pesticide safety measure awareness should be intensified amongst young pesticide users.**

Keywords – **Awareness, Factors, Oil Palm, Pesticide, Safety Measures.**

I. INTRODUCTION

World fresh fruit bunches of oil palm production is said to be over 95 million tons: 75 million tons fromeight countriesin Asia,6 million tonsfrom thirteen Latin American countries and 14 million tons from twenty-two countries in Africa, out of which 8 million tons come from Nigeria[1]. This agricultural subsector remains the backbone of Nigeria economy, a major vocation, income/revenue source for farmers and government in Southeast, South-South, Southwest and some central states in Nigeria were oil palm production system are mainly large estates, small/medium plantations and semi/natural groves[2].

Pests are among the major problems of oil palm production [3], necessitating the application of pesticides in oil palm production to protect it against pests that are inimical to its production [4]. Pesticide use in Nigeria has increased since 1988-1994 due to emergence of large farms andADPs importationto boost crop/and livestock production [5]. Past studies have shown that only 25% of the world pesticides produced is used in developing/under-developingcountriesbut still they are experiencing 99% human deaths arising from chemical pesticide related incidences [6].

Pesticide [6] is likened to a 'double-edged sword' whose improper use/handling leads to human and environmental hazards. It may leads to ill health that maylead to loss of work days, reduction in workers' productivity and impairment in decision-making ability due to people direct or indirect exposure to chemical pesticides [7]. All class of people are at risk of pesticide poison but the main people include are production workers, formulators, mixersand/or sprayers/users loaders[7] Agricultural farm workers other means of exposures are through selling, transporting and storing; taking care of the equipment, spillage and disposal of pesticide wastes

High level of human pesticide risk in agriculture was due to failure of farmers to adhere to safety measures[8]. Pesticide safety measures include: pre-spraying precautions, precautions during application and post-spraying precautions. To minimize human pesticide risk in oil palm production there is compelling need for oil palm farmers who use pesticides to be aware of these safety measures. High level of awareness of risks associated with the use of pesticides among pesticides users in oil palm production will not only lead to increase inknowledge of precautionary measures but promote safe use of pesticides and arrest exposure to health hazards that are associated with pesticides use.

It is against this background that this study sought toanalyze the factors associated with pesticide users' awareness of pesticide safety measures in Edo, Delta and Ondo States. The study objectives were to:

1. Examine oil palm farms pesticide users' socioeconomic characteristics; and
2. Ascertain oil palm farms pesticide users' extent of awareness of pesticide safety measures. The hypothesis tested in the study was: There is no significant relationship between respondents' socioeconomic characteristics and awareness of pesticide safety measures information.

II. MATERIAL AND METHODS

This study wasconducted in Edo, Delta and Ondo States in Niger-Delta area of Nigeria. Ondo State is the highest producer of oil palm in the southwest states, Edo and Delta States are key producers in the South-South states [4]. The total respondents sampled for this study was 268 using multi-stage and simple random sampling procedure. Descriptive and inferential statistics were employed in the analyses of the data. The tobit or censored normal regression model was employed to determine the level and direction of influence for situations in which $Y_{1or\ 0}$ is observed for values greater than 0, but is not observed for values of zero or less [9].

The tobit standard model is expressed as follows:

Y_i * = $X_i\beta$ +U_i

The model employed for this study is specified below

$Y_i = \beta_0 + \beta_1X_{1i} + \beta_2X_{2i} + \beta_3X_{3i} + \ldots\ldots\ldots\beta_8X_{8i}$ ...

i =1, 2, ….8

Where

Y_i isoftheoretical value (observed dependent variable);Y_i* is unobserved (latent dependent variable), unlike the dummy variable Y_i,

$Y_i = Y_i$ * if $Y_i > 0$

$Y_i = 0$ if $Y_i \leq 0$

X_i is the vector of the independent variables. β is the vector of coefficients and $U_i$error term. The independent (explanatory) variables are defined as comprising oil palm pesticides users' specific characteristics attributes that are associated with pesticide safety measures.

Variables regressed in this model for awareness was:

Y=Level of awareness (low = 0; high = 1)

X_1= sex (male=1, female=2) X_2 = age (number of years) X_3 = education (number of years in school) X_4 = household size (number) X_5 = farming experience (years of experience in farming)

X_6 = income (in naira, N) X_7 = experience (years of experience in pesticide use)

III. Results and Discussion

The results and discussion are as presented under the following sub-headings:

1. Socio-economic characteristics of pesticide users

Table1 shows the socio-economic characteristics of pesticides users in Edo, Delta and Ondo states. Majority (75.5%) of pesticide users across the three states were males. Highest percentage of male pesticide users was recorded in Edo, followed by Delta and Ondo States. This is expected as women are more involved in processing and marketing activities in oil palm production. Women use of pesticides may be limited to these few activities. Most of the respondents were within the age bracket of 31-40 years with mean age of 39 years. At the State level the mean age of respondents in Edo was about 37 years, 40 years in Delta and 41years in Ondo, indicating that pesticide users in oil palm farms/plantations were relatively young, within the economically active group. The prevalence of young people in pesticide use may be because the application of pesticide is energy demanding and that could be tedious for older people. The pesticide users were mainly (82.8%) married people in the states of Edo (74.1%), Delta (91.2%) and Ondo (79.7%). This that majority (82.8%) of pesticide users were married and could be said to be responsible and matured enough to give reasonable answers to research questions.

Most of the respondents had household size of 5-8 persons with an average of 5 persons per household in the sampled states while the mean household size for Edo, Delta and Ondo States were 5, 6, and 5 respectively. The result reveals that their household size is fairly large and this strongly suggests the practice of the extended family system, which is common in rural areas [10]. It could imply that more family labour will be readily available. Relatively large household size is an obvious advantage in terms of farm labour supply. More than half (56.7%) of the respondents had formal educational experience not beyond secondary school level representing 65.2% in Ondo, 62.3% in Delta and 42.4% in Edo. The formal educational experience of pesticide users helped them to take more precautionary measures when using pesticides [7]. It is expected that formal educational experience of respondents would enable them to understand pesticide safety measures in whichever form the messages are presented to them than those without formal educational experience[10]. With respect to experience in farming, Table1 also shows that on the average the farming experience of respondents was 16years. Most of the respondents fell within the farming experience of 11-15 years. This finding is in agreement with past study on smallholder oil palm producers in Ika Local Government Area of Delta State [3]. This could imply that the respondents had long time farming experience and could have over the years acquired wealth of knowledge on use of pesticides and corresponding safety measures for cushioning the effects of pesticide health hazards. Majority (70.9%) of the respondents were full time pesticide users. Edo state had the least number of the full time pesticide users (55.3%) while Delta State had the highest (90.4%) number followed by Ondo (58.0%). Most of the respondents earned monthly wages of between ₦15, 001 to ₦150,000 with an average monthly income of ₦15,062. Edo State mean monthly income (₦27,152.00) was higher than that of Ondo (₦9742.00) and Delta (₦9,268.00) states respectively. Generally, use of pesticides as an agricultural practice in most oil palm farms is new as they adopted the practice less than two years in the three states, with majority (86.9%) using only the pattern of mix and spray.

2. Respondents' awareness of pesticide safety measures.

The results in Table 2 show the level of respondents' awareness the 28 identified pesticide safety measures. The respondents' levels of awareness of the 28 identified safety measures exceed 80%. The percentage of awareness across the three states was a mix of very high and high levels of awareness with Delta state recording the highest level of awareness followed by Edo state and Ondo state the least. Awareness results in Table 2 indicate that pesticide users in the study area possess a very knowledge of pesticide use safety measures. This may be due to the high number of respondents who had formal educational experience, which enable to read and understand pesticide use instructions [7].

3. Determinants of awareness of pesticide safety measures

Table 3 shows tobit regression analysis results indicating the relationship between respondents' socioeconomic characteristics and awareness of pesticide safety measures. The likelihood ratio value X^2(19.17) shows that the model was significant at 1% since the estimated value was greater than critical value X^2(18.475) at 7 degree of freedom. This implies that the model was appropriate for the analysis. The Pseudo R^2(0.692) indicates that the explanatory variables indicated in the model accounted for 69.2% of the variations in

respondents awareness of pesticides safety measures. Results for the individual coefficients indicated that respondents' age at 1% ($p<0.01$) level had negative significant relationship with oil palm pesticide users' awareness of pesticide safety measures. The coefficient for age ($b = -0.009$) implies that younger pesticide users were more aware of pesticides safety measures than older users. An additional marginal increase in respondents' age would reduce the likelihood of rise in users' level of awareness of pesticide safety measures by 0.3%. Generally, younger farmers are more inquisitive than older farmers

Farming experience at 1% ($p<0.01$) level had negative significant relationship with oil palm pesticide users' awareness of pesticide safety measures. The coefficient of farming experience ($b=0.014$) implies that an increase in the number of years of respondents' farming experience would lead to a marginal increase in their awareness of pesticides safety measures by 0.7%. Though, most of oil palm farmers have been farming over the years and have acquired a wealth of knowledge about improved farm practices, the oil palm farmers have very little pesticide use experience as most of them have been applying pesticide for a little more than a year.

IV. Conclusion

The use of pesticides on oil palm farms/plantations is very common, predisposing users to high level of human pesticide risk if they fail to adhere to safety measures. The study revealed that most the pesticide users were young oil palm farmers who have high awareness knowledge of pesticide safety measures. It concluded that the intensity of pesticide users' awareness of pesticide safety measures is increased with a unit increase in the farming experience of oil palm farmers and among younger pesticide users. Based on the study findings and the conclusion reached it is recommended that: a veritable step towards the protection of farmers against hazardous chemical pesticides is to create awareness of pesticide safety measures among pesticide users. In creating this awareness the agricultural extension service can rely on the wealth of farming experience of the oil palm farmers. Pesticide safety measure awareness should be intensified amongst young pesticide users

Implication of the Study

This empirical study contributed to the knowledge on communication of pesticide safety measures to pesticide users.The intensity of awareness of pesticide safety measures depends on the farming experience and age of pesticide users. Therefore, awareness of pesticide safety measures should be intensified among young users.

References

[1] Fairhurst,T. H. and Mutert, E. (1998). Introduction to oil palm production.International (BCI)*Better Crops International 13*(1). Accessed 23th November 2012 from https://www.ippi.net/ppiweb/bcropint.n8f/Swebindex/32EDD1030D2EEF52568F600558DE0/sfile/i99-ip03.pdf

[2] Initiative for Public Policy Analysis (IPPA, 2010). Palm oil and economic development in Nigeria and Ghana, recommendation for the World Bank's 2010 palm oil strategies. *www.ippanigeria.org*

[3] Dimelu, M.U. and Anyaiwe, V. (2011). Priorities of smallholder oil palm producers in IkaLocal Government Area ofDelta State: implication for agricultural extension service in Nigeria *World Journal of Agricultural Sciences 7* (2): 117-123, 2011

[4] Nigerian Institute for Oil Palm Research(NIFOR) (2005). Briefing on the institute and highlights of achievements in research and production. Nifor Benin City

[5] Pesticides Action Network (2007).Strategic assessment of the status of POPs pesticides tradingin south western Nigeria. Accessed on the 5th May 2011 from *www.PAN-UK.org/archieve/project/obsolete*

[6] Anderson, A. (2005).Milk with soda. A minor field study on the chemical companies and distributors' role in the use-age of pesticides in the Rice production in Tarapoto, Peru. M.Sc. thesis,SoderonsHogskola University College.Retrieved on 4th June, 2010 from http://sh.diva-portal.org/smash/get/diva2:16134/fulltext01

[7] Alkthukorala, W., Wilson, W. and Robinson, R. (2012). Determinants of health costs due to farmers exposure to pesticides: an empirical analysis. Working/Discussion Papers no.78 *http://econpapersrepec.org/RePEc:qut.dpaper278* Accessed on 5th January, 2013

[8] Ogunjimi, S. I. and Farinde, A. J. (2012). Farmers' knowledge level of precautionary measures in agrochemicals usage in cocoa production in Osun and Edo states, Nigeria *International Journal of Agriculture and Forestry 2*(4): 186-194

[9] Splett, N. S., Barry, P. J. Dixon, B. L. and Ellinger, P. N. (1994). A joint experience and statistical approach to credit scoring. *Agricultural science review* 54: 39-54

[10] Ekong, E. E. (1988): *Introduction to Rural Sociology*. Published by Concept Publications Press Limited.Ishomolu, Lagos.

[11] Shama, F. A., Nijem, K. Bjertnes, E.and Kristensen, P. (2010) Pesticide use opportunities of exposures among farmers and their families: Cross- sectional studies 1998 - 2006 *Envirn Health 9*: 63

[12] S alameh P. R, and Abi, S. B. (2004). Symptoms and acute pesticide intoxication among Agricultural worker in Lebanon*Journal of Medical Librans* 2004:52(2):64-70.

Author's Profile

Omoregbee, F. E.
Ph.D., Associate Professor of Agricultural Extension and Rural Sociology in the Department of Agricultural Economics and Extension Services, University of Benin, Benin-City.

Osabuhien, J. I.
a P.hD. Student of the Department of Agricultural Economics and Extension Services, University of Benin, Benin-City.

International Journal of Agriculture Innovations and Research
Volume 2, Issue 6, ISSN (Online) 2319-1473

Table 1: Mean and percentage distribution of respondents by socio-economic characteristics

Variable	Edo		Delta		Ondo		Pooled	
	$\bar{X}$	%	$\bar{X}$	%	$\bar{X}$	%	$\bar{X}$	%
Sex(Male)	-	87.1	-	64.0	-	79.7	-	75.4
Age in years(31-40)	36.7	-	39.5	-	41.1	-	39.0	-
Marital status(Married)	-	74.1	-	91.2	-	79.7	-	82.8
Education(completed secondary school)	-	42.4	-	62.3	-	65.2	-	56.7
Household size(5-8)	4.84	-	6.16	-	5.01	-	5.44	-
Monthly income(15,000-150,000)	27152	-	9268	-	9742	-	15062	-
Farming experience(11-15)	18.5	-	16.4	-	12.4	-	16.0	-
Pesticide use pattern (mix & spray only)	-	83.5	-	97.4	-	73.9	-	86.9
Pesticide use experience(1-5)	1.8	-	0.71	-	1.1	-	1.2	-
Working status(Full time)	-	55.3	-	90.4	-	58.0	-	70.9

Table 2: Percentage distribution of respondents by awareness of pesticides safety measures

Safety measures	Edo %	Delta %	Ondo %	Pooled %
Buy only required quantity 100, 250,or 1000g/ml for single	91.8	97.4	82.6	91.8
Avoid storage of pesticides in the house	90.6	99.1	89.9	94.0
Don't transfer pesticides to other containers	94.1	98.2	81.2	92.5
Never keep pesticides with food/feeds	94.1	99.1	94.2	96.3
Keep pesticides away from children/livestock	97.6	100.0	94.2	97.8
Never carry/transport pesticides along with food resources	91.8	98.2	92.8	94.8
Avoid carrying pesticides on head, shoulders or the back	94.1	99.1	84.1	93.7
Always protect your nose, eyes, mouth, ears and hands	95.3	99.1	97.1	97.4
Use hand gloves, face mask and head cover	94.1	94.7	92.8	94.0
Read the label on the container before preparing spraying solution	98.8	92.1	89.9	93.7
Prepare spray solution as per requirement	95.3	94.7	88.4	93.3
Don't mix granules with water	89.4	92.1	75.4	86.9
Concentrated pesticides must not fall on any pack on your body	94.1	93.9	92.8	93.7
Don't smell the sprayer tank	96.5	94.7	84.1	92.5
Avoid spilling of pesticide solution while filling the sprayer tank	94.1	96.5	97.1	95.9
Don't eat, drink, smoke or chew while preparing solution	96.5	100.0	94.2	97.4
Don't use leaky, defective equipment	97.6	100.0	97.1	98.5
Don't blow/clean clogged nozzle with mouth	94.1	99.1	97.1	97.0
Apply only at recommended dose and dilution	98.8	93.0	92.8	94.8
Don't apply on hot sunny day or strong windy condition	95.3	93.9	85.5	92.2

Table 3: Tobit regression estimates of socioeconomic determinants of farmers' awareness of pesticide safety measures

Socio-economic characteristics	Coefficient (b)	t value	Marginal effects
Constant	0.869	4.410	
Sex	-0.046	-0.610	-0.040
Age years	-0.009**	-2.400	-0.003
Education	0.014	0.800	0.012
Household size	0.010	0.820	0.010
Farming experience years	0.014**	3.070	0.007
Income (monthly)	-0.044	-1.530	-0.024
Experience with pesticide (years)	0.008	1.60	0.007
Sigma	0.503	18.63	

*LR chi^2 (7) =19.17 **Significant at 1% (critical t=2.33)*
Pseudo R ^{2}= 0.692