

## **Knowlegde, Attitudes and Practices (KAP) of Farmers regarding the use of pesticides: A case study of a cocoa farming community in Southwestern Nigeria**

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### **Abstract**

A questionnaire survey and observation study of 125 cocoa farmers using pesticides in a southwestern Nigerian farming community shows a high risk of exposure to pesticides among the farmers. This was due to low level of knowledge, awareness and practices among the farmers about the use of pesticides. Up to 89% of the farmers had no training in the proper use of pesticides while their main source of information about pesticides was experience gained from parents (63%). None of the farmers wore protective apparels while spraying. As many as 74% neither changed nor washed their work clothes after spraying while 67% reused their empty pesticide containers. Exposure to pesticide was not limited to the farmers alone as some other members of the farming families especially young children were found to be exposed. The pesticides used by the farmers were those containing Aldrin, Gamma BHC (Benzene Hexachloride), Cuprous Oxide, Copper Sulfate and Paraquat dichloride which are hazardous to human and environmental health and have therefore been banned, severely restricted or unregistered in many countries. Appropriate measures to reduce the risk of health hazards faced by farmers exposed to pesticides are recommended.

### **Introduction**

At one time, farmers were thought to have a lower overall mortality than other workers because they were presumed to have a healthier life-style. Numerous studies now suggest that today's farmers could have an increased risk of suffering from a number of diseases which are closely associated with exposures to pesticides (Saflas, et. al.).

Pesticides have been of tremendous benefit to humans and the environment if they are properly used; when used carelessly, pesticides could cause considerable and, in some cases, inestimable harm. Some investigators have reported that agricultural workers have higher death rates from malignant brain tumors (Delzel, 1985); agricultural workers and pesticide applicators also have been shown to have increased risk of testicular cancer (Wiklund, 1986). A study has also revealed that 10 out of 14 Egyptian farmers who between 1980 and 1984 were diagnosed as having hepatic angiosarcoma, had been exposed to organophosphorus, organochlorine, and arsenical pesticides. This relatively rare tumor, about 1% to 3% of all liver tumors, generally has been associated with exposures to arsenic and vinyl chloride pesticide

(Elzayadi, et. al., 1986).

World Health Organization (WHO) estimates that there are as high as 20,000 unintentional deaths a year from pesticides, based on problems related to application (Dinham, 1992). For agricultural workers and rural communities, the consequences of the pesticides treadmill are high indeed. Many farm workers are unable to read pesticide warnings and instructions. Living accommodations for plantation workers are often poor, lacking toilet and washing facilities, and situated close to the field, thereby exposing them to spray drift.

The consequences of pesticide dependence also affect the surrounding environment. In Sudan, for example, the Gezira Cotton Scheme has devastated large areas of the local ecology. Residues from irrigation run into the canals, causing problems for people living alongside, who use them for fishing and drinking water (Dinham, 1992). Pesticide containers are often washed out and re-used by pesticide users and their households.

The increasing use of pesticides in agriculture in the developing countries and the absence of adequate worker education and effective control measures have given rise to a grave concern about the magnitude of the health risk to farm workers exposed to these chemicals. It is suspected that many illnesses and deaths go unrecorded as a result of exposure to pesticides. A preliminary observation of a small number of cocoa farm operations in some plantations along the Owena River at the boundary between Ondo and Osun States revealed an unacceptable pesticide mixing and spraying habits, among farm workers and such observation has prompted this study.

The cocoa plantations that constituted the study area for this work are located at about 10 kilometres South of Owena village (on the Ife-Akure Road) with the farmers residing in seven villages closely surrounded by cocoa plantations. The objective of this study, therefore was to determine the knowledge, attitude and practices (KAP) of the cocoa farmers and other farm workers regarding the use of pesticides.

#### **Materials and methods**

The study was carried out between June and August 1993 in three of the seven farming villages which include Sokoto Ogundele, Sokoto Ajebandele, S.B. Ojo, Odunwo, Orita, Olorunsogo and Demule located in this order in the study area. The three villages included in the study were Sokoto Ogundele (1st village), Odunwo (4th village) and Demule (7th village).

Questionnaire survey to determine Knowledge, Awareness and Practice (KAP) of the farmers about the use of pesticides was designed in accordance to a standard protocol (WHO 1982) with a slight modification. The questionnaires were administered on all the 125 farmers in the three villages by specially trained interviewers who were residents of the villages. Observation study was also carried out to note farm operations with specific attention to those habits related to mixing and spraying of pesticides as well as to any other habits associated with exposure to pesticides. The administration of questionnaire survey and observation schedule were preceded by meetings with head (Baale) and representatives of each of the villages to explain the rationale of the study and to solicit their cooperation and responsiveness.

Information sought in the administered questionnaires were those relating to demographic characteristics of farmers and others involved in farm works; level of education of farmers; types of crops cultivated; types of pesticide used; sources of information about pesticides; training in the proper use of pesticides; need for protective clothing while spraying; bathing and washing of clothes after spraying; storage of pesticides and disposal of empty containers; status of pesticides in relation to health; and feeling of unusual symptoms after spraying pesticides.

As to the observation study, 32 farmers were randomly selected for observation during pesticide application in their cocoa plantations. The farmers were observed for activities associated with exposure to pesticides. These include mixing and spraying of pesticides; clothes worn while mixing and spraying pesticides; smoking and eating while spraying pesticides. They were also observed for storage of pesticides, disposal of empty containers and management of clothes used for spraying.

## Results

Of the 105 households in the three villages, 81 (77.1%) agreed to participate in the study. There were a total of 125 farmers from the 81 households. All of them were Yorubas.

All the 125 farmers were males who cultivated cocoa as their major farm crops. Other crops cultivated were oil palm, kola, citrus, plantain and banana which were found in smaller numbers inside the cocoa plantations. There were also spotty areas occupied by cassava, yams, and koko yams. Eleven (8.8%) of the farmers have worked on cocoa plantations for over 40 years.

About 85% of the farmers were between 40 and 59 years old and above (Table 1). In all, 872 people (males and females) were involved in cocoa farm works including those activities that brought them in contact with pesticides as at the time of the study. They included the farmers who owned the cocoa plantations, their wives, children, other relations and hired labourers. Of this number, as high as 503 (57.7%) were under 20 years of age (Table 2). These were mostly school children who gave help to their parents on weekends, holidays and some evenings on week days after school hours as their schools and residences were within the villages at locations close to the plantations.

**Table 1: AGE GROUP OF FARMERS**

Age Group (Years)	No.	Percentage
20	2	1.6
29 - 29	5	4.0
30 - 39	12	9.6
40 - 49	45	36.0
50 - 59	40	32.0
59+	21	16.8
<b>Total</b>	<b>125</b>	<b>100.0</b>

**Table 2: AGE GROUP OF FAMILY MEMBERS\* AND LABOURERS INVOLVED IN FARM WORKS**

Age group (Years)	No.	Percentage
20	503	57.7
20 - 29	99	11.4
30 - 39	131	15.0
40 - 49	42	4.8
50 - 59	71	8.1
59+	26	3.0
<b>Total</b>	<b>872</b>	<b>100.0</b>

*\*Farmers owning plantations inclusive*

Majority (56%) of the farmers had no formal education. There were 38% having primary education, while 5% had secondary education and 1% had post-secondary education. It is of a note that over half of those who claimed to have primary education could not read the instructions on pesticide packages which were written in Yoruba and English languages.

The pesticides used by farmers were very toxic. They generally used the same types of pesticides which included Gammalin 20 (Benzene Hexachloride, BHC), Aldrex 40 (Aldrin), Peronox (Cuprous Oxide), Caocobre Sandoz (Cuprous Oxide) and Copper sulphate. While the first four pesticides were packaged in either plastic or metal containers with instructions to their use written on them in both English and Yoruba languages, copper sulphate was packaged in bags with no instruction or any other useful information written on the bags. Another chemical used by a few of the farmers was gramoxone (Paraquat dichloride) for control of weeds. The instruction for use of this pesticide was written only in English language which the farmers could not read and understand. It is well documented that the five pesticides being used by the farmers belong to various categories of hazardous pesticides (Table 3).

**Table 3: CLASSIFICATION BY HAZARD OF PESTICIDES USED BY THE FARMERS ACCORDING TO WHO LISTING.**

Pesticide (Common Name)	Trade Name	Classification
Aldrin	Aldrex 40	Class IB "HIGHLY HAZARDOUS"
Gamma BHC (Benzene Hexachloride)	Gammalin 20	Class II "MODERATELY HAZARDOUS"
Cuprous Oxide	Peronox Caocobre Sandoz)	Class II "MODERATELY HAZARDOUS"
Copper Sulfate	Copper Sulfate	Class II "MODERATELY HAZARDOUS"
Paraquat	Gramoxone	Class II "MODERATELY HAZARDOUS"

*Source: UNEP/ILO/WHO (1992). The WHO recommended Classification of pesticides by hazard and guidelines to classification 1992-1993 WHO/PCS/92 14. Geneva, Switzerland.*

Answers to questions on knowledge, attitudes and beliefs of the farmers about pesticides are shown in Table 4. Knowledge about the choice and use of pesticides was gained mostly from personal experience (63%) which the majority of the farmers claimed to have acquired from parents or relatives. Other sources of information about pesticides were government agents (15%), sales agents (22%), cocoa merchants (31%) and other farmers (17%).

As high in number as 89% of the farmers had no proper training in the use of pesticides. Even the 11% that claimed to have training were unable to produce convincing evidence for such claim.

Despite the fact that 63% of the respondents were aware that pesticides are dangerous to health and that 31% had actually had unusual symptoms after spraying, as much as 71% of the farmers were in the habit of eating while spraying. Answers to questions relating to exposure to pesticides and personal observation of the cocoa farm workers at work revealed a high risk to their health. Only 28% of the respondents believed farmers should wear protective apparel while 18% claimed to be wearing protective clothing while spraying. However, result from observation was contrary to this claim in that none of the observed 32 farmers wore protective clothing while mixing or spraying. Only 1 (3%) was seen wearing boots while some wore uncovered shoes (made from worn out tyres) and about 43% were barefooted. No farmer wore gloves. Faces, legs and arms were the parts of the body mostly exposed during spraying.

**Table 4: KNOWLEDGE, ATTITUDES AND BELIEFS OF FARMERS ABOUT PESTICIDES**

Question	Response	(%)
Source of information about pesticide (some respondents indicated more than one sources)	Government Agent	15%
	Pesticide Sales Agents	22%
	Cocoa Merchants	31%
	Other farmers	17%
	Experience	63%
Are pesticides dangerous to health ?	Yes	63%
	No	14%
	Don't know	23%
Should farmers wear protective clothing?	Yes	28%
	No	47%
	Don't know	25%
How do you dispose of empty containers?	Throw away	2%
	Wash for re-use	67%
	Sell to buyers	21%

Almost all the farmers wore their usual clothes most of which were ragged according to our observation during spraying activities. Contrary to the claim of 74% of the farmers that they changed or washed their clothes immediately after spraying, our observation indicated that only 22% of the observed group actually changed their clothes after spraying. Some of them were seen wearing contaminated clothes days

after spraying and such clothes were washed with the family clothes. Bathing was not done immediately after spraying by majority of farmers. Washing of faces, hands and legs, often without soap after handling pesticides were common among the farmers.

Pesticides were stored indiscriminately in the farms or homes (under tables and in the corners in sitting rooms and under beds in sleeping rooms). Empty containers were often washed and re-used. Some were used for storing palm oil while children were observed playing with those thrown around as toys. Copper Sulphate bags were also washed and re-used for storing various food items such as gari, beans, maize, etc.

Spraying equipment were not regularly serviced and often delivered a high dose or completely blocked at times. Four farmers were observed blowing the spraying gun with mouth in attempts to dislodge the objects causing the blockade.

### Discussion

Results from this study has revealed that the farm workers were seriously exposed to pesticides. This can be associated with the low level of knowledge, awareness and practice among the farmers. A similar finding was observed among farm workers using pesticides in the Jordan Valley of the West Bank (Sansur, 1993).

While it is expected that users of pesticides should be conversant with the information guiding the use of the chemicals, only a very few farmers in this study were literate enough to read and understand the information on packaged pesticides. The low level of knowledge arising from their lack of formal education must have contributed immensely to their low level of awareness and their unsafe use of pesticides in their cocoa farm works. About 25% of the farmers did not know that pesticide is harmful while 14% believed it is not harmful to health.

Most farmers (63%) relied more on experience acquired from parents for information about pesticides. Other sources such as cocoa merchants and pesticide sales agents could have been much more concerned with making money from their sales and less concerned with the use or the effects arising from the use of pesticides on human health. This is certainly an evidence of lack of organized forum to impact the knowledge about pesticide procurement which should have been closely associated with the safe use.

Without doubt, the farmers' exposure (some of them for over 40 years) to pesticides must have caused them some health hazards which the study could not cover. The long term effects of pesticides have been well observed in some countries. In a number of studies, diseases such as brain tumors, testicular cancer and liver cancer have been found to be prevalent among farmers using pesticides (Delzell, 1985; Wiklund, 1986 and Elzayadi, et. al. 1986).

The pesticide use habits of the farmers were particularly deplorable as they left most parts of their bodies exposed to contamination while mixing or spraying pesticides. Apart from the fact that none of the farmers used protective clothing, wearing of boots and hand gloves were found to be unnecessary to them. Another deplorable habit was the eating among farmers while spraying, an act that could result to food contamination and health risk to farmers.

The use of clothes worn while spraying days after working on farms or washing such contaminated clothes with family clothes, as it was commonly practised among the farming population, would definitely encourage a long term exposure to pesticide and spread of contamination within the families. So also is the hazard from the reuse of pesticide containers by the farming families and the access of containers to children who played with them as toys.

The five pesticides being used by the farmers during this study are classified either as "Highly Hazardous" or "Moderately Hazardous" (UNEP/ILO/WHO, 1992). In fact, Aldrex (Aldrin), Gammalin (BHC) and Gramoxone (Paraquat) belong to a group of pesticides popularly listed as the "Dirty Dozen" (PAN, 1993). In a chart titled "Denise of the Dirty Dozen"; these pesticides, among others on the list, are shown to have been banned, severely restricted or unregistered in 78 countries in view of their known hazards to human and environmental health.

The Dirty Dozen list was compiled based on criteria that included: hazard to human and environmental health, evidence of wide spread use and resulting harm, bans in exporting countries and their value as examples of problems caused by pesticides dependence. Despite the fact that the Dirty Dozen pesticides are banned, severely restricted or unregistered in many countries and despite their having been listed as hazardous by the World Health Organisation, many of them are still widely promoted and used especially in developing countries, where weak controls and dangerous work conditions make their impact even more devastating.

It is doubtful if the Federal Government has strict control over formulation, importation, sales and use of pesticides in Nigeria. Apart from its hazardous status, one of the pesticides (Copper Sulfate) used by the farmers did not carry any information on the package and it is sold in every nook and corner in any town where cocoa is cultivated. This is an evidence that the government shows little or no concern about its use and consequently, the health of the users. If anything at all, such product ought not to be in the market. According to the Food and Agriculture Organization (FAO) International Code of Conduct and the International Group of National Associations of Agrochemical Products (GIFAP), all pesticides must carry labels and information in the language of end users.

In conclusion, evidence from this study has shown that cocoa farmers are seriously exposed to pesticides, an act which could constitute health hazards to the farmers. This has prevailed as a result of their low levels of knowledge, awareness and practice about the use of pesticides. Therefore, there is the need for measures to ameliorate this situation to minimize the health hazards being posed to this occupational group whose contributions to the nation's economy are so enormous.

### **Recommendations**

- (1) Government should urge the Federal Environmental Protection Agency (FEPA) to intensify its efforts at pesticide registration and control with a view to categorizing them according to their safety status. In this way, those pesticides that deserve to be banned or restricted should be so categorized and made known to the public.

- (2) Appropriate Federal and State government regulatory agencies should endeavour to safeguard human and environmental health especially the health of agricultural workers who may be exposed to pesticides.
- (3) Government should enforce the inscription of adequate information on packages of all pesticides. Such information which must be written in the language of the users should include adequate precautionary measures about safe handling of pesticides.
- (4) There is need for farmer education which should include knowledge about the proper choice of pesticides, safety precaution about pesticide use, and awareness about the long-term effects on users.

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