



AFRICA
STOCKPILES PROGRAMME



Strategic Assessment of the Status of POPs Pesticides Trading in South Western Nigeria

By

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EXECUTIVE SUMMARY

Despite the ban on certain categories of Persistent Organic Pollutants (POPs), these substances are still common in the markets, utilized in various locations in the society and are considered potential threats to the environment and health of the population. The broad objective of this study was to assess factors contributing to the build up of pesticide stockpiles; their distribution and consumption pattern and to identify strategies for their effective control and management.

The study was a descriptive cross sectional survey which involved the utilization of questionnaires, observation checklist and indepth interviews. The pilot phase of the study focused on four out of the five South Western States in Nigeria namely Lagos, Ogun, Ondo and Oyo States. A total of 827 questionnaires were administered in the four study areas as follows: Lagos (110), Ogun (75), Ondo (500) and Oyo (142). The questionnaire sought information from respondents (individual and corporate) on awareness regarding POPs Pesticides, sources of POPs pesticides, trading and use pattern, health and environmental impact, existing regulatory policies and control measures, and level of adoption of alternatives to POPs pesticides. Five structured questionnaire types were designed to elicit information from the five main identified classes of respondents viz: General public, Importers, Distributors/Retailers, Users and Regulators as it relates to POPs issues. Interviews were carried out by means of consultations with different units in relevant ministries such as the Ministry of Environment, Ministry of Health, Ministry of Agriculture, Ministry of Forestry, Ministry of Commerce and Industry, Universities/Research Institutions, Farmers groups and the Nigerian Custom Service, among other relevant organizations. Visits were scheduled to border posts, agrochemical dealers/marketers shops, sawmills and agricultural farms for physical inspections using the observation checklist designed for assessing POP Pesticides trading. Questionnaire informations were entered into computer and data analysed using descriptive statistics. Results were presented in simple frequencies and percentages. In some cases results were presented graphically to illustrate some significant outcomes.

Results of the investigations show that socio-demographically most of the respondents were male. For instance 75% of the respondents were male and 25% female at Ogun State. This was reflected in the fact that most of the farmers, distributors and heads of regulatory agencies were males. In another distribution 71.47% of users of POPs pesticides in Ondo State were farmers and majority of these farmers (58.20%) had no formal education. This accounted for the low knowledge level experienced among these target groups across all the study locations. In Oyo State among the retailers, majority (90%) were males mostly between the ages of 31-40yrs (60%), 90% had secondary education and all were traders engaged in selling mixed pesticides. In terms of knowledge, attitude and practices, awareness and knowledge level was higher among the regulators compared to the other classes of respondents. Again, awareness level was low among the users because the substances were identified using their technical names. Out of the total number of respondents in Ogun State, only 32% heard about POPs pesticides (as chemicals used for crop protection and pest destruction), while 68%

claimed ignorance of the substances. According to the general public in Oyo study area POPs pesticides were mostly used for vector (26%) and insects (18%) controls. Majority (70%) indicated that POPs pesticides are not produced in Nigeria and they were aware that the accumulation of POPs pesticides affected environment and health. Also 82% were aware of illegal trading on POPs pesticides and that the people mostly involved were at the sea port. Majority (86%) of the respondents kept these products in the store (farm store, farm house, hamlets, shop) and according to 54% of the respondents these chemicals lasted for 12 months in the store. About 60% indicated they use it yearly, and about the same percentage indicated they were aware accumulation of POPs pesticides could affect the environment and health.

In Lagos, large numbers of POPs pesticides that are in use are mostly limited to Gamalin 20, because it is not an agrarian State. Most of them are imported via the illegal route through the land border at Seme where small quantities at a time are regularly smuggled into the country and others are formulated locally, usually small-scaled and limited to formulation of rat poisons. Of all the various kinds of POPs pesticides, Gamalin 20 is the most popular. In Ogun Study area the pesticide traders claimed to get supply from importers in Lagos and at times from Ogunpa market in Ibadan. Common types of POPs pesticides identified in the state include Gammalin 20 (used for protecting kola nut from pest, fishing and also used for formulating local insecticides and rodenticides), Lindane (used for Cocoa protection) and Grammassonne. Common types of locally formulated insecticides mostly used by household are 'ota pia pia' and G.O 90. In Ondo state they include: DDT, DD-force, Weed-Off, Round-up, Termicot, Atrazin, Glyphosphate, Metaclors-plus, Alaclhlor 2-4 Amcine, Paraquent, C-methrine, Monochloro phous, Lindane (Gammalin 20 - the genuine and the fake ones), Thionex 35, aldrin, Toxaphere, Uden 20, Best, Kokotin, Nitrogram, Neopybrutin.

The study found that in Lagos study area, among distributors/retailers, the big dealers had their offices and warehouses while the small ones conducted their trade in the open market and makeshift sheds near their patronizers. There was no information on these category of target group from Ogun State. However, in Ondo most of the retailers of Agro-chemical supply were based in Akure the State capital and some other towns where tree cash-crops farming are well established in order to meet the needs of the farmers at close range. In Oyo Study area, majorities (70%) of the retailers were not involved in the importation of the POPs pesticides, and as such these substances were sold or distributed at the general market. As for the users, results indicated that of the number of people interviewed in this category at the Lagos study area eighteen (18) 51% were saw millers and furniture makers while seventeen (17) 49% were farmers and other small scale users. In Oyo State, Majority (86%) of the users who were mostly farmers declined knowledge about what POPs pesticides were. They reported (46%) receiving information on them mainly from Oyo-state Agricultural Development Programme (OYSADEP).

The current survey did not indicate any empirical evidence on the environmental and health impact of POPs pesticides for instance in Lagos State. This is not to say that such impacts do not exist. However, the study revealed that containers of used pesticides and insecticides were

being used by the local people to store consumable products like water, palm oil and vegetable oil. At Oyo study area about 70% of the general public indicated pesticides stockpiling impact on the environment, namely the soil, water, air, and food chain and the same proportion of people indicated that they experienced irritation whenever they applied insecticides spray in their living room. In terms of enforcement it was discovered that access to information about POPs pesticides from regulatory agencies like NAFDAC was limited especially in Lagos. Level of awareness to the issue varied from group to group across the different study locations and there was generally a low sense of commitment to enforcement.

The conclusions arising from this study are as follows:

1. The low level of awareness and knowledge about POPs pesticides especially among the general public in all the four study areas viz: Lagos, Ogun, Ondo and Oyo was apparently because these substances were presented and identified by their technical terms other than the popular trade names.
2. That knowledge level was particularly higher among the users was because of the existence of cooperative groups and some form of media activities in locations like Ondo. Also among the importers, distributors and regulators viz: ministry officials and NAFDAC, awareness was relatively high. However, among the law enforcement agents at the border awareness was low.
3. The apparent increase in the knowledge and awareness level among the regulators was because of their comparatively higher educational background compared to the rest of the target groups. This was found to be unconnected with their claims of obtaining information from office, schools and from publications. Among the regulators all indicated they knew what POPs pesticides are, and that the types used were – DDT, Benzofuran, Lindane, gammalin 20, aldrex 7, otapiapia, and organic pesticides.
4. The survey revealed that POPs pesticides were imported mostly through illegal channels from Asian countries like China and India with most of the importers based in Lagos and Oyo states respectively. Although not much of importation through the Lagos ports is known. There were hardly any importers from Ondo and Ogun states.
5. Illegal trafficking of POPs pesticides were found to occur mostly in the border towns of Lagos and Ogun States which borders Nigeria’s West African coast. This was largely associated with the low level of awareness on the part of the law enforcement agents at the border coupled with their non challant attitude with respect to POPs pesticides.
6. A large number of POPs pesticides were found to be present in the Lagos area and most of them through illegal routes. Those imported include cypermethrin, dichlovus, gammalin 20, gammalin super, lindane, capsitox 20, herbicides, insecticide, fungicides while others such as ota pia pia and G.O 90 are formulated locally using Gamalin 20. Some of these were mainly hawked on the streets by pesticide vendors.

7. Lack of compliance with dose specifications and the use of protective clothings or safety wears during chemical application by farmers were considered poor practices that could pose serious hazards to most of the POPs pesticides users
8. Most users of POPs pesticides were reported as keeping their products in the store (farm store, farm house, hamlets, shop) with these chemicals usually lasting for a period of about 12 months in the store. Nevertheless, the stockpiling of POPs pesticides and their obsolescence was found to arise from the careless storage of the substances in different dwelling places viz: under the bed, roofs/ceiling until they became expired.
9. Even though data seems to be scanty or non-existent it was obvious that there were bound to be some toxicological implications on users and the field crops associated with the application of expired POPs pesticides.
10. Although there was a ban on some of the POPs pesticides such as Gammalin 20, Lindane, DDT and heptachlor from entering Nigeria. It was glaring that people still traded illegally on these substances. The illegal importers and traders were mostly engaged in this business at the local markets or hide outs.
11. Even though there were sanctions (against illegal dealers on POPs pesticides) such as confiscation, payment of administrative fine, apprehension and jail sentence, there were still some ominous drawbacks and limitations such as the lack of enforcement of these sanctions and the clandestine smuggling activities that occur at the borders.
12. Improper disposal of the expired products by burial and uncontrolled incineration as reported in some of the locations was a serious threat to the quality of environment especially to the atmospheric, aquatic and terrestrial ecosystems and this has potential impacts on the food chain with corresponding implications on public health.
13. There was an increasing low knowledge level among members of the public including POPs pesticide users on the health risks associated with exposure to these substances going by the report of people storing consumable products like water, palm oil and vegetable oil in evacuated pesticide containers.
14. Records of environmental impacts and health hazards associated with POPs pesticide use in the study communities were lacking although most members of the public reported experiencing some level of irritation whenever they applied insecticides spray in their living quarters.
15. There are problems among the various federal government ministries sharing responsibilities for the control and management of chemicals. The jurisdictional conflict and lack of coordination among the different ministries in charge of chemical management and

across different levels of government have adversely affected the efficient management of chemicals in Nigeria.

Given the study outcome and the conclusions therein the following recommendations are therefore proffered:

1. There is need to carry out a comprehensive awareness campaign using all forms of communication channels especially the media and schools on the sources, trade local names, uses and management of POPs pesticides
2. There is need to sensitize, educate and empower the law enforcement agents operating at Nigeria's International borders on POPs pesticide policy, trade and management issues to forestall smuggling.
3. Efforts should be made to improve surveillance and censoring of chemical products at the border post particularly as well as the Lagos Ports where there is likelihood of the POPs pesticides importation to circumvent flooding the market with the banned items
4. The regulatory agencies particularly NAFDAC and the Federal Ministry of Environment should penalize illegal formulation plants especially those producing derivatives of Gammalin 20
5. Regulatory agencies should review licencies of POPs pesticide importers regularly and increase the frequency of inspection of their ware houses as well as the shops of the distributors and retailers
6. There is need to have regional centres for periodic censoring, screening and testing of POPs pesticides to ensure compliance with potency and validity parameters
7. All users of POPs pesticides should be educated on practices associated with safe storage, handling, application and disposal of the substances.
8. A thorough inventory of all locations where POPs pesticides are used is required to ascertain the status of POPs pesticides stock, use and management pattern
9. There is need to carry out an assessment of the extent of pesticide contamination of the various environmental media and possible food matrices especially in locations where these substances are highly utilized
10. There is a need to conduct a health risk assessment (using appropriate biomarkers) among populations located within the vicinity of pesticide applications to ascertain the level of health hazards.
11. There is need for routine monitoring of the activities of POPs pesticide users to ensure compliance with guidelines
12. Proper record keeping and documentation by all stakeholders is highly imperative to ensure good feed-back mechanisms for planning, management and enforcement
13. There is need to optimally explore other non POPs pesticide options for instance use of Integrated Vector Management (IVM) and Integrated Pest Management (IPM) approach.

LIST OF ABBREVIATIONS AND ACRONYMS

AGROMAN	-	Agrochemicals Sector of Manufacturers Association of Nigeria
ALFAN	-	All Farmers Association of Nigeria
ASP	-	African Stockpiles Programme
CPP	-	Crop Protection Products
FAO	-	Food and Agriculture Organization
FEPA	-	Federal Environmental Protection Agency
HCB	-	Hexachlorobenzene
HCH	-	Hexachlorocyclohexane (Lindane)
IPEP	-	International POPs Elimination Project
IPM	-	Integrated Pest Management
IVM	-	Integrated Vector Management
LDPE	-	Low Density Polyethylene
MAN	-	Manufacturers Association of Nigeria
Nigeria-ASP	-	Nigeria-Africa Stockpiles Programme
Nigeria-ASPSC-	-	Nigeria-Africa Stockpiles Programme Steering Committee
NGOs	-	Non-Governmental Organizations
PAN	-	Pesticide Action Network
PCBs	-	Polychlorinated biphenyls
PCDD	-	Polychlorinated dibenzo-para-dioxin
PCDF	-	Polychlorinated dibenzofuran
PECAN	-	Pest Control Association of Nigeria
PHCN	-	Power Holding Company of Nigeria (formerly called NEPA)
PIC	-	Prior Informed Consent
POPs	-	Persistent Organic Pollutants
PPP	-	Polluter Pay Principle
PTS	-	Persistent Toxic Substances
PVA	-	Polyvinyl amine and amides
PVC	-	Polyvinyl Chloride
UNEP	-	United Nations Environment Programme
UNIDO	-	United Nations Industrial Development Organization
WWF	-	World-Wide Fund for Nature
ADI	-	Acceptable Daily Intake
ADP	-	Agricultural Development Project
CBOs	-	Community Based Organizations
CHCs	-	Chlorinated Hydrocarbons
DDT	-	Dichloro disphenyll trichloroethane
ECE	-	Economic Commission for Europe
FAO	-	Food and Agricultural Organization
FME _{env}	-	Federal Ministry of Environment
GEF	-	Global Environmental Facility.
I-TEF	-	International Toxicity Equivalency Factor

LC ₅₀	-	Median Lethal Concentration
LD ₅₀	-	Median Lethal Dose
MRL	-	Maximum Residue Limit
NAFDAC	-	National Agency for Food, Drugs, Administration and control
PAN	-	Pesticides Action Network
PCB	-	Poly Chlorinated bi phenyls
PLA	-	Participatory Learning Action
PRA	-	Participatory Rural Action
WHO	-	World Health Organisation

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SECTION ONE

1.0 INTRODUCTION

Globally the world is facing many environmental problems. These problems include deforestation, desertification, soil erosion, oil pollution, water pollution, biodiversity losses, coastal erosion, floods, urban decay and industrial pollution, and recently the surge and threat of illegal shipment of hazardous and toxic waste, toxic chemicals [pesticides] and contraband chlorofluorohydrocarbons.

With the strong and active environmental awareness and pressure groups in industrialized countries, the hazardous waste from industrial processes in these countries were awaiting disposal elsewhere. The toxic chemicals [pesticides] and contraband chlorofluorohydrocarbons which have been banned in these countries are finding their way illegally into developing countries, Nigeria inclusive. Nigeria, like other developing countries, is facing continuous threats of illegal traffic and trade of hazardous wastes, toxic chemicals [Pesticides], and contraband chlorofluorohydrocarbons, in spite of the stringent laws enacted after Nigeria's first experience of hazardous wastes dumping in 1988. The reasons advanced for this trend in Nigeria are: the down turn in the economy, which is compelling industrialists to seek for cheap secondary raw materials and goods; poor awareness of existing enforcement agencies and bottle necks in the enforcement of the regulations; and porous borders.

POPs are not manufactured in Nigeria but imported mostly from developed countries such as France, United Kingdom and Japan. Formulation plants for POPs pesticides, owned by multinational companies, which existed in Lagos, Kaduna and Port Harcourt, were shut down in the late 1980s and early 1990s. The Federal Environmental Protection Agency Regulations in 1990 banned the importation of POPs pesticides in response to international concern about POPs and their effects.

POPs pesticides are still available today for sale in the informal market "under cover". The Nigerian Federal Ministry of Health indicated that aldrin, dieldrin, chlordane, DDT and endrin are POPs pesticides used for control of arthropods of medical and veterinary importance and their use was stopped in 2002. The use of DDT continues on a continual basis for malaria control on as a need basis. Data is generally lacking on POPs imports and consumption.

Over 95% of all pesticides are imported as finished pre-packed products. Pesticides use in Nigeria includes certain chemicals that for environmental reason have been partially or completely banned in developed countries. However such chemicals continue to find their way into Nigeria for pest control mainly through illegal traffic.

The most commonly used pesticide is Lindane (Gamma BHC) on Kola-nuts (*cola nitida*) for protection against kola-nut weevils (*Balanogastriis Kola*). It is also widely used by fishermen to kill fish for commercial purposes in Nigeria. Fenthion (an insecticide) is an effective avicide

and is used mostly in northern part of Nigeria against bird pest. DDT and Gammalin-20 a rodenticide that has been outlawed but they are still illegally used in some parts of Nigeria.

A number of these POPs i.e. *Aldrin, Dieldrin, DDT, Chlordane, Toxaphene* and *Heptachlor*, are still being widely used by the rural populace for eradivative and non-eradivative treatment of timber, pre-planting treatment of seeds and treatment of wooden rafters against termite attack in homes, offices, and industry. Aldrin dust was also found to be used for treatment of yam seedlings against yam beetle attack.

There is heavy pollution nationwide across the different environmental media even though Nigeria has authorities and programmes geared towards sound chemical pesticides management. Pesticide poisoning continues to be a severe environmental and health problem in Nigeria. Some researches have indicated that poor farmers and farm workers have continued to suffer from pesticide poisoning each year.

1.1 Study Rationale and Justification

Chemical pesticides have contributed to the protection of crop, human, and animal health for over a half century. However, management of pesticides in developing countries is often inadequate due to lack of available resources. Many African and other developing countries suffer from weak import controls, lack of training on appropriate pesticide use, inappropriate donations and aggressive sales practices, poor storage and stock management, pressure to stockpile for unforeseen emergencies, and a lack of safe destruction technologies. Despite the committed efforts of the Food and Agriculture Organisation (FAO) and others to address this problem over the past 10 years, obsolete pesticides continue to accumulate.

The continuous accumulation of the pesticide has grave implications. The factors behind this accumulation include: poor import controls; inappropriate procurement and central purchasing policies; untimely distribution; inadequate stock management; aggressive sales practices; pressure to stockpile for unforeseen emergencies; lack of coordination between donor agencies; receipt of products that are outdated or mislabelled (or labelled in the wrong language).

The challenges facing the country in dealing with the adverse effects associated with exposure to POPs include: (i) Need to carry out a comprehensive inventory of existing POP pesticide stocks in the country (ii) Need to overcome the financial constraints facing local research on evaluation of POPs (iii) Need to improve existing legal instruments and implementation strategies for the monitoring and control of POPs in particular (iv) Need to maintain a dependable, well-informed and coordinated field force for pesticides application (v) Need to train and ensure competence of other Security Agencies that regulate imports in order to strengthen their capability (vi) National regional training for effective implementation of POPs candidates (vii) Need to increase/improve public education and awareness of the hazards

associated with POPs exposure at the grassroots (viii) Need to dispose of existing PCB waste stocks

Despite the functioning of a legal framework coupled with stringent penalties, the prevailing situation indicates the lowest level of compliance by most importers/retailers. Non-compliance has been acknowledged and documented by regulatory authorities. Effective border controls at all major entry points is lacking rendering them very porous for illegal importation of goods and services especially banned chemical substances.

In Nigeria today, POPs currently allowed for importation under severe restrictions are the PCBs and Hexachlorobenzene. There has been however a national trend towards the phase out of all POPs since the year 2000. In spite of these control actions however, POPs pesticides are still in wide use in Nigeria in the agricultural, trading and public health sectors especially among subsistence farmers and the rural populace.

Infringements include the presence of unregistered, unlabelled, repackaged, decanted and expired pesticides into the market. Despite inspectors having well defined roles and powers, enforcement has been grossly ineffective due to inadequate resourcing.

Apart from the health and the environmental impact, government is losing revenue through illegal importation and evading taxes. High fees paid by importers are likely reasons for illegal importation. This includes fees required for issuance of importation permit, analytical fees, pre-shipment inspection fees and others.

In view of this scenario the aim of this study was to assess the status of POPs pesticides trading, consumption pattern and management mechanisms/strategies that is in place with a view to appraising ASP implementation in Nigeria.

1.2 Broad Objective of the Study

The broad objective of this study was to determine factors contributing to the build up of POPs pesticide stockpiles and to identify suitable prevention, control and management strategies.

1.3 Specific Objectives of the Study

The specific objectives of the study are to:

- assess the status, scale of availability and use of POPs pesticides and where possible identify wholesalers and retailers involved in trading these pesticides (*Particularly DDT, aldrin, and lindane including Gammalin 20*).
- identify whether banned or restricted pesticides are available in the selected locations of the study area in South Western Nigeria
- identify the impact of illegal pesticides trading and the state of enforcement of regulation on the build up of obsolete pesticide stockpiles in the study area

- identify gaps/loopholes and weaknesses in the government's strategy to register, manage and monitor pesticides by a cradle-to-grave approach in the study area
- generate sufficient knowledge-based information and create awareness on the socio-economic, environmental and health impact of continuous illegal trading on pesticides among stakeholders in the study area
- document all relevant baseline information on POPs pesticides from the selected South Western States in Nigeria to be used for an indepth national study

SECTION TWO

2.0 BACKGROUND INFORMATION

2.1 Relevant Global Conventions

Global concerns about the challenges posed by chemicals management has resulted in numerous international agreements, protocols, conventions, and activities all geared towards minimizing the adverse effects of these chemicals on human health and the environment.

2.1.1 The Stockholm Convention on Persistent Organic Pollutants

The Stockholm Convention establishes measures for the control and elimination of twelve Persistent Organic Pollutants (POPs) known as the dirty dozen(see Table 1.0): eight of them are pesticides (Aldrin, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Mirex and Toxaphene), and the others include industrial products referred to as polychlorinated biphenyls or PCBs (insulating oils used primarily in the electrical industry) and substances, particularly Dioxins and Furans, that are unintentionally produced during combustion and the manufacture of chemical compounds containing primarily chlorine. The Stockholm Convention was signed in Stockholm, Sweden on May 23, 2001 and became legally binding for signatory countries, on May 17, 2004. Nigeria signed the Stockholm Convention in May 2001 and ratified it in May 2004.

Table 1: The Dirty Dozen (12 POPs Chemicals)

Chemical	Pesticides	Industrial Chemicals	By-products
Aldrin	+		
Chlordane	+		
DDT	+		
Dieldrin	+		
Endrin	+		
Heptachlor	+		
Mirex	+		
Toxaphene	+		
HCB	+	+	

PCB		+	
Chlorinated Dioxins			+
Chlorinated Furans			+

The Stockholm Convention aims at protecting human health and the environment from POPs by:

- Getting rid of existing POPs through
 - Disposing of stocks of obsolete and unwanted POPs
 - Identifying equipment containing PCBs and managing it properly
 - disposing of PCBs stocks in an environmentally sound manner
 - identifying and testing alternatives to POPs
- Avoiding further production and use of POPs through
 - Finding and using alternatives
 - Stopping or restricting further production and use
 - Identifying chemicals with POPs characteristics and avoiding new POPs
 - Limiting DDT use to decrease vector control.
- By minimizing emission of POPs that can be eliminated through
 - Identifying sources and reducing releases of unintentionally produced POPs
 - Promote measures, including Best Available Technique (BAT) and Best Environmental Practice (BEP).
 - Continuing minimization and where feasible, ultimate elimination of the total release of dioxins, furans and PCBs.

2.1.2 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, and Related Protocol

The Basel convention was adopted in 1989 and came into force in 1992 in response to the global annual production of millions of tonnes of waste materials that are hazardous to the human health and the environment and the consequent need for international action to address the transboundary movement of such wastes and ensure their Environmentally Sound Management (ESM) and disposal. A central goal of the Convention is the ESM, which aims to protect human health and the environment by minimizing hazardous waste production whenever possible. Nigeria is a signatory to the convention.

2.1.3 The Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

The Rotterdam Convention was adopted in 1998 and became legally binding in 2004. The prime objective of this convention is to protect human health and the environment from specified hazardous chemicals by promoting shared responsibility and cooperation among

Parties in respect to their international trade and environmentally sound use. This is to be achieved by sharing relevant information and providing an agreed process for making national decisions on the import and export of these chemicals and for distribution of such decisions to Parties. The result is that Parties will not be able to export the 22 pesticides and 5 industrial chemicals currently specified in the convention without the prior informed consent of the importing party.

2.2 The International Code of Conduct on the Distribution and Use of Pesticides

The objectives of this code are to establish voluntary standards of conduct for all public and private entities engaged in or associated with the distribution and use of pesticides, particularly where there is inadequate or national legislation to regulate pesticides.¹

2.3 Origin of POPs Pesticides in Africa

Before the mid-twentieth century, pollutants with these harmful characteristics were virtually non-existent. Their origin and actual production is traced to after the World War II. This era witnessed increased production of chemicals and their by-products. POPs defy natural boundaries and when released in one part of the world can travel to remote areas (regions) far from the source.

Most, if not all, of the nine pesticides in question are still in use or existing in many countries. However, the actual quantity that specific countries may be currently using is unknown. There are no central registers of individual country use, although some organizations, like the FAO, United Nations Economic Commission for Europe, and the World Bank have begun to assemble aggregate use data.

The main categories of sources identified in the African region were production and imports, use of POPs pesticides, issue of stocks of and reservoirs of obsolete, discarded and banned PTS/POPs pesticides and PCBs (120,000 MT FAO Estimate) industrial sources (manufacture, mining and electricity), PCBs and dioxins/furans from open/uncontrolled burning of waste².

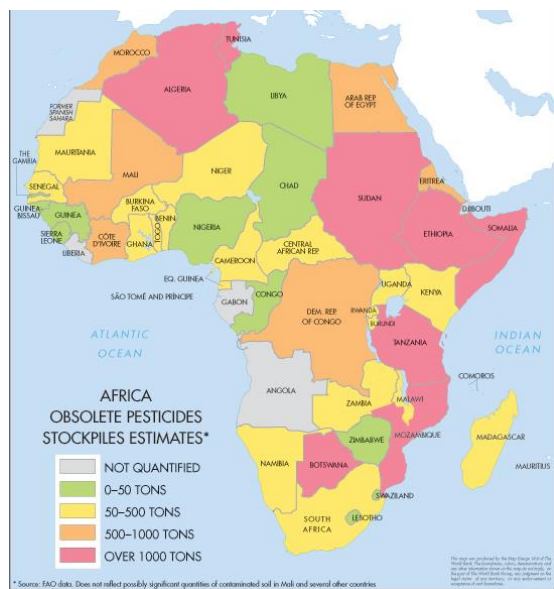
Up to 50,000 metric tonnes of disused obsolete pesticides or toxic products are lying unprotected around the Africa continent. The stockpiles are spread across the continent's 53 countries. Contaminations from obsolete pesticides are threatening the health of communities throughout Africa. The stockpiles according in WWF study include some extremely toxic pesticides, which may be up to 40yrs old. Many of these chemicals and their contaminants are in poor conditions threaten local and regional environments through the contamination of soil, water and air.

2.3.1 The African Stockpile Programme

The ASP is one of the GEF's first projects in the POPs subject area; a set of substances known to pose a considerable threat to the continent of Africa. Across the African continent, an estimated 50,000 tonnes of obsolete stockpiles of pesticides and seriously degraded soils are leaking into the environment, contaminating soil, water, air, and food sources. Having accumulated over the past 40 years, these persistent organic pollutants (POPs) and other

pesticides pose serious threats to the health of both rural and urban populations, especially the poorest of the poor, and contribute to land and water degradation.

At its October 2002 GEF Council meeting, in Beijing, the GEF Council pledged \$25 million in funding for phase 1 of ASP. The Africa Stockpiles Programme (ASP) aims to eliminate all obsolete pesticide stocks (see Plate 1.0) from the continent and help to effectively prevent their re-emergence. By reducing and removing long-standing toxic threats throughout Africa, the ASP promotes improved public health, poverty reduction, and environmental safety - critical elements of sustainable development. Its partners are committed to creating a dedicated, regional fund of at least \$250 million for the 12-15 year programme.



The Africa Stockpiles Programme brings together the skills, expertise, and resources of a diverse group of stakeholders. In addition to the country and donor government (Sweden) represented, the following organizations participated in the partner and country workshop meetings in Midrand, South

Africa, on 9-18 September 2002:

Plate 1.0: Africa Obsolete Pesticides stockpiles

African Union, CropLife International, Economic Commission for Africa, Food and Agriculture Organization, The Global Environmental Facility, NEPAD, Pesticide Action Network-Africa, Pesticide Action Network-UK, Secretariat of the Basel Convention, UN Environment Programme, UN Industrial Development Organisation, World Bank, World Health Organisation, and WWF.

2.3.2 Africa Stockpiles Programme: Operational Manual for Inventory

The Overall objective of the inventory process is to design and create a complete inventory/national register of all obsolete pesticide stocks in Nigeria. The inventory will include all significant obsolete pesticide stocks, redundant contaminated spray equipment, contaminated soils, contaminated drums and other containers which would otherwise not be recycled as well as related pesticide residuals irrespective of ownership, location or manufacturer. The inventory will be designed to FAO standard and will be available electronically and in hard copy format and will include a simple GIS map linked to the data base. The inventory will be undertaken sector by sector. The training will be provided to FMEnv data management officer to manage the data base.

The process for the development of the inventory will include all key stakeholders in the pesticide life cycle including: pesticide manufacturers, pesticide formulators, pesticide distributors, government users, farmers (commercial and small scale) and farmers cooperatives, and other end users (including game parks, dams and household users) and old disposal sites³.

2.4 POPs Pesticide Situation in Nigeria

Chemicals are used for crops and seeds protection and are widely used in both developed and developing nations to improve their crop yield and therefore ensure their food security. In Nigeria, there are currently about 124 registered crop protection chemicals officially sanctioned by NAFDAC and its Directorate of Registration responsible for the registration of all chemicals regulated by law. Nigeria's consumption of fertilizer per hectare is the lowest in the world at about 10kg/hectare/annum which is less than 5 percent of the best practice rate of 210kg. Therefore, due to the low-level of chemical use in agriculture in Nigeria, it may be possible that stockpiles of obsolete pesticides may not be significant. The FAO in 2002 estimated that Nigeria had only about 22 tonnes of obsolete stock of 40 assorted pesticides in 55 different sites. The FAO source also revealed that pesticides accounted for most POPs contaminations in Nigeria.

POPs are not manufactured in Nigeria but imported mostly from developed countries. About 90 percent of all chemicals used in Nigeria are imported as finished pre-packed products from France, United Kingdom, Japan, and China among others. These include pesticides, industrial chemicals, fertilizers and consumer chemical products. Formulation plants for POPs pesticides, owned by multinational companies, which existed in Lagos, Kaduna and Port Harcourt were shut down in the late 1980s and early 1990s.

The Federal Environmental Protection Agency Regulations in 1990 banned the importation of POPs pesticides in response to international concern about POPs and their effects. However, it has been established that some of these banned or restricted chemicals are smuggled into Nigeria from the country's land borders from neighbouring French speaking countries. These countries have a higher rate of crop protection chemicals use and receive chemical donations sometimes in excess of their needs from foreign donors. Labelling of such chemicals is usually in French and this makes them strong candidates for wrong application and abandonment in Nigeria. These types of chemicals constitute the majority of pesticides that come into Nigeria illegally through the land borders. Today, Chemicals formulated or produced in Nigeria are those for use in agriculture such as fertilizers and agro-chemicals and industrial chemicals like Sulphuric Acid, Alum, Linear Alkyl Benzene, Carbon Black etc.

POPs pesticides were used for pest control until the 1980s/1990s in food crops and export crops as well as malaria vector control. POPs pesticides are still available for sale in the informal market "under cover". The Nigerian Federal Ministry of Health indicated that aldrin, dieldrin, chlordane, DDT and endrin are POPs pesticides used for control of arthropods of medical and veterinary importance and their use was stopped in 2002. The use of DDT

continues on a continual basis for malaria control on as a need basis. Data is generally lacking on POPs imports and consumption. Inadequate funding is claimed to be responsible for the low levels of obsolete stocks of POPs as chemicals were consumed as soon as they were purchased.

The Nigerian experience from available research shows that major POPs contamination of air, soil and water arises basically from the use of pesticides. Pesticides use in Nigeria includes certain chemicals that for environmental reason have been partially or completely banned in developed countries. However such chemicals continue to find their way into Nigeria for pest control mainly through illegal traffic.

Of the nine POPs pesticides, only seven (see Table 2) are known to have been used or are in use in Nigeria. Mirex has never been reported to have been used in Nigeria. The seven pesticides are Aldrin, Chlordane, DDT, Dieldrin, Endrin, Heptachlor and Toxaphene. Aldrin and Dieldrin have widely been used as insecticides in cash crops protection such as cocoa, rubber and cotton. Heptachlor, Chlordane and Dieldrin have been used for termite control in many parts of Nigeria. However, the current general response by most stakeholders is that all POP substances are no longer in use in Nigeria, but reports by some experts have revealed that Nigerian farmers still prefer some of these banned POPs because of their potency and relatively cheaper cost than their non POPs alternatives.

The most commonly used pesticide is Lindane (Gamma BHC) on Kola-nuts (*cola nitida*) for protection against kola-nut weevils (*Balanogastriis Kola*). It is also widely used by fishermen to kill fish for commercial purposes in Nigeria. Fenthion (an insecticide) is an effective avicide and is used mostly in northern part of Nigeria against bird pest. DDT and Gammalin-20 a rodenticide that has been outlawed but they are still illegally used in some parts of Nigeria.

Until recently, the adverse effects of pesticides and their residue on non-target organisms have not been seriously considered in Nigeria. For example information on lethal limits of pesticide on Nigeria fish or food crops scarcely exists. (Ezemonye and Ilechie are currently working on a battery of biomalces and Altrazine toxicity to amphibian tadpoles; Ezemonye and Ohofosa are working on site-specific Gamalin 20 bioaccumulation in fish from Niger Delta waters). POPs have also been identified in the waters sediments and fish in Niger Delta water namely Ethiope, Benin, and Warri Rivers⁴. This environmental alarm calls for regular monitoring of the water bodies.

Table 2: POPs Pesticides known to have been used in Nigeria

S/No.	Common Name (s)	Trade Name (s)	Characteristics
1	Aldrin	Aldrec, Aldrex, Aldrex 30, Aldrite, Aldrosol, Altox, Compound 118, Drinox,	White, odourless crystals. Technical grades are tan to

		Seedrin	dark brown with mild chemical odour
2	Chlordane	Aspon, Belt, Chloriandin, Chlorkil, Corodan, Cortilan-neu, Dowchlor, HCS 3260, Kypchlor, M140, Niran, Octachlor, Ortho-Klor, Synklor, Tatchlor 4, Topichlor, Toxichlor.	Colourless to yellowish-brown viscous liquid with an aromatic, pungent odour
3	DDT	Agritan, Anofex, Artotine, Bosan Boverimol, Chloropenothane, Citox, Chlorophenotoxum, Dedelo, Deoval, Detox, Detoxan, Dicophane, Didigam, Didimac, Dykol, Estonate, Genitox, Gesafid, Gesapon, Gesarol, Gyron, Kopsol, Mutoxin, Pentachlorin.	Odourless to slightly fragrant colourless crystals or white powder
4	Dieldrin	Dieldrex, Alvit, Dieldrite, Illoxol, Panoram, D-31, Quintox.	White crystals or pale tan flakes, odourless to mild chemical odour
5	Endrin	Hexadrin, Endrex, Isodrin Epoxide, Mendrin, Nendrin.	White, odourless, crystalline solid when pure; light tan colour with faint chemical odour (tech. grade)
6	Heptachlor	Aehepta, Agroceres, Baskalor, Drinox, Heptachlorane, Heptagranox, Heptamak, Heptamul, Heptasol, Heptox, Soleptax, Rhodiachlor	White to light tan, waxy solid or crystals with a camphor-like odour
7	Toxaphene	Alltex, Alltox, Attac 4-2, Camphechlor, Camphochlor, Huilex, Chemphene, Kamfochlor, Malipax, Toxyphen, Octachorocamphene, Penphene, Phenatox, Phenphane.	Yellow, waxy solid with a chlorine-like odour

Earlier studies⁵ revealed the presence of POPs in the Nigerian Environment. Risk associated with drinking POPs contaminated surface and underground water supplies were highlighted.

Akingbade in his book "Nigeria, on the Trail of Environment" has reported uncommon ailments associated with POPs contamination to include:

- lack of brain coverage in children
- microcephaly (cases of small brains)
- macrocephaly (cases of extra large brain)
- congenital heat disease
- blocked anus in children
- urinogenital disorder.

2.5 The Nigeria - Africa Stockpiles Programme

The Nigeria-Africa Stockpiles Programme (Nigeria-ASP) is one of the seven continental projects being implemented under the African Stockpiles Programme Phase 1(ASP-P1) (ASP Doc).The

objective of N-ASP is to reduce the risk of obsolete pesticides to humans and the environment through clean-up and preventive measures and is premised on creating awareness of adverse effects of obsolete chemicals stockpiles, inventory of obsolete stockpiles, destruction of obsolete stockpiles, and prevention of stockpiles. The following achievements have so far been recorded:

- Inauguration of Nigeria- ASP Steering Committee
- Obtained due process certification for the release of the first year counterpart funding contribution
- Recruitment of full-time and part time officers of the project management unit

2.6 Inventory of Obsolete Pesticide Stocks in Nigeria

The Introduction of chemical substances as pesticides in food production and preservation in the late 1930's led to the initial notion that pest problems were over since then a variety of chemicals have been developed and introduced while the intensification of agricultural production systems has caused rapidly increasing use of pesticides. The increased pesticide use has also led to negative side effects which include: accumulation of stockpiles of obsolete pesticides, severe contamination of the environment, increased incidence of pesticide poisoning cases, rapid development of resistant pest strains and a destabilization of production in some crops as a result of pesticide induced pests and pest resurgence.

In Africa, the issue of pesticides has become a source of grave environmental concern and although the variety, quantities and distribution of the stocks vary from region to region and from country to country, the overall environmental impact is negative and hazardous.

The purpose of the inventory is to identify and record the pesticides in stock; to determine which of these are obsolete and which might still be usable; to obtain accurate information needed to draw up a plan for site stabilization; to identify suitable disposal options; and to prepare a disposal plan

2.7 Overview of Existing National Chemicals Management Policy in Nigeria

The Nigeria Government has placed priority on the control and management of toxic chemicals in its 1999 National Policy on Environment which articulates clear intentions on the need for sustainable and environmentally sound management of chemicals. Sound management of POPs chemicals, development of a National Inventory survey/survey of pesticide stock, usage and distribution, consumer chemicals, industrial and hazardous chemicals etc were some of the key issues identified as National priority. Some of the legal instruments which address or have relevance to Chemicals Management in Nigeria are discussed below:

- FEPA Decree 58 of 1988 (Amended by FEPA Decree 59 of 1992). The objective of the Decree is environmental protection, pollution abatement and control and enforcement

of regulations. Specially targeted to pesticides is Harmful Waste (Special Criminal Provisions, etc) Act 1988.

- NAFDAC Decree 15 of 1993. Controls the importation, exportation, manufacture, advertisement, distribution, sale and use of foods and chemicals etc. Specifically, targeted to Pesticides are the Pesticide Registrations Regulation of 1996 and Drugs and Regulated Products (Registration, etc) Decree 1993.
- The Federal Ministry of Agriculture and Rural Development have some pesticides targeted legislations such as the Plants etc (Control of Importation) Regulations 1970; the Nigerian Pesticide Council (Draft) Pesticide Legislation.
- Guidelines on Pesticide Management Handbook 2000 from Federal Ministry of Environment

2.8 Issues and Challenges of POPs Management in Nigeria

The identification of sound chemicals management as the bedrock of sustainable development served to focus the national efforts at achieving sustainable development, on chemicals management. To this end, the chemicals tracking programme was initiated by the Federal Environmental protection Agency (FEPA) which is the apex institution in charge of protecting the Nigerian Environment. The aim of this programme was and still remains the regulation of chemicals by a "cradle-to-grave" approach, with the ports of entry being the cradle.

In an effort to further enhance the programme and fulfill the nation's obligations to the UNEP/FAO Prior Informed Consent (PIC) Procedure, the Agency inaugurated a Standing Committee on PIC import decisions charged with the responsibility of examining chemicals/pesticides which are included in the PIC procedure in the light of: -Trade benefits derivable from their use; Local research findings; Impact on environment; and Public health risks; and making recommendations for National actions on them in respect of continued import/use.

Some of the chemicals/pesticides under the PIC procedure on which national decisions have been made are Persistent Organic Pollutants (POPs). The POPs currently allowed for importation under severe restrictions, are the PCBs and Hexachlorobenzene. There is however a national trend towards the phase out of all POPs by the year 2000. In spite of these control actions however, POPs are still in wide use in Nigeria in the agricultural, trading and public health sectors especially among subsistence farmers and the rural populace.

2.8.1 Status of some POPs in Nigeria

Documented information on local status of POPs in Nigeria in respect of, extent of use; toxicology; residues, occupational accidents; persistence and bioaccumulation is very

scanty. The available information is derived from researches carried out at these levels which indicate the presence of residues of some of the identified POPs in human breast milk, some food crops and the environment. These studies also revealed that a number of these POPs i.e. Aldrin, Dieldrin, DDT, Chlordane, Toxaphene and Heptachlor, are still being widely used by the rural populace for eradication and non-eradication treatment of timber, pre-planting treatment of seeds and treatment of wooden rafters against termite attack in homes, offices, and industry. Aldrin dust was also found to be used for treatment of yam seedlings against yam beetle attack. These studies also indicated the presence of stocks of these pesticides in many parts of the country, although details of quantities and locations could not be given.

2.8.2 Poly chlorinated Biphenyls

Polychlorinated biphenyls (PCBs), Polychlorinated terphenyl (PCTs) and Polybrominated biphenyls (PBBs) are a class of persistent organic compounds which have wide application in electrical, mining and other industrial sectors due to their peculiar physical and chemical characteristics especially their fire resistance property. In Nigeria PCB-containing transformer oils are used extensively by the National Electric Power Authority (NEPA), in the supply of electric power to the Nation

In spite of the importance of PCBs to the national economy, however they are known to cause various adverse health and environmental problems much like other POPs. These problems are further compounded by the inadequate capacity, administrative and legislative framework to ensure that management of these chemical substances is in such a manner as to reduce or eliminate their health and environmental risks.

Although only one case of stockpiled PCB contained in transformer oil has been identified,¹ it is certain that there will be many others since many industrial facilities, housing estates, individuals and other large establishments have their individual transformers. The disposal of these PCB wastes remains a major challenge as there is inadequate capacity to carry out environmentally sound disposal in the nation. At present, efforts are being made to ship one such stock overseas for disposal.

2.8.3 National Efforts

Notwithstanding the above, various efforts have been made to strengthen the overall national hazardous chemicals management programme and they include: Chemical registration, which regulates chemical imports by requiring a notification/registration before formulation/importation, Establishment of the Standing Committee on PIC import decisions/Enforcement of national decisions, Donor Agency sponsored workshop on hazardous chemical tracking in Nigeria to raise awareness and hold consultations with all stakeholders involved in hazardous chemicals management; and Preparation of a National Profile on chemicals management infrastructure.

Efforts have also been made to introduce alternatives to the farmers. However this has met with some resistance because of their familiarity with the old POP pesticides and their lack of awareness of the associated risks to health and the environment that the use of these POPs pose.

2.8.4 Priority Concerns

Although the efforts so far made have achieved considerable success in regulating the importation of hazardous chemicals into Nigeria, and in particular controlling the import of these POPs, through bans, there is an urgent need to address the peculiar problems associated with current and past uses of POPs in view of their toxicity and persistence in the environment and the tendency to bio-magnify and accumulate in fatty tissues. The following priority concerns have been identified for which further action is required:

(a) The issue of existing POP pesticide stocks in the country.(i) The abuse and misuse of agrochemicals including POPs which is rampant due to inadequate legislative control, safety guidelines and public information on awareness of the harmful effects of these substances.(ii) The continual contamination and pollution faced by the Nigerian Coastal and Marine environment from pesticides run-offs with resultant fish kills and human deaths.(iii) The cases of off-label uses involving illegal importation of banned, adulterated and obsolete pesticides into the country.The inadequate technical and financial capacity to determine/identify sources and locations of these stocks in the country in view of the large stock of these POP pesticides at cheap prices.

(b) The issue of stockpiled PCB wastes scattered in transformers in various parts of the country which is of grave concern in environmental protection considerations.

(c) Also, the inadequate technical capability to determine, combat or contain the adverse after-effects of POPs on public health and the environment in the country due to inadequate funds for local research on these substances.

2.8.5 Challenges

Some of the challenges facing the country in dealing with the adverse effects associated with exposure to POPs include:

- (i) Need to carry out a comprehensive inventory of existing POP pesticide stocks in the country.
- (ii) Need to overcome the financial constraints facing local research on evaluation of POPs.
- (iii) Need to improve existing legal instruments and implementation strategies for the monitoring and control of POPs in particular.
- (iv) Need to maintain a dependable, well-informed and coordinated field force for pesticides application.
- (v) Need to train and ensure competence of other Security Agencies that regulate imports in order to strengthen their capability.
- (vi) National/regional training for effective implementation of POPs

candidates

- (vii) Need to increase/improve public education and awareness of the hazards associated with POPs exposure at the grassroots.
- (viii) Need to dispose of existing PCB waste stocks

2.9 Pesticide Registration Regulations

This regulation⁶ prescribes the following:

No pesticide shall be manufactured, formulated, imported, exported, advertised, sold or distributed in Nigeria unless it has been registered in accordance with the provisions of these regulations.

2.10 Importation Guidelines

2.10.1 Customs Barriers

Nigerian port practices continue to present major obstacles to trade. Importers face long clearance procedures, high berthing and unloading costs, erratic application of customs regulations, and corruption. Customs exemptions granted to U.S. firms as a concession for setting up operations in Nigeria have not always been honored. In December 2005, the government released import guidelines for the implementation of a physical destination inspection regime. Under the destination inspection scheme, all imports will be inspected on arrival into Nigeria. These guidelines will be implemented by the Destination Inspection Service Providers, which is a team comprised of the Customs Service and three firms that provide scanning services.

2.10.2 Standards, Testing, Labeling, and Certification

Rules concerning sanitary and phytosanitary standards, testing, and labeling are well defined, but bureaucratic hurdles slow the import-approval process. Regardless of origin, all food, drug, cosmetic, and pesticide imports must be accompanied by certificates of analysis from manufacturers and appropriate national authorities, and specified animal products, plants, seeds, and soils must be accompanied by proper inspection certificates. U.S. exporters may obtain these certificates from the U.S. Department of Agriculture and other relevant federal or state agencies. By law, items entering Nigeria must be labeled exclusively in the metric system. The Nigerian Customs Service is charged with preventing the entry of products with dual or multiple markings, but such items are often found in Nigerian markets.

2.11 POPs Pesticide Production in Nigeria

As at 2000, there were no record of pesticide manufacture in Nigeria but some companies have formulation and repackaging plants. Over 95% of all the pesticides used in Nigeria are imported mainly as finished prepacked products. Where local production takes place (less than 5% of overall consumption) above 60% of the raw materials for production are imported.

The organochlorine Chemicals or POPs pesticides use in Nigeria date back to the 1940s for agricultural production of food crops for the country's rapidly growing population and cash crops (Cocoa, rubber, forest products and cotton) for export for economic buoyancy as well as malaria vector control activities. But there is a paucity of data on the production and use of POPs and other pesticides in the country whereas such data are readily available in developed countries⁷. This is a reflection of the lack of mechanism and planning programme in place for chemicals management including POPs as well as low level of understanding of the environmental and public health hazards of chemicals/pesticide/POPs use.

POPs pesticides are not produced in Nigeria similar to the situation in the rest of Africa.⁸ All the pesticides including POPs used in Nigeria are imported from the developed countries especially Europe, America and Japan. However there were until the late 1980s/early 1990s a few formulation facilities/plants in the country in Lagos, Port Harcourt and Kaduna owned by the multinational oil companies such as National oil and Chemicals marketing Company, NOLCHEM (Shell petroleum Development Company was a major share holder) now under new management Consolidated oil plc (Con oil).

Mobil Oil Nigeria Plc and Chemical and Allied products Limited (CAPL). NOLCHEM then had plants formulating POPs and Other Organic chlorine pesticides in Apapa, Lagos; Port Harcourt and Kaduna. Mobil Oil also had an industrial plant formulating POPs in Apapa, Lagos; and Port Harcourt while CAPL had a formulating Plant in Ibadan for Lindane and some POPs pesticides. In response to international concern about the deleterious health and environmental effects all the POPs pesticides, the formulation plants have closed down since the 1990s except the CAPL plant at Ibadan, Oyo State that closed down in 2004. There is paucity of information on quantities of locally formulated POPs pesticides over time as such data could not be provided neither by the companies concerned nor by government agencies.

2.12 Uses of POPs Pesticides

POPs pesticides e.g. Aldrin and Dieldrin have been used as insecticides in food crops including Cocoa, rubber and cotton. Heptachlor, Chlordane and Dieldrin have been used for termite control in virtually all the zones in Nigeria include Ondo State. The general response in all the six geo-political zones indicated that all POPs substances were no longer in use. But no one was able to tell where exactly the use of those substances stopped. Although the POPs had been banned, some of the pesticides are still being sold in the markets, as farmers prefer to buy and use them because of their potency and relatively cheaper cost, although alternatives to POPs pesticides including Basudin, Unden 20 EC, and phosphine exist, they are expensive and not affordable to the farmers.

A survey commissioned by the Federal Livestock Department and Pest Control Services, Federal Ministry of agriculture and Rural Development, Abuja⁹ listed 124 pesticides available in Nigeria. The seven POPs pesticides included in the list were Aldrin (Aldrosol^(A) Seedrin[@]) Chlordane (Octachlor; octa-Klor), DDT (Anofex; Ixodex), Dieldrin (Diedrex^R; Quintox^R), Endrin (Haxadrin^R), Heptachlor (Soladrin^R; Heptagram^R) and Toxaphene. Mirex and other POPs

pesticides were missing in the list¹⁰. Tsetse fly control and eradication programmes involving the spraying of DDT, dieldrin and non-POPs pesticide such as endosulfan have taken place in different parts of Northern States in the country.

The Federal Ministry of Health (Roll Back Malaria Unit) and the Lagos Ministry of Health provided information that 5 out of the 12 POPs pesticides namely: aldrin, Dieldrin, Chlordane, DDT and Endrin were used through fumigation for the control of arthropods of medical and veterinary importance and their use have been stopped in 2002.

However, DDT is still being used largely to control malaria especially from the source, fumigation of Anopheles mosquito, mosquito borne viruses (yellow fever) and mosquito borne Filariasis. There is no stockpile of these obsolete POPs chemicals because they were consumed as soon as they were purchased. Neopybrutin has been identified as alternative to POPs for 'Roll Back Malaria'. Again there has been no statistics of the quantities of POPs pesticides used for health purposes.

The abuse and misuse of POPs Chemicals for control of head lice, toothache is common among rural farmers. Some of the farmers claimed that POPs pesticides such as Aldrin diluted in water can be used to cure stomach trouble, toothache and any mouth disease! No follow up study was done on the detection of POPs in this regard.

2.13 Trend in Pesticide Usage in Nigeria

During the period 1988 to 1994 there was an increase in the pesticides imported into the country through large scale farms established by the big companies under the Backward Integration Programme. Again the various State Agricultural Development Projects (ADP's) imported various amounts of pesticides with the World Bank loan during this period

Over importation of agrochemicals into Nigeria occurred between 1991 and 1993 and although there was very low quantities of agrochemicals imported into the country between 1994 to 1995, there are still available quantities of pesticides for use in the country¹¹. Also between 1991 and 1995 large stocks of products that were out of shelf-life (expired) and in some instances, obsolete emerged in various parts of the country. The reasons adduced for this was :

- over importation of products in which case the quantities imported did not represent the actual need and demand of farmers,
- importation of products which were unfamiliar to Nigerian farmers by ADB and other government institutions using aid/loan from World Bank
- The ADPs and the various States and Federal Government Agencies are not equipped with professional marketing and sales departments to make the products
- The devaluation of the Naira during the mid 90's made it difficult for the agrochemical companies to sell the products imported as prices of pesticides rose by 300% making them too expensive for small scale farmers.

- There was also a decrease in agricultural activities especially among the medium and large scale farmers. The reversal of the Backward Integration programme of government led to the closure of many large scale farms which had been high users of pesticides
- The marketing of pesticides in Nigeria is very much unorganized and lacks proper legislative control. Importation of pesticides is allowed even there is no outfit on ground in the country to market and provide stewardship for such pesticides
- Of the total value of pesticides worth USD12 million USD 12 million imported into the country in 1997 about 25% went into Public Hygiene and domestic”

2.13.1 Insect Control

The insecticide market is the oldest pesticide market in Nigeria. It was formerly dominated by Gamma-BHC insecticides and other organochlorines. Although most of the products were withdrawn or banned in various markets, from 1992-1997, Lindane remained important in the cocoa capsids market, but its share reduced from 85% to 70%. Organophosphates such as Diazino and Carbamaes such as Propoxur on the other hand accounted for 15% to 30% of the capsid market within the same period. Today, synthetic pyrethroids represent 25% of the total insecticide market. It is expected that in the next five years the Organophosphates will continue to dominate the insecticide market in Nigeria. In the public hygiene market, the insecticide of choice is DDVp which accounts for over 70% of the insecticides used.

2.13.2 Weed control

In the 70's the use of herbicides in food crops became important but before then only the use of Paraquat, 2,4-D and 2,4,5-T in plantation crops were known. The Nigerian market is dominated today by Paraquat, mostly used in plantation crops; Atrazine and its mixtures used in maize, sorghum and sugarcane while Propanil based products are used for weed control in rice. At the moment, over 50% of herbicides used in Nigeria go into the plantation crops such as Sugacane, Oilpalm and Rubber¹¹

2.13.3 Disease control

Most of the fungicides (85%) used in Nigeria are used on cocoa. These are mainly copper based products such as CuSO₄ (Bordeaux mixture), Copper Oxychloride (cuprous Oxide) and Metalaxyl + Cu mixture. Other fungicides such as Mancozeb and Benlate are used on rice, tobacco, and vegetables. This market is cocoa dependent and with the renewed vigour in cocoa production it is expected that the market will continue to grow at the rate of 8-10% per annum.

2.13.4 Storage Products

The Federal Government alone has an established storage capacity of 250,000 MT and this makes this sub-market important. The high post-harvest losses among small-scale farmers is also a reflection of the importance of this market. Among the insecticides in this market 60% are fumigants mainly Hydrogen Phosphide in form of tablets and bags. Organophosphate insecticides such as Actellic and DDVP are also very important. The use of Prrethoids is also

becoming important in this sub-market. Rodenticides like zinc Phosphate, Bromadolone, Bromdifacoum and Racumin are used to protect stored produce and in public hygiene.¹¹

2.13.4 Seed Treatment Market

In the sixties and seventies, this sub-market was dominated by Aldrex T and Fernasan D which were widely used by small scale farmers. At that time, seed treatment was a cultural practice in most parts of Nigeria especially in the North where Sorghum and Millet are grown. The low cost also made it easy to adopt. However, as the use of these products is decreasing, seed dressing chemicals with systemic actions such as Apron plus are now in the market. The increase in the incidence of diseases such as downy mildew especially in the South-West region has increased the usage of Apron Plus in Nigeria. Today it represents about 80% of the seed treatment market¹¹.

2.13.5 Accumulation of Obsolete Pesticide Products

Common reasons for the accumulation of obsolete stocks include: banning of pesticides that are still in storage, prolonged storage of products with a short shelf life, difficulties in forecasting outbreaks of pests, particularly with regard to migratory pests e.g locusts, grain eating birds and army worms, inappropriate assessment of pesticide requirements, inefficient application capacity, use of inappropriate formulations or containers, inappropriate, untimely and uncoordinated donations, late arrival of donations (out of season), inadequate storage facilities, lack of staff trained in storage management, ineffective distribution and making systems for pesticides and lack of systematic and controlled stock-taking.

2.13.6 Expired / Obsolete Pesticides

When a pesticide has stayed beyond the expiration period unused or longer than the shelf life either in the farmers store, Pest Controller's store, Agrochemical Company's store or in the warehouse of a subsidiary company to the manufacturer it can be said to be an expired product. On the other hand, an obsolete product is one that can no longer be used for its original purposes or any other purpose and therefore requires disposal (12,13). Usually, an expired product is an obsolete product, but a product may not be expired even though it may be obsolete if for example the product is no longer suitable for its original use and cannot be used for another purpose nor can it easily be modified to become usable. However, the terms 'expired' and 'obsolete' pesticides may be used interchangeably as in practical terms the two situations are the same.

2.13.7 Conditions Promoting Product Expiration

Most pesticides carry shelf-life rather than expired periods. In a few cases, expiration periods of 1-3 years are given on the label. But because conditions of storage are important determinants of the state of the active ingredients, shelf-lives or expiration periods are given along with optimal conditions for the storage of the particular product. Environmental conditions relevant to storage of pesticide products include temperature, humidity, and exposure to direct sunlight.

Routinely in developed countries where facilities are available, the usability of not of pesticide products are routinely tested to confirm the level of activity of the active ingredients in order to eliminate the uncertainties inherent in the expiry date or shelf-life vis-à-vis the original specifications of the product. Such tests are physical, chemical and biological. In developing countries however, due largely to the level of education, poor enforcement and regulatory control, specified storage conditions of pesticide products are not strictly adhered to or are simply too expensive to provide. Consequently, products often deteriorate much faster than the expiry date or shelf life specification of the label. For the same reasons, validation tests are often not carried out.

The end result is that many pesticide products have become obsolete or altered before they are available for use by the farmer. It is also in these regions that national guidelines governing the disposal of pesticide wastes are either non-existent or enforced. Consequently, the Nigerian pesticide market is full of all categories of pesticides from whose specifications are valid to others whose specifications are far from the manufactures' and to others that are already pesticide wastes(12,14)

2.13.8 Assessment and Quantification of Obsolete Pesticide Stocks

The outcome of a previous survey showed that seventy nine types of pesticide stocks were available at eighty-one centers covered by the survey. The largest ten pesticide stock quantities included Bronocot, Cypermethrin, Atrazine, Sevin, Fenithrothion, Aluminium phosphate, Upper Cott, Furadan, Karate and Cuprous oxide. The lowest five pesticide stock quantities included Permethrin, Whip, Carbendazim, Pentachlorophenol and Delvap Super.

The results showed that the centers visited acquired some pesticide stocks haphazardly from different sources. For example, Aluminium phosphide is marketed under different names ie Phostoxin, Phosphos, Quick phos, Protex etc and some of the centers procured the same product under these different names e.g. OYSAISCO, Saki had both Quick phos and Protex in stock. This may be due to tested potency and efficacy of the different but similar products. Another reason may be that the pesticides were gathered unknowingly by the agro-allied centers.

Most of the pesticides, forty-two in number, had expired or deteriorated with some stored in damaged containers of varying degrees. However, sixty of the agrochemicals still remained in a relatively useable state. The survey revealed that many of the deteriorated pesticide stocks were extremely and highly hazardous. Expired or deteriorated pesticide products were found present in majority of the States of the Federation where the survey was carried out. The expired or deteriorated pesticide stocks ranged from a high 3325Kg of Methyl bromide in Oyo State and a low 5kg of Igram Combi, Nurelle D and Primextra in Borno, Anambra and Abia States respectively. In all the states surveyed, a total of 21, 739 kg made up of different pesticide products were found to be obsolete, deteriorated or expired. In contrast, 64,025kg of different brands of pesticides spread across 24 States were found to be useable.

An indication of Agrochemical Distributors and the States they supply is shown in Table 3.0. Again chemical companies that are well established were more patronized by the States than the relatively new chemical companies. For example Agrochemical industries such as ICI, Ciba Geigy, Zeneca, Rhone Poulenc and Novartis recorded more state patronage. This had to do with proven integrity and product stewardship of these high-ranking chemical industries. These group of agrochemical companies have less products in stock that deteriorated or expired based on the survey outcome.

In terms of container used for storage the study revealed that 57.7% of the pesticide stock was in plastic, 16.2% in metal related container and 10.4% in paper sachets. The FC and EC are usually in plastic kegs or glass containers. However, the high cost of glass may have shifted the attention of manufacturers to the use of plastic containers. The dusts and granules are in sachets. The materials stored in aluminum are fumigants for storage pests e.g. Protex, Phostoxin and Quick-phos. Other containers such as cartons, rubber and polythene bags play minor roles in pesticide storage.

2.14 Stocks and Reservoirs of POPs Pesticides in Nigeria

According to FAO, obsolete unwanted and banned pesticides and persistent organic pollutants (9POPs) are serious environmental hazards, especially where they are stocked and mostly neglected. The FAO estimates that there are about 120,000 tons of obsolete stocks of pesticides in Africa that require disposal¹⁵. The proportions of these that are POPs pesticides are unknown. According to the FAO obsolete pesticides take into consideration the following criteria:

- * Pesticides that are in the form of liquids, powder or dust, granules, emulsions, etc.
- * Empty and contaminated pesticides containers of all forms and kinds (i.e. metal drums, plastic containers, paper cartons, jute and other bags, e.t.c.)
- * Heavily contaminated soil,
- * Buried pesticides, etc. ¹¹

Obsolete pesticides are therefore pesticides that can no longer be used for their intended purpose or any other purpose. Thus it requires disposal.

Common causes of this situation include the following:

- * Use of the product has been prohibited or severely restricted for health or environmental reasons (e.g. through banning, withdrawal of registration, or policy decisions).
- * The product has deteriorated as a result of improper or prolonged storage and can no longer be used according to its label specifications and instructions for use, nor can easily be reformulated to become usable again.
- * The product is not suitable for its intended use and cannot be used for other purposes, nor can it easily be modified to become usable.¹¹

Based on projections made on FAO data Nigeria is estimated to have 22 tons of obsolete stocks of 40 assorted pesticides in 55 different sites which have become contaminated. An in country survey (see Tables 3.0a, 3.0b, 4.0a, 4.0b and 5.0) earlier

undertaken in 1999 estimated obsolete stock of pesticides including POPs in the country to be 30 tons.¹⁶ The FAO figure and the earlier in-country study data need validation by means of a comprehensive study.

Table 3.0a: Type of Pesticide Stock, Quantity Available in Useable Condition and States Where Located

S/N	Pesticide Type	Quantity	States
1	Actellic dust	558Kg	Delta,Oyo,Zamfara,Katsina, Cross River, Bayelsa and Benue
2	Apron Plus	304 Kg	Zamfara, Delta, Oyo, Bauchi and Ebonyi
3	Atrazine	4715Its	Oyo, Kano
4	Unspecified(Agrevo)	6Its	Zamfara
5	Alachlor	205Its	Oyo
6	Aluminium phosphide	3079kg	Delta, Oyo, Bauchi
7	Blazer	7.5Its	Osun
8	Basagram	1775Its	Bauchi, Ebonyi
9	Bordeaux Plus	410Kg	Bauchi
10	Bronocot	6900Kg	Bauchi, Kano
11	Butachlor	2000Its	Bauchi
12	Carbendazin	1Itr	Bayelsa
13	Callisufan	1000Its	Sokoto
14	Cotalm D	1000Its	Sokoto
15	Cyhaloxon	500Its	Sokoto
16	Cytoate	522Its	Sokoto
17	Cypermethrin	5610Its	Ekiti, Kebbi, Anambra, Kano
18	Cuprous Oxide	2085Kg	Ogun
19	Copper hydroxide	358kg	Kano, Cross River
20	Diazinon	740Its	Oyo
21	Delvap super	5Its	Zamfara
22	Decis	1660Its	Sokoto, Kebbi
23	Dendres	500Its	Sokoto
24	Dithane	50Kg	Enugu
25	Fenithrothion	4500Its	Bauchi,Katsina, Abia, Enugu
26	Furadam	150kg	Ebonyi, Akwa Ibom
27	Folar	300Its	Oyo
28	Gesatop	800Its	Oyo
29	Glyphosate	1168Its	Belta, Bauchi, Oyo, Ondo
30	Gardoprim A	230 Its	Enugu

Table 3.0b: Type of Pesticide Stock, Quantity Available in Useable Condition and States Where Located

31	Unspecified(Ikarincorate)	56Kg	Cross River
32	Karate	2019Its	Zamfara, Sokoto, Bauchi

33	Lindane	2537Its	Zamfara, Sokoto, Kebbi, Akwa Ibom
34	Monocrotophos	171 Its	Oyo
35	Marshal	13Its	Ebonyi, Cross River
36	Methacrifos	410 Kg	Kano, Anambra
37	Metiram	350Kgs	Anambra, Enugu
38	Nurelle D	110Its	Zamfara, Kebbi
39	Nuvan	515Its	Zamfara, Sokoto
40	Oxadiazon	247Its	Ekiti, Ebonyi
41	Ordam	522Kg	Osun
42	Pentachlorophenol	4Its	Anambra
43	Primextra	355 Its	Delta, Lagos
44	Paraquat dichloride	821 Its	Delta, Lagos
45	Propanil	114 Its	Osun
46	Perfecthion	10Its	Zamfara
47	Permethrin	0.6Kg	Zamfara
48	Prometon	200Its	Enugu
49	Queletox	60Its	Katsina
50	Ridomil Plus	956Kg	Osun, Oyo
51	Rovral	47Its	Osun
52	Sherpa Plus	344Its	Oyo
53	Sevin 85	6101 Kg	Lagos, Bauchi, Kano, Cross River
54	Sumicidin	2000Its	Abia
55	Thiobencarb	19Its	Osun
56	Tricyclazole	80Kg	Enugu
57	Triadimeform	500kg	Kano
58	Ultracide	1654 Its	Ebonyi, Kano
59	Upper Cott	2670 kg	Oyo, Bauchi
60	Whip	1Kg	Osun

Table 4.0a: Type of Pesticide Stock, Quantity Available in either Deteriorated Condition or Damaged containers and States where located

S/N	Pesticide	Quantity	States
1	Actellic	1998Kg	Ebonyi, Akwa Ibom, Ondo, Plateau, Benue, Bayelsa and Nasarawa
2	Aluminum phosphide	346 Kg	Ogun
3	Antracol	150kg	Abia
4	Apron plus	50kg	Ebonyi
5	Atrazine	1470Its	Ondo Sokoto, Benue, Taraba
6	Basagram	15 Its	Ebonyi
7	Benomy	12 Its	Anambra
8	Bromadiolone	2,308	Kaduna, Borno
9	Butralin	50Its	Anambra
10	Carbaryl	1Kg	Cross River
11	Cypermethrin	610 Its	Ondo, Ekiti, Kebbi
12	2,4-D	1500Its	Kano
13	Decis	200Its	Abia
14	Dimecron	200Its	Abia

15	Diazinon	412 Its	Imo, Ebonyi, Abia
16	Dieldrin	14 Its	Abia
17	Dithane	400 kg	Anambra
18	Elocron	55kg	Abia
19	Endosulfan	1250kg	Oyo
20	Fenithrothion	600Its	Kano
21	Furadan	2450kg	Ebonyi, Plateau, Nasarawa, Benue, Taraba
22	Gesaprim	500kg	Imo
23	Gestop	100Its	Oyo
24	Igram Combi	5Its	Borno
25	Karate	89Its	Ekiti, Ebonyi
26	Klerat	65Kg	Ogun, Cross River
27	Lindane	447Its	Kaduna, Ebonyi, Imo
28	Marshal	237Its	Kaduna, Ebonyi, Bayelsa
29	Methyl Bromide	3325 kg	Oyo
30	Metiram	250kg	Anambra
31	Nurelle D	5Its	Anambra
32	Oxadiazon	205Its	Sokoto, Ebonyi
33	Paraquat Dichloride	45 Its	Lagos
34	Pimagram	216Its	Kaduna
35	Primextra	5Its	Abia
36	Phosphamidon	15Its	Abia
37	Spicytin	225kg	Ondo

Table 4.0b: Agrochemical Distributors and Area of Coverage as Identified in the Survey of Obsolete Pesticide Stocks in Nigeria, 1999

S/N	Origin	States Covered
1	Novartis	Niger, Oyo, Lagos, Ebonyi, Kano, Delta, Zamfara
2	Gaskiya Nigeria	Kebbi
3	Ciba Geigy	Enugu, Abia, Imo, Borno, Zamfara, kaduna, Lagos, Delta, and Oyo
4	Welcome Foundations	Zamfara
5	Imperial Chemical Industries	Niger, Ekiti, Oyo, Ogun, Zamfara, Abakaliki and Kano
6	Mckechnje Chemicals	Bauchi
7	Ikari Yakuhin Limited	Niger
8	Norkem	Bauchi
9	Detia Freyberg GmbH	Niger
10	Mitsui and Company	Enugu
11	Saro Chemicals	Niger, Oyo, Bauchi
12	Sundats pte Limited	Bauchi
13	Rhone Poulenc	Ekiti, Oyo, Osun, Bauchi, Kano
14	Luxan	Oyo
15	C. Zard	Ebonyi, Abakaliki, Imo
16	The Candle CO	Ondo, Oyo, Bauchi, Ekiti, Lagos, Zamfara
17	National Chemicals	Abia
18	Ajeco Chemicals	Ondo
19	United Phosphorus, India	Oyo, Ogun

20	Drexel Chemicals	Imo
21	Epiclean	Awka
22	Zeneca	Sokoto, Zamfara
23	Oska	Imo
24	Dizengoff	Bauchi, Lagos
25	Meridian Trading Group	Ogun
26	Hoescht and Roussel	Osun , Zamfara
27	BASF	Enugu, Ebonyi, Osun
28	CAPL	Ebonyi, Abakaliki, Zamfara
29	Sumitomo	Enugu
30	Dow Agric Services	Zamfara
31	Franbet	Kano
32	FMC Agrochem Group, USA	Nassarawa, Benue, Plateau, Taraba
33	ICI, Pakistan	Nassarawa, Benue, Plateau

Table 5.0: Types of Containers used for the Storage of Pesticide Product

S/N	Type	Frequency	%	Type of Pesticide
1	Paper Sachets	23	10.36	Mainly Dust/tablets
2	Plastic Keg	128	57.7	Mainly EC and EW
3	Metal related	36	16.2	Mainly EC
4	Aluminum	05	2.25	Mainly dust/tablets
5	Glass bottles	01	0.45	EC
6	Jute bags	03	1.35	WP
7	Polythene bags	11	4.95	WP,EC
8	Rubber container	01	0.45	EC
9	Cartons	05	2.25	Granules/Powder
10	Not stated	0.9	4.05	EC/WP

2.14.1 Recommended strategies for collection/disposal of obsolete/expired Pesticide stocks

Pesticides that cannot be used for their intended purposes or a permitted alternative, and cannot be formulated to become usable again, should be considered for disposal. Disposal methods are divided into three categories:

1. Disposal methods that may be acceptable, depending on type of product and local circumstances viz: high temperature incineration, chemical treatment, specially engineered landfill and long-term controlled storage
2. Disposal methods unsuitable for bulk quantities of pesticide: open burning, burying or landfill disposal, discharge to sewer, solar evaporation, land fanning/ superficial application, deep well injection, other methods primarily developed for soil remediation and groundwater decontamination(including uv treatment, ozonation, ion exchange, precipitation or flocculation, activated coal absorption)

3. Promising new developments: plasma energy pyrolysis, gas-phase chemical reduction, molten salt oxidation process

2.14.2 Awareness workshops among end-users

Studies have shown that developing countries do not have adequate facilities to dispose of obsolete stocks of pesticide in a safe and environmentally sound manner. Therefore it is very important to raise awareness about mechanism through which obsolete pesticide stock accumulate and to enhance the formulation of policies and procedures aimed at prevention and such accumulation. An awareness workshop among end-users should analyse the causes of this accumulation and recommend how it can be prevented. It should provide guidance to the government of Nigeria, aid agencies and the pesticide industry. It should be considered of special interest to Ministers of Agriculture, Health, and particularly for senior staff responsible for assessing the country's yearly pesticide requirements.

2.14.3 Identification of Alternatives

For several major crops, the use of pesticides may be reduced considerably through Integrated Pest Management. The same applies to Vector Control programme in public and annual health programmes. Reduced use of pesticides will also reduce the need for large stocks. To achieve this, pesticides would be sold at realistic, unsubsidized prices to avoid excessive use by farmers. In many cases, conventional pesticides can be replaced by more modern products such as biological pesticides and growth inhibitors that are more or less dangerous to human beings and animals and of which much smaller volumes are required.

2.14.4 Strategies to prevent future stockpiling

It is recommended that government and other large-scale users examine critically their policies on pest management, plant protection and vector control, their procedures for assessing pesticide requirements, and their procedures for procurement of pesticides. It may be necessary to provide training for government and non-government staff responsible for stock keeping at pesticide stores and inspection of pesticide storage facilities.

The following recommendations should also be considered: Reduce pesticide use, where possible, reduce the amount of pesticides by careful selection products, avoid overstocking of pesticides, make accurate assessment of requirements before ordering pesticides or making requests to aid agencies, anticipate the effects of changes in pricing policies, avoid inappropriate products by ensuring in advance that products are effective, provide detailed specifications when processing or requesting for pesticides, exchange information on pesticides to enhance judicious selection of pesticides, ensure proper handling, storage and stock management and avoid damage during transport, ensure proper storage, determine whether older products can still be used, reduce surplus stocks and others not directly usable, anticipate the effects of banning products, government should ensure safety in private sector stores and Aid agencies should ensure that all pesticide donations comply with national pesticide legislation and relevant regulations of the recipient country and PIC.

2.15 Levels of POPs in Environmental Media in Nigeria

Although there is lack of data on POPs consumption and use in Nigeria, it is a well known fact that POPs chemicals were widely used in the country for food and cash crops as well as vector disease control since post World War II because of their relatively cheaper cost and also being first generation insecticides. However FEPA ban on POPs in the early 1990s has drastically reduced their use. Establishing the residue levels of POPs in environmental media provides information on potential socio-economic, health and environmental impact of POPs usage in the country over time. Although analytical capability for POPs detection and quantitative analysis is generally lacking in the country, limited data is however available based on some past studies in the country. ¹⁷

2.15.1 POPs in Nigerian Soils

In spite of the relatively short half-lives of POPs in Nigerian soils (Osibanjo, 2002), there is wide spread contamination of Nigerian soils. The contamination trend in soils is private farms < industrial sites < municipal Refuse dump soils has the highest concentrations (ngg⁻¹) of OCs including POPs with the mean and range as follows: Lindane 135(ND-712),, aldrin 104(9-630), DDEpp 57(4-2004), total DDT 201(ND-530), heptachlor 84(ND-352), dieldril 41(7.4-159), endosulphan 16(ND-60) and PCBs 1141(353-3311) ng/g dry weight. (See Table 6.0)

TABLE 6.0: Chlorinated hydrocarbon including POPs levels in some Nigerian farm land industrial and refuse dump soils

Pollutant	Concentration(ng/g) dry weight		
	Farm Land soils	Industrial soils	Refuse dump soils
Lindane	8.7 (ND-20.5)	8.6 (ND-13.7)	135 (ND-712)
Aldrin	ND	ND	104(9-630)
DDEp.p	7.9 (ND-60)	32(ND-127)	57(4-204)
Total DDT	2(ND-11)	195(4-774)	201 (ND-530)
Heptachlor	6(3-43)	8(ND-56)	84(ND-352)
Dieldrin	—	11(ND-28)	41(7.4-159)
Endosulphan	—	-	16(ND-60)
PCBs	ND	122 (ND-740)	16(ND-60)

N.B: ND=Implies no data,

Source "Seminar paper-Ministry of Environment and Mineral Resources Ondo State"

2.15.2 POPs in Nigerian Waters

The occurrence and levels of some OPs and other organochlorine pesticides (OCPs) in water of 17 rivers, 2 lakes and one dam in southern Nigeria has been documented.

The overall range of value (ng/1) of the POPs and other OCPs found were Lindane ND-1 67, Aldrin ND-1 90, Endosulfan ND-750, HCB ND-9.2, Heptachlor ND -96 and PCBs ND-8991

respectively. DDT and metabolites were not detected. For example, concentrations (ng l^{-1}) in River Ogun which traverses three states and discharges into Lagos Lagoon were: Lindane 1.4—41.9 (13.3), Aldrin 5-1 49 (40), Endosulfan ND-260(116), Heptachlor ND-0.8(0.25) and PCBs ND-224 (87) respectively.

The occurrence and levels of OCPS and POPs in 9 rivers in Ondo State a major Cocoa growing area of Nigeria were also studied with the following results (in ng/l): lindane ND-6.4 (2.4), heptachlor ND-5.0(2.1), endrin ND-21 (5.1), aldrin ND-3.6 (1.0) and dieldrin ND- 2,1 50 (1,062). PCBs, DDT and metabolites were not detected.

The detection of 10 OCPs and POPs residues including PCBs in surface waters in Ibadan, the largest indigenous city in Nigeria has also been reported¹⁷. The concentration ranges in ng l^{-1} of some of the compounds quantified are – and, B- HCH 1-302, lindane 7-297, aldrin ND-40, dieldrin 17.8-657, endrin ND-19, heptachlor 4-202, Endosulfan ND-430, HCB ND-92 and total DDT ND-1,266; PCBs were detected but not quantified. These results show higher loads of OCs including POPs in the water bodies compared to concentrations elsewhere.

This study confirms that organochlorine pesticides and POPs remote from point source the presence of pesticide/POPs residues in Lagos Lagoon water has been confirmed with concentrations in ng l^{-1} as: Lindane 85.3; Aldrin 1 9. 3; DDE; HCB 1 .9; Endrin 1 2.5 and Dieldrin 28.0. The majority of the African inland water have Y-HCH concentrations below 10 ng l^{-1} .

The problem of gross contamination of ground water by organochlorine pesticides has also been identified in parts of Nigeria. The Table below shows that the mean concentrations of total DDT and heptachlor exceed the WHO limits for these.

2.15.3 POPs in Nigerian Foods

Ingestion of contaminated foods is a major source of human exposure to OCs including POPs. Hence in Nigeria, exposure to OCs including POPs through dietary source had been established by the collection of foodstuffs: 217 fruit and Vegetable samples three major cereals (rice, maize and sorghum) and a legume (soybean) as well as foodstuffs of animal origin from different locations in the country and analyzing them for the presence and levels of the OCs including POPs .Table 1.2 shows the summary of mean concentrations of the OCs including POPs residues in Nigerian foodstuffs. Most samples recorded maximum residue levels below the FAO's maximum residue limits (MRL). However some samples of meat, cereals and pulses had DDTs, aldrin and dieldrin levels above the MRL. Thus meat and pulses from the greatest sources of human exposure.

The high levels obtained for DDT and Aldrin + Dieldrin could be correlated with house treatment with DDT for malaria control and Aldrin + Dieldrin with house treatment for termite control respectively. The study further established that the dietary intakes of HCHs, DDTs, aldrin and dieldrin came predominantly from tubers, pulses and cereals. The dietary intakes (ADI) of aldrin and dieldrin in Nigeria were estimated for the first time and found similar to ADI value for India but higher than FAO/WHO, Japan and European countries ADI values. But ADI

values for DDTs and HCHs were below the Acceptable Daily intake (ADI) of the FAO and those of the developed countries (see Table 7.0). The ADI data were calculated based on national data on food consumption, national food composition tables and the methodologies used by USFDA and WHO.

Table 7.0: Estimated Daily Intake of HCHs, aldrin +dieldrin and DDTs by Nigerians in comparison with those of some other countries and the ADI of FAO/WHO

Pesticide	Nigeria	India	USA^a	Japan	FAO/WHO^a
HCHs	13.1+ 8.2	155	0.17	0.47	600 ^b
Aldrin & Dieldrin	18.0+10.8	19.0	0.29	0.05	6.0
DDTs	28.8+15.3	48.0	1.6	3.1	1200

Source "Seminar paper-Ministry of Environment and Mineral Resources Ondo State"

^a Value converted from ug/kg-1 body weight/day to ug/person/day, using an average body weight of 60kg/person, for ease of comparison.

^b Value for gamma – HCH alone.

Sources: India¹⁹ (Kannan et al, 1992), Japan²⁰ (Matsumoto et al, 1988), U.S.A FDA, (1989), FAO/WHO (1986)

There are series of other studies that have confirmed that there is the concentration of POPs in the Nigerian wild life and in human Breast milk.

SECTION THREE

3.0 METHODOLOGY

3.1 Description of the Study Area

The study was carried out in four of the five South Western States in Nigeria namely: Lagos, Ogun, Ondo and Oyo States.

3.1.1 The Lagos Study Area

Lagos is located on the Bight of Benin (an arm of the Atlantic Ocean). It is situated in the Southwestern corner of the country and borders Ogun State in the north and east, the Republic of Benin in the west, and the Atlantic Ocean in the south (see Plate 2.0).

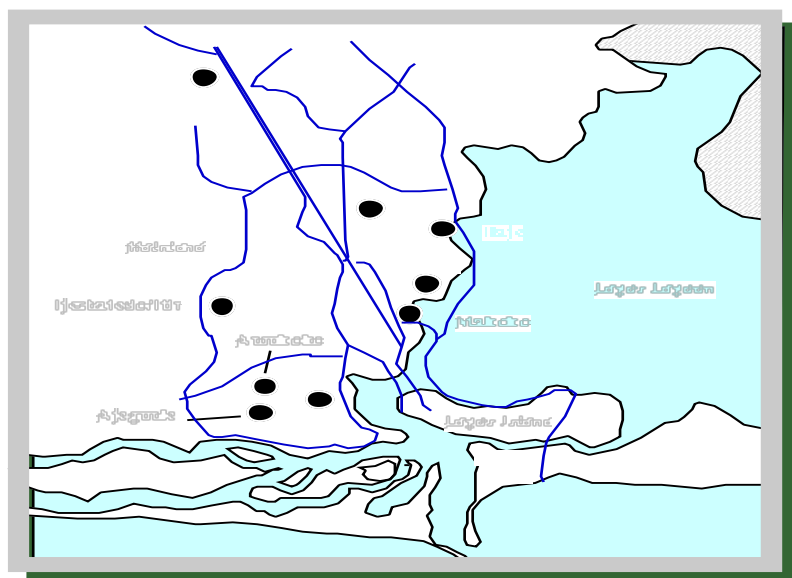


Plate 2.0: Lagos Study Area

Lagos is Nigeria's largest city, chief seaport, and principal economic and cultural center located on only about 3545 square kilometers, but with a population of over 9 million people. Lagos served as Nigeria's political capital until 1991, when the seat of the federal government moved to Abuja. The Lagos metropolitan area covers much of

Lagos State and is located on four principal islands and adjacent parts of the mainland (Figure 1). The major sections of the city are the Lagos Island, which serves as

mainly commercial district, Ikoyi and Victoria Island situated east of Lagos Island and serve as residential/commercial districts and Apapa, the port district, located on the mainland. Important mainland suburbs, incorporated as part of the city in 1967, include Ebute-Metta, Yaba, Surulere, Ajegunle, Shomolu, Agege, Mushin, and Ikeja.

Lagos port is Nigeria's leading port, particularly for imports of consumer goods, foodstuffs, motor vehicles, machinery, and industrial raw materials. A wide range of manufactured goods are produced in the city, including machinery, motor vehicles, electronic equipment, chemicals, beer, processed food, and textiles.

The Lagos metropolis harbours more than 60 percent of Nigeria's industrial capacity where a wide range of goods are produced. Due to its limited landscape, small-scale agriculture is

mainly restricted to the rural areas of the state where chemicals use is limited. However, Lagos is a centre of timber and wood processing industry which constitute a major consumer of chemicals including POPs. Lagos is also a transit point for imported chemicals since it has the longest land border crossing (for illegal imports) and the majority of the large chemicals importers and distributors (for legal imports) are also located in Lagos.

3.1.2 The Ogun Study Area

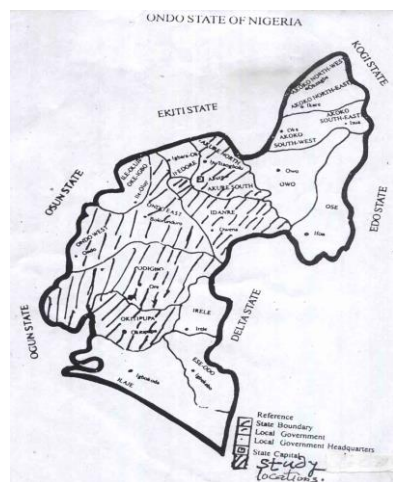
Ogun State is located in South-western Nigeria. It has been in existence since the 70's, with 20 Local Government Areas and Abeokuta as its capital. The state borders Lagos State to the south, Oyo and Osun states to the North, Ondo State to the east and the Republic of Benin to the west. Ogun state is in the tropical rain forest zone and is blessed with good climatic conditions and soil formation. All these make the state one of the major agricultural zones of Nigeria.

There are numerous markets in which a considerable trade is done in native products and articles of European manufacture. Timber, cocoa, cassava, palm-oil, rubber, yams and shea-butter are the chief articles of trade. It is one of the largest cassava producing states in Nigeria, and Nigeria is the World's largest producer of cassava. The industry generates US \$5 billion in revenue annually.

The State is a good reflection of a border state (Idiroko border post between Nigeria and the Benin Republic) and characterized by a variety of human activities, which range from agricultural, industrial, commercial, municipal, and domestic activities. The thematic study area is limited to POP Pesticides trading, use and regulations in Ogun State. This covers the pesticides Importers/marketers, Distributors, Users, Regulatory Agencies and the general public

3.1.3 The Ondo Study Area

Plate 3.0. Ondo study area



Ondo State is also one of the six states that lie to the South Western part of the country Nigeria along with others such as Ogun, Lagos, Oyo, Osun and Ekiti States. The state came into being on 3rd February, 1976 when it was carved out from the Old Western State. Another state, Ekiti State was carved out of the State in 1996. With an area of 14,769Km², it has eighteen Local Government Council Areas. By 1991 census, it has a population of 2.255, 713million which can be roughly given today as about three million (3 million). Ondo State lies between longitudes 4⁰, 30'E and 6⁰, 00'E of the Greenwich and latitudes 5⁰, 45'N and 8⁰, 15'N of the Equator. It is bounded by Kwara, Kogi and Ekiti States in the North, Edo and Delta in the East, Ogun, Oyo and Osun States in the West and in the South by the Atlantic Ocean. The

State has large drainage basins composed of Rivers and Creeks such as Oni, Owena, Ala, Ofosu, Ose and Ogbese.

Embedded in the bowels of the sedimentary rocks, basement complex and granite rocks are exploitable economic mineral resources ranging from Kaolin to Bitumen and Crude Oil. Generally, the land rises from the Coastal part of Ilaje, Ese-Odo and Okitipupa Areas of the State. The Climate is tropical with two distinct seasons of wet and dry. The Wet season lasts from April – October while the dry season lasts from November – March. The August break which represents a period of lower rainfall in the midst of the rainy season is recorded in August. The global climatic change is however gradually impacting on the climate of the state to the extent that minor alternations are now noticeable in the rainfall regimes. The state is blessed with a 12 diurnal sunshine hours and a moderate year round temperature of 25°C. The annual rainfall varies from 2,000mm in the Southern parts to 1,150mm in the Northern extremes.

The adequate rainfall encourages the growth of luxuriant forest vegetation to the South and most parts of the state while we have traces of the derived savanna to the Northern extreme which offers attraction to cattle herders. Ondo State therefore traverses various biomes and ecosystems thus placing the state as a veritable point in the study of the dynamics in ecosystem structure and functioning. These favourable climatic conditions have made it possible for the people to engage in a wide variety of economic activities all the year round.

Ondo State which is indeed a microcosm of the Nigerian Nation is blessed with abundant natural resources coupled with a resourceful, industrious and hospitable people. Her crop of educated elites has led to her being classified as one of the most educationally advantaged states in Nigeria. The people of Ondo State are mostly the Yoruba speaking tribes comprising mainly Owos, Ondos, Akokos, Ikales, Ilajes, Akures and Idanres. Others are the Apois and the Arogbos who are the Ijaw speaking people. Generally, the people of the State have almost the same life patterns. The languages spoken are the Yoruba, Ijaw and English. Although varying dialects of Yoruba Language are spoken locally, all are understood by nearly all inhabitants of the State. The people are mainly subsistence farmers, fishermen, lumbermen and palm wine tappers³.

3.1.4 The Oyo Study Area

Ibadan is the capital of Oyo State in Nigeria and the largest city in West Africa. An indigenous African town that lies between latitude 7 ° and 9°30' east of prime meridian²¹. Ibadan covers a land area of 12 kilometers radius with Mapo hall as the centre. It has an altitude generally ranging from 152 to 213m with isolated ridges and peaks rising to 274m. ²² The population of Ibadan was estimated as 100,000 in 1851, while the last official census conducted in 1963 gave an estimate of 627,739 ²³. The present population of the city is more than 3 million. Ibadan presents a typical picture of many African cities each known for having the old town area (inner core), the transitional and peripheral areas. The majority of the people are Yorubas' while other ethnic groups constitute a smaller proportion of the population. Over fifty percent are Muslims while others are Christians and a small proportion are adherents of

traditional African religion. Most of the people are engaged in petty trading and small-scale business, while others are civil/public servants. Ibadan has several public, private and social amenities such hospitals like the University Teaching Hospital (UCH), banks, industries, post office, higher institutions such as the University of Ibadan, research institutes such as the International Institute for Tropical Agriculture(IITA) , water corporation and over 3000 schools made up of both public and private nursery, primary and secondary schools.

3.2 Study Design and Scope

The study was a descriptive cross sectional survey. It involved the use of survey instruments like questionnaires, observation checklists, interview guides. Primary data was collected from well defined target groups namely the general population, importers/distributors, users and enforcement agents .Also secondary data was obtained from sources such previous reports, monographs, manuals and other literature materials.

3.3 Study Materials and Methods

3.3.1 Desktop Information

Existing data on the status of POPs Pesticides trading and use in Nigeria with specific emphasis on the five South Western States was obtained from related literature and reports from different sources.

3.3.2 Interviews

Interviews were carried out by means of consultations with different units in relevant ministries such as the Ministry of Environment, Ministry of Health, Ministry of Agriculture, Ministry of Forestry, Ministry of Commerce and Industry, Universities/Research Institutions, Farmers groups and the Nigerian Custom Service, among other relevant organizations.



Plate 4: Ogun State Study Team at Work (Ministry of Health)

3.3.3 Questionnaire Administration

A total of 827 questionnaires were administered in the four study areas as follows: Lagos (110), Ogun (75), Ondo (500) and Oyo (142). The questionnaire sought information from respondents (individual and corporate) on awareness on POP Pesticides, sources of POPs pesticides, trading and use pattern, health and environmental impact, existing regulatory

policies and control measures, and level of adoption of alternatives to POPs pesticides. Five structured questionnaire types were designed to target information from the five main identified classes of respondents as it relates to POPs issues.

The *Type A Questionnaire* was designed for the general members of the public – representing different socio-economic strata. Questionnaires were distributed among different respondents, reflecting urban-rural differential, chronological stratification, sex variation, and educational background. The Type B Questionnaire was designed for importers of Agrochemicals, especially POPs pesticides. The study team was informed that major pesticides and agrochemical importers were based in Lagos, a coastal city with sea ports and land borders. The Type C Questionnaire was designed for a distributor of Agrochemicals. The Type D Questionnaire was designed for users of Agrochemicals, including farmers (crops and animals) researchers and household users etc. The Type E Questionnaire was designed for relevant Regulatory agencies and their officers. The questionnaire was divided into four sections viz Socio-demographic, Knowledge, Attitude and Practices (KAP), Environmental characteristics and Health conditions. The questionnaire was pre-tested prior to the main administration in the communities.

3.3.4 Site Visits and Physical Inspection

Visits were scheduled to the border post, agrochemical dealers/marketers shops, sawmills and agricultural farms for physical inspection using the observation checklist designed for assessing POP Pesticides trading in South-western Nigeria.

3.3.5 Photo-Documentation

Photographs of relevant sites were taken during the site visits for pictorial illustration. Some of the snap shots are presented in this report.

3.3.6 Data Analysis

Questionnaire information was entered into computer and data analysed using descriptive statistics. Results were presented in simple frequencies and percentages. In some cases results were presented graphically to illustrate certain significant outcomes.

SECTION FOUR

4.0 RESULTS AND DISCUSSION

4.1 Socio-Demographic Distribution of Studied Subjects

4.1.1 Socio-Demographic Distribution of Respondents in Lagos

The result from Lagos showed that 16 (80%) of the respondents in the General Public category reside in the Lagos metropolitan area, while 4(20%) reside in the rural areas of the state. All the respondents (100%) reportedly knew about the usefulness of pesticides, especially those used for vector control in homes. No respondent was aware of POPs pesticides. However, after listing the 8 POPs pesticides by name, only 12 (60%) acknowledged being familiar with DDT and its use in vector control activities. This correlated with their ages as 12 respondents over 40 years of age reported being aware that DDT was used for vector control up till the late 1980s, but 8 respondents under 40 years could not recall having any information on DDT.

4.1.2 Socio-demographic Distribution of Respondents in Ogun State

In Ogun State, the respondents included people of different gender, age, educational level, social class, marital status and ethnic group. 75% of the respondents were male and 25% females. This is not unconnected with the fact that most of the farmers, distributors and heads of regulatory agencies were males. Age distribution was between 26-67years. Most respondents were elderly with long-term experience and practice, they were expected to have good knowledge of pesticides and pesticides related issues. Most of the users, specifically farmers had low academic backgrounds. 66% had no formal education, 20% had primary education, and 12% had secondary education, while those with tertiary education accounted for 2%. The academic background of the distributors was not far from that of the users. The case was not the same among the regulatory agencies and general public, as most have higher educational background. Tertiary education (56%), secondary (25%), primary (12%), and 7% with no formal education.

4.1.3 Socio-demographic distribution of the respondents in Ondo State

In Ondo State, the socio-demographic characteristics of POPs pesticides users interviewed are shown in Table 8.0. This shows that 71.47% of the users are farmers and majority of these farmers (58.20%) had no formal education. These farmers cultivated mostly cash-crops such as Cocoa, Cashew, Kola-nut and Oil-palm. Eighty (80%) percent of the respondents were male while the remaining 20% were female. Overall, about 60% of them had no formal education and 25% at one time or the other had attended primary school. Only 2% had post secondary education.

The implication of this is that they can neither read nor interpret the instructions on the pesticides container successfully on their own. These are experienced farmers that have been engaged in farming activities for more than twenty years. However, 10.67% of the users are

traders and 80% of these traders had formal education ranging from primary school (30%) to post secondary school (20%). In addition, it was discovered that the users of POPs pesticides in Ondo State were civil servants. They constitute 6.13% of the entire users. Probably these groups of civil servants were engaged in part time farming. The business men and women were not left out in the usage of POPs pesticides. They also constitute 4.5% of the users in the State.

The analysis of the questionnaires from the general public category revealed that over 60% of the respondents were farmers, 10% were engaged in one type of business or the other, 9% were civil servants, while the rest were either craftsmen/crafts women or some unemployed. Socio-demographic characteristics of respondents engaged in the trading and distribution of POPs pesticides in Ondo State shows that more than 92% were male out of which 60% of them had no formal education.

As derived from the discussion it is necessary to observe that the situation where over 45% of the overall users and 60% of the distributors /traders of these kinds of environmentally sensitive chemical had no formal education calls for special attention in the form of control of their distribution and to embark on aggressive awareness drive among users in Ondo State as a whole.

Table 8.0: Socio-Demographic characteristics of Pops Pesticides Users In Ondo State, Nigeria

<i>EDUCATION</i>	<i>TRADERS</i>	<i>FARMERS</i>	<i>BUSINESS</i>	<i>CIVIL SERVANT</i>	<i>STUDENTS</i>	<i>OTHERS</i>	<i>TOTAL</i>
<i>NO FORMAL EDUCATION</i>	8 (20%)	156 (58.20%)	2 (11.76%)	-	-	4 (26.65%)	170 (45.33%)
<i>PRIMARY EDUCATION</i>	12 (30%)	72 (26.87%)	2 (11.76%)	6 (26.08%)	8 (100%)	-	100 (26.62%)
<i>SECONDARY EDUCATION</i>	8 (20%)	35 (13.06%)	12 (70.50%)	5 (21.74%)	-	10 (66.67%)	70 (18.67%)
<i>TERTIARY EDUCATION</i>	6 (15%)	3 (1.12%)	3 (17.65%)	2 (8.70%)	-	1 (6.67%)	15 (4.00%)
<i>OTHER</i>	6 (15%)	2 (0.7%)	2 (11.76%)	10 (43.43%)	-	-	20 (5.33%)
<i>TOTAL</i>	40 (10.67%)	268 (71.47%)	17 (\$.53%)	23 (6.13%)	8 (2.13%)	15 (4.00%)	375 (100%)

4.1.4 Socio-demographic distribution of Respondents in Oyo State

In Oyo State, both male (60%) and female (40%) were interviewed in the general public category. They were mostly civil servants (46%), followed by students (28%), business people (20%) and traders (4%) (see Fig 2.0). All the users interviewed were males (100%). This may be due to the nature of the job, as the primary occupation of the users is farming (76%) and carpentry (18%). Majority were in the age range of 51-60 (30%) and 61-70 (30%). Unlike the general public, majority of the users had secondary education (34%). Most (74%) of the respondents' were from the semi-urban areas (outskirts) of Ibadan viz Pade village, Olorundaraba, Ajibade, Ajibode, Okeado Agbowo, Eniosa Onibepe, Foranbi village, Mokola,

Orogun, Samupade and Challenge areas of Ibadan. Majority (64%) of the users have been using POPs pesticides above 20yrs.

Among the retailers majority (90%) were males mostly between the ages of 31-40yrs (60%), 90% had secondary education and all were traders engaged in selling mixed pesticides. Among retailers who sell pesticides majorly in Agbeni Ogunpa market, 90% have been involved in the business for more than 10 years, and they were mainly (70%) based in ogunpa market.

The assessment of POPs pesticides trading amongst the distributors and chemical dealers in Ibadan Oyo State revealed that they were all males (100%). Whereas 50% of them were located in Ogunpa markets only about 20% each were located in Mokola and Iwo road area respectively. Majorities (43.8%) were in the age range of 41-50 and had post-secondary education (56.3%). Majority (62.5%) of the distributors were in the business between 11-20yrs (see Fig 3.0) and resided in Ibadan metropolis – Ogunpa , Iwo road, Mokola, Amunigun, Agbeni/Ogunpa areas mainly etc.

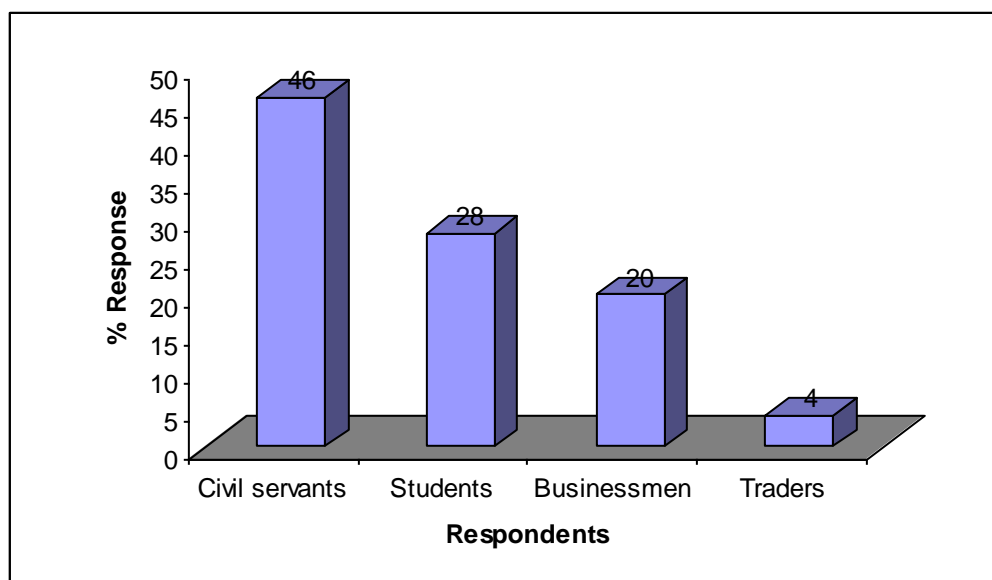


Fig 2.0: Socio-demographic Distribution of Respondents at Oyo State

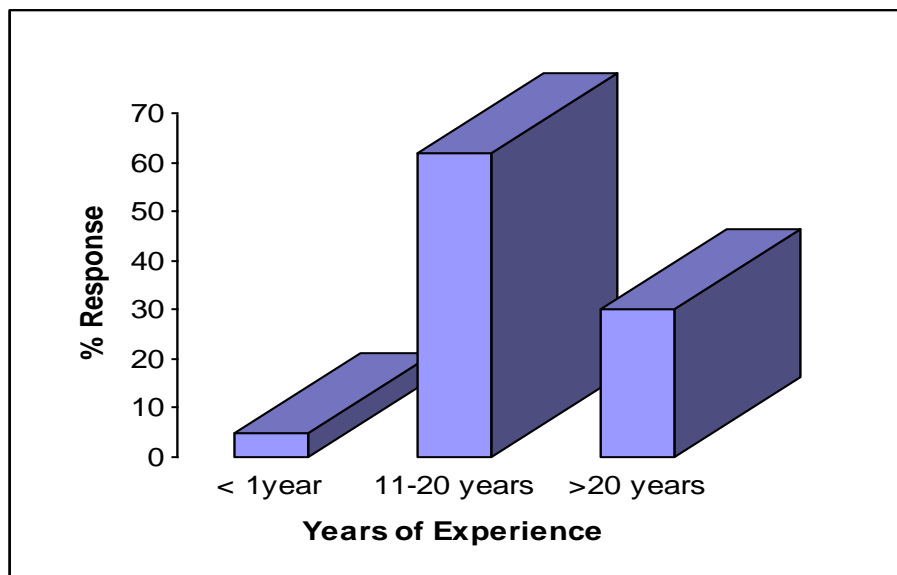


Fig 3.0: POPs Pesticides Importers years of Experience in Oyo State

The interviews among the importers showed that few of them imported pesticides from across the borders. Majority (64%) of those that were interviewed indicated that they were involved in the trade more than ten (10) years. More than 80% of these respondents agreed that POP pesticides and other farming chemicals were produced in the Asian continent (especially China, India, and Singapore) while about 20% had the view that they were produced in the European countries.

From the survey, it could be deduced that the importers were well aware of POPs pesticides; however they all agreed that none of these POPs pesticides were imported by them except Herbicides and Insecticides. Also the sales of these pesticides were not considered an illegal trade. Moreover; all of them affirmed that the responsibility of regulation lies with NAFDAC, and that weak enforcement remain the force militating against getting rid of the society from illegal traders of POPs pesticides.

One of the importers (FITSCO) revealed that in Oyo state, they were already forming an association whose advice, views and opinion could be harmonised and sent to the appropriate government quarters to form policies on importation, distribution and use of pesticides in general.

Only one female respondent was found among the importers, they were mostly (83.3%) within the age range of 31-40yrs, and they all had tertiary education. Six major importers were interviewed - FITSCO, JUBALI, CSAR, COLLINS GROUPE JUBAILI, DIZZENGOFF, CZAR, and they were found mostly within Jericho, Mokola and Monatan areas of Ibadan. About half of the respondents were in the business for 1-10years and another 50% above 20years – respectively. They imported mostly chemicals/drugs and their import products were mostly for traders from Ibadan, Kano and Lagos.

Regulators – The Regulatory Bodies used for the purpose of the study included - Federal Environmental Protection Agency (FEPA) now a parastatal under the Federal Ministry of Environment, Oyo State Ministry of Environment and Water Resources, Oyo State Agricultural Development Programme (OYSADEP), Institute of Agriculture, Research and Training (IAR &T) Oyo state Agricultural Input and Credit Organization (OYSAISCO) Plant Quarantine Office, Moor Plantation, Oyo State Tree Crops Development (TCDU), Standard Organisation of Nigeria (SON) etc.

Expectedly, all the regulators were government officials and all had tertiary education. They were mostly (70%) within the age range of 31-40yrs. Majority (70%) of the regulators had less than 10years experience.



Plate 5: A pesticide Store in Abeokuta, Ogun State



Plate 6: Pesticides stocked in a Store in Ilaro, Ogun State



Plate.7: A mobile Rodenticide Hawker in Ogun State



Plate.8: Trafficking of goods at the Border Post in Ogun State



Plate 9: A custom officer at work at the border post in Ogun State

4.2 Knowledge, Attitudes and Practices Associated with POPs Pesticides

4.2.1 Knowledge, Attitude and Practices Associated with POPs Pesticides in Lagos State

Lindane (Gammalin 20) is one of the 27 pesticides on the PIC list, but still in use globally. In Lagos, it is widely used in the formulation of a variety of insecticides. For example, two locally formulated insecticides called 'ota pia pia' (killer) and G.O 90 are reportedly made from Gammalin 20 which is mixed with other solvents like kerosene and packaged in small bottles of about 5ml. These highly pungent concoctions are dropped in little quantities around the house and they have proved very effective against vectors like flies, mosquitoes, cockroaches, bed-bugs etc. Lindane powder mixed with some unknown chemicals is used to formulate a very effective rodenticide. To administer lethal doses to rodents the powder is mixed with some edible products like dried fish and placed in nooks and corners of the dwelling at night. On consumption of this menu, rats and other rodents are known to be quickly killed and dried up, thus leaving very little odour. There are a large number of rodenticides in Lagos state and these are mainly hawked on the streets by mobile salesmen.

These locally made insecticides and rodenticides are very important in the lives of majority of Lagos residents whose homes harbour different types of rodents and insects. They are by far cheaper than the branded ones like Raid, Mobil and Shelltox or their imported equivalent. They are therefore very popular with the poor and since about 75 percent of Lagos residents are classified as poor, it is estimated that about 7 million people use these products on a regular basis.

A majority of respondents (18) claimed that the Gammalin 20 used in the formulation of these insecticides and rodenticides in Nigeria are smuggled into the country from Ghana and some neighbouring French speaking West African countries. These however could not be confirmed

since observations at the border post in Seme failed to spot large-scale chemical smuggling activities. Food items like frozen chicken and rice were the most popular smuggled items identified at the Seme border post. It is however possible that banned chemicals such as Gammalin 20 could be smuggled into the country in small consignments since the law enforcement agents were literally less educated or disinterested in issues of chemicals imports. This fact was established when the team of interviewers tried to administer a questionnaire on a custom's officer and he collected the questionnaire only to request the team to get the feedback after one month because he had to liaise with his bosses in the head-office in town.

4.2.2 Knowledge, Attitude and Practices Associated with POPs Pesticides in Ogun State

Out of the total number of respondents, only 32% heard about POPs pesticides (as chemicals used for crop protection and pest destruction), while 68% claimed ignorance of POPs pesticides. Awareness level among the regulatory agencies and distributors were higher than among the users. About 11% of the users claimed to have used POP pesticides before and only 7% still used it for crop protection and mosquito control. Only 4 POPs pesticides were identified by the respondents as commonly used, namely Lindane, Aldrin dust, Grammassonne and Gammalin 20. About 17% claimed that POPs Pesticides persist in the environment and that they caused injury and defects. The implication of the observation is that, the awareness status of most of the respondents was low and a massive awareness and enlightenment programme is imperative.

The common practice of pesticide distribution/sale in the state is through small scale pesticides stores which dot various parts of the states and through rodenticide/insecticide hawking. The study revealed that POPs pesticide have been extensively used in the area for pest and vector control until late 80s but, it is no longer a common practice in the state. The Ministry of Agriculture informed the team that present day farmers in the state rarely used pesticides except when there was a major pest outbreak, which the state has not experienced in the last 25 years. The pesticides distributors and retailers further confirmed this fact, as they claimed to suffer very low patronage of pesticides by users unlike in the past. An attempt to determine what they do to expired pesticides revealed that they still sold expired pesticides to farmers, but at cheaper price. The Ministry of Health informed the team that the state does not use DDT for malaria control, but encourages the use of Insecticide Treated Nets (ITNs) among the populace. Most of the farmers attributed the use of POPs pesticides in the past and when need be, to high efficacy, effectiveness (fast knocking ability on insects and its durability). Some household also patronize Gammalin 20 for termite control from wood and home furniture.

4.2.3 Knowledge, Attitudes and Practices associated with POPs Pesticides in Ondo State

The data from the general public on knowledge, attitude and practices associated with the POPs pesticides in Ondo State shows that above 75% knew what POPs pesticides was all about. However, almost all the respondents' exhibited ignorance in understanding what the technical terminology and acronym (POPs) meant not until an explanation was provided by the survey personnel using local names to describe the chemicals.

The assessment of the knowledge levels about POPs pesticides in Ondo State was approached primarily from two perspectives. First, was to look at different sources from which respondents had knowledge about POPs pesticides. The identified sources among others include when the respondents were in school, from office, through friends, media or other sources. Second, was to assess the knowledge of the respondents on the uses of POPs pesticides.

The sources of information on POPs pesticides among respondents are as shown in Table 4. Over 70% of the general public indicated other sources. This category of respondents claimed they never heard of POPs pesticides at all. This is as a result of the technical terms used; however, they were able to understand what it meant after the survey personnel described the chemicals in their local names. The situation is different when focusing on the users who are mostly farmers. While 26.67% of the users had information on POPs pesticides during their school days; 12.8% got to know about it from friends, 53.3% from advertisement from the electronic media and 47.2% got to know of the chemical from other sources. These other sources as mentioned by the users are at Community Based Association (CBA) meetings and Cooperative Societies meetings. The fact remains that even when respondents provided information about different sources of Pops pesticides, this does not guarantee their knowledge about the correct usage of these POPs pesticides. Table 5 shows the assessment of the knowledge of uses of POPs pesticides among respondents in Ondo State.

It was observed among the general public in Ondo State, that 42.75% of the respondents were aware of the uses of POPs pesticides, while about 0.53% of the acclaimed users had no knowledge about the uses. Thus, their belief was that the POPs pesticides were meant for the catching fish in streams. Again they were not at all aware of the inherent dangers and damages their activities could possibly cause to the environment and health. Overall, 26.8% of the respondents felt that POPs were used for farmland pest control, particularly, CAPSIDS pest control (Farifari as it is known locally), 6.39% believed that they were meant for wood pest control, 8.78% saw it as meant for weeds control, while 20.52% claimed that the POPs were essentially meant for general vector control (see table 5.)

Users of POPs pesticides among farmers in Ondo State were known to take less precautionary measures during the chemical application. This was reported in terms of their not wearing protective material to guard against inhaling the poisonous gases emitted by these chemicals during applications as well as their non compliance with the specifications regarding uses. The unused (left over) POPs pesticides at any particular farming year were carelessly stored by packing them under the bed in their sleeping rooms or kept inside the roof / ceiling in their houses. It was not uncommon to detect some of the unused quantities become expired, yet they were still being used in the subsequent farming season. The release of expired POPs on the crops and the users during application was considered to have some toxicological implications.

Table 6 shows the usage of POPs pesticides among respondents in Ondo State. Overall, only 36.31% of the respondents claimed to have used POPs pesticides before. This is not to say

that they have used the POPs correctly, while 61.69% of them claimed they have not use one form or the other. This result shows a very low level of understanding of the people about the POPs pesticides and their accompanied environmental and human health hazards. Therefore, both the low level of usage of POPs and the storage practices of the unused POPs among respondents in Ondo State deserve immediate and imperative awareness drive in the State.

Table 9.0: Sources of Information on Pops Pesticides among The Respondents in Ondo State, Nigeria

SOURCES OF KNOWLEDGE OF POPs	GENERAL PUBLIC	USERS	DISTRIBUTORS	REGULATOR Y BODIES	TOTAL
AT SCHOOL	10 (2.5%)	10 (26.67%)	- (0.00%)	-	20 (2.28%)
OFFICE	4 (1.0%)	- (0.00%)	20 (20.00%)	2 (100%)	26 (2.98%)
FRIENDS	2 (0.50%)	48 (12.80%)	18 (18.00%)	-	68 (7.75%)
ELECTRONIC MEDIA	102 (25.50%)	200 (53.33%)	17 (17.00%)	-	319 (36.37%)
OTHER	282 (70.50%)	117 (47.20%)	45 (45.00%)	-	444 (50.63%)
TOTAL	400 (45.61%)	375 (42.76%)	100 (11.40%)	2 (0.02%)	877 (100%)

SOURCE: NES Ondo State Chapter Field-work, April 2007

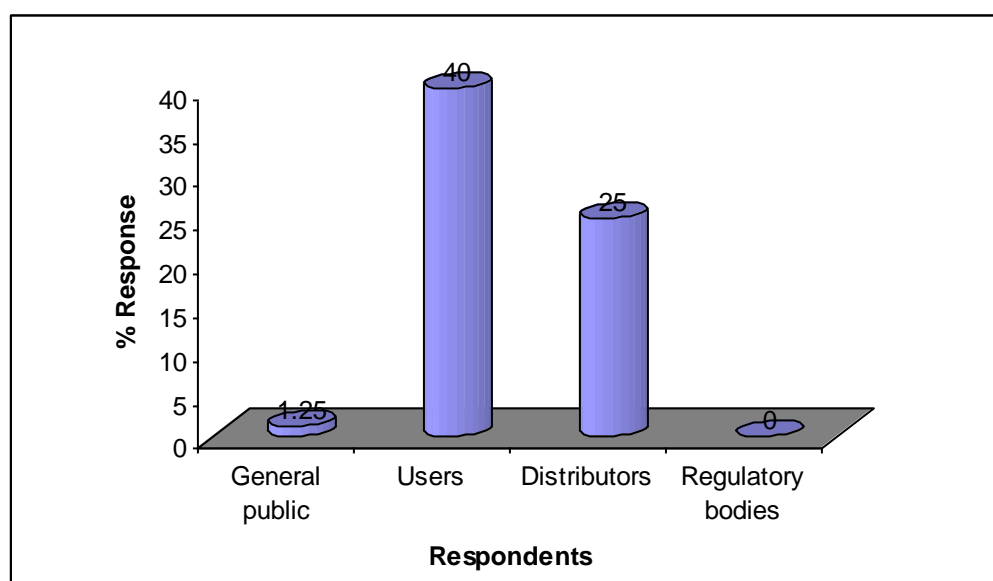


Fig 4.0: Knowledge about Use of POPs Pesticides for Vector Control in Ondo State

Table 10.0: Knowledge of Uses of Pops Pesticides by Respondents In Ondo State, Nigeria

KNOWLEDGE AND USES OF POPS	GENERAL PUBLIC	USERS	DISTRIBUTORS	REGULATOR Y BODIES	TOTAL
FARM PESTS CONTROL	105 (26.25%)	100 (26.67%)	30 (30.00%)	-	235 (26.8%)
WOOD PESTS CONTROL	15 (3.75%)	16 (4.27%)	25 (25.00%)	-	56 (6.39%)
WEED CONTROL	10 (2.50%)	52 (13.87%)	15 (15.00%)	-	77 (8.78%)
GENERAL VECTOR CONTROL	5 (1.25%)	150 (40.00%)	25 (25.00%)	-	180 (20.52%)
ALL OF THE ABOVE	86 (21.50%)	45 (12.00%)	3 (3.00%)	2 (100%)	136 (15.51%)
NONE	8 (2.00%)	10 (2.67%)	- (0.00%)	-	18 (2.05%)
OTHERS	171 (42.75%)	2 (0.53%)	2 (2.00%)	-	175 (19.95%)
TOTAL	400 (45.61%)	375 (42.76%)	100 (11.40%)	2 (0.02%)	877 (100%)

SOURCE: NES Ondo State Chapter Field-work, April 2007

4.2.3 Knowledge, Attitude and Practices associated with POPs Pesticides in Oyo State

Among the general public where 50 questionnaires were administered to different people randomly selected from Mokola, Sango, Orogun, Ojoo, Eleyele, and Adamasingba about 40% of them were able to identify only two classes of POPs pesticides namely aldrin dust, Gammalin and also mentioned some other farming herbicides and pesticides. Their knowledge level was somewhat limited to insecticides used within the household for vector control.

It was discovered that pesticide usage had different meaning to the users, though many (76%) of them claimed to know what POPs pesticides are. Majority received information from school (30%) and friends (22%). According to the general public, POPs pesticides were mostly used for vector (26%) and insects (18%) controls. An equal distribution of respondents indicated they had or had not used these pesticides. They claimed that it was mostly (64%) used for insect control, and that it was used (68%) weekly. Majority (70%), indicated POPs pesticides are not produced in Nigeria and they were aware that the accumulation of POPs pesticides affected environment and health. Also 82% were aware of illegal trading on POPs pesticides and that the people mostly involved were at the sea port according to 80%. The most commonly imported POPs was gammalin 20 according to 88% of the respondents and they were mostly sold at the general market. The farmers admitted that often times the

pesticides that they used were unfamiliar but that they did not patronize touts or illegal dealers, rather they secured most of the pesticides they used through government agricultural agencies specifically Oyo State Agricultural Development Project OYSADEP, and OYSAISCO. The carpenters however purchased their solighum from retailers in the open markets. About 80% of the respondents also indicated that gammalin 20 has been banned from Nigeria. Those who engaged in this illegal trade were smugglers according to 88% of the respondents, while 10% of the general public was aware of policies or regulations, or even regulatory bodies in charge of enforcing the law and regulations surrounding POPs usage, distribution and storage.

Among the users, majority (86%) do not know what POPs pesticides are, they also received information on them mainly (46%) from Oyo-state Agricultural development programme (OYSADEP). The respondents indicated they are used mainly on farmlands for pest control, wood pest control and vector control. The types of POPs pesticides ranged from gammalin 20, aldex 40, gramoxone, gramzone, anthrazine etc. They used gramoxone, nuvacrone, solignum, gammalin 20 mostly and basically for pest control. About 60% indicated they use it yearly, the same percentage indicated they were aware accumulation of POPs pesticides could affect the environment and health.

Majority (86%) of the respondents kept these products in the store (farm store, farm house, hamlets, shop) and according to 54% of the respondents these chemicals lasted for 12 months in the store. Most (38%) of the respondents indicated they obtained POPs pesticides from the general market, and nearly 60% of them also indicated they disposed of these products when they expired.

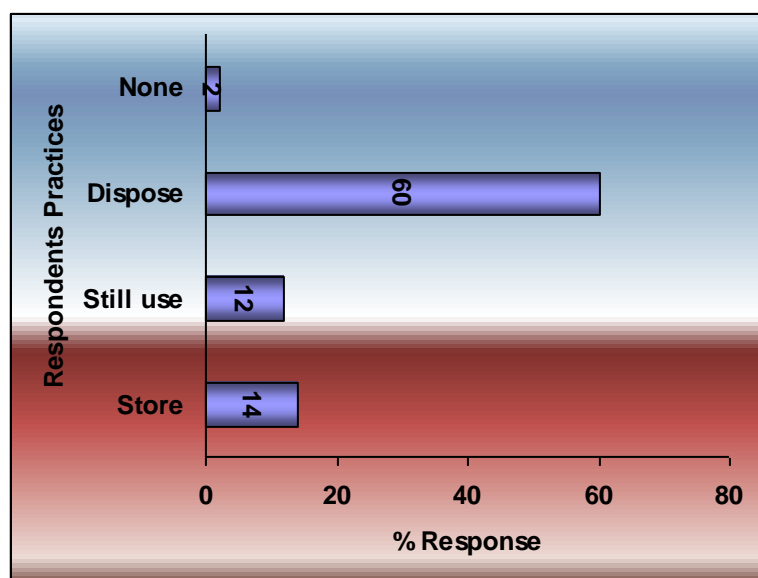


Fig 5.0: Practices of POPs Pesticides Users in Oyo State

Many (82%) are not aware that there is illegal trading of POPs pesticides, also 72% are not aware that there are sanctions against dealing on these products and they (14%), indicated

that NAFDAC and another(4%) that NDLEA and the police were those responsible for imposing the sanctions.

Among the retailers it was observed that more than 80% of these retailers do not really know what POPs pesticides are, but claimed that all chemicals used by farmers for farming are POPs pesticides. They indicated that a whole lot of mixtures were made from herbicides and pesticides and packaged to unsuspecting members of the society as household insecticides. It was also gathered that many of the respondents were not aware of the presence of any regulatory bodies, as they continued selling adulterated products unabated. Although, they were not forthcoming with information but after much persuasion most of them volunteered responses even though they were suspicious of being interrogated by police.

About 80% of the retailers interviewed indicated that the POPs pesticides were used against pests such as insects, weed and for other vector controls. Another 60% indicated they used the products mainly to kill insects and rodents while 80% indicated that accumulation of these chemicals can affect the environment and health.

All the distributors indicated they know POPs pesticides, though few were able to name these substances. They (75.1%) also claimed to obtain information on POPs pesticides from government offices while majority indicated that the pesticides were used for all forms of pest as earlier indicated. About 87.5% indicated they have used some of the products, basically for fumigation (43.8%) and preservation (25%). And 93.8% also indicated that they were aware the accumulation of POPs pesticides can affect the environment and health.

However the general knowledge of the distributors of farming chemicals about POPs pesticides appears limited as only a few of them could name only three (3) classes of these substances viz Lindane, DDT and Gammalin 20. It appeared that most of the POPs pesticides were replaced or substituted with many other chemicals which were sold to farmers in other trade names.

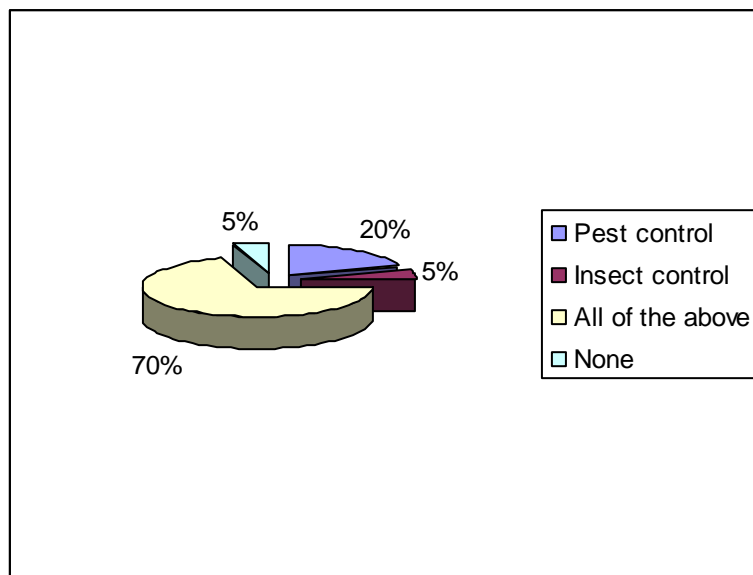


Fig 6.0: Utilization Pattern of POPs Pesticides by Users in Oyo State

Among the importers all indicated they know what POPs pesticides are, and the types include - cypermethrin, dichlorvos, gammalin 20, gammalin super, lindane, capsitox 20, herbicides, insecticide, fungicides. According to the respondents the substances were used for all the various pest control activities earlier mentioned.

Among the regulators all of them indicated they know what POPs pesticides are, and that the types used were – DDT, Benzofuran, Lindane, gammalin 20, aldrex 7, otapiapia, and organic pesticides. They obtained information from office (50%), school (30%), and from journals (10%). They claimed to have used it before (60%), and the types used are – diuron, "and aldrin, "lesekes" (locally translated for "immediately"). They were mainly used as insecticides, and 90% of them agreed they were aware that its accumulation can affect the environment and health. The study revealed the respondents could not identify those involved in the genuine POPs pesticide trading, yet about 55.5% agreed that there was illegal trading of POPs pesticides and 70% of them indicated that those involved in the business were smugglers. Also 50% of named all banned chemicals as the class of POPs considered illegal.

The findings also revealed that there are policies on ground against the importation of POPs pesticides that attract sanctions. Hence, 70% of the respondents indicated that there were sanctions against those who engaged in illegal POPs trading. These sanctions include; payment of administrative fine, jail, apprehension and confiscation. Though these sanctions were applied always and as the need arises, there were some limitations to these sanctions. These included smuggling and inability to pay the imposed fine by offenders. In the same vein, the feedback put in place to check the enforcement of these sanctions included follow up, information and thorough checking of containers on arrival at the seaports. Also results showed that some of them have partial knowledge of POPs pesticides. Although there were policies on ground for regulating the importation of these substances into the country, smuggling was a militating factor against the effectiveness of the Regulatory bodies.

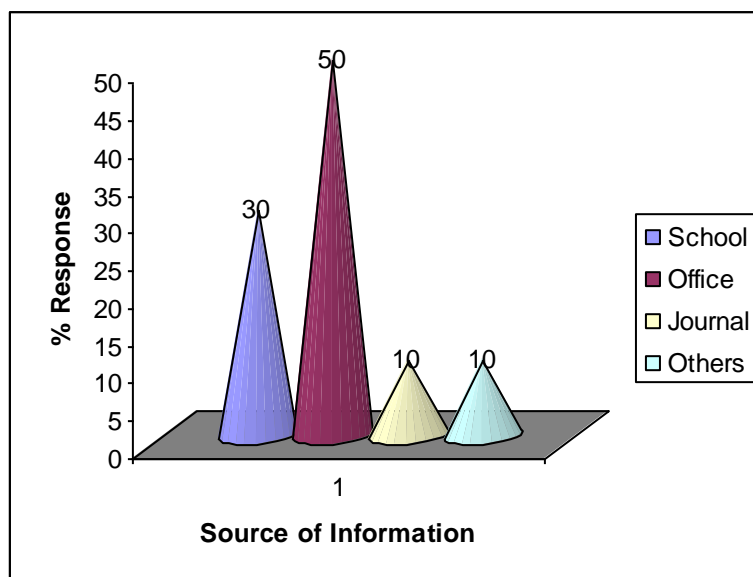


Fig 7.0: Source of Information about POPs Pesticides among Respondents in Oyo State

4.3 Sources / Types of POPs Pesticides Commonly Used

4.3.1 Sources and Type of POPs Pesticides in Lagos State

In Lagos there are a large number of POPs pesticides that are in use. Most of them are imported via the ports and others are formulated locally. Some of these are mainly hawked on the streets by mobile salesmen. Of all the various kinds of POPs pesticides, Gamalin 20 is the most popular. This chemical as earlier mentioned is used in making other local insecticides. These locally made insecticides and rodenticides are very important in the lives of majority of Lagos residents whose homes harbour different types of rodents and insects. They are by far cheaper than the branded ones like Raid, Mobil and Shelltox or their imported equivalent. They are therefore very popular with the poor and since about 75 percent of Lagos residents are classified as poor, it is estimated that about 7 million people use these products on a regular basis.

4.3.2 Sources and Type of POPs Pesticides in Ogun State

The survey revealed that there were no POPs pesticide importer in the state, but POPs pesticides still found their way illegally into the state. The pesticide traders claimed to get supply from importers in Lagos and at times from Ogunpa market in Ibadan. Common types of POPs pesticides identified in the state include Gammalin 20 (used for protecting kola nut from pest, fishing and also used for formulating local insecticides and rodenticides), Lindane (used for Cocoa protection), Grammassonne. Common types of locally formulated insecticides mostly used by household are 'ota pia pia' and G.O 90. They were mainly used for the control of mosquitoes, flies, crawling insects such as bed bugs and cockroaches, and also used to kill rodents. They were said to be far cheaper and faster in action than the branded pesticides. A brief interview with a mobile insecticide hawker revealed that the locally formulated

insecticides were made from Gammalin 20 mixed with solvents like kerosene and packaged in small bottles or paper sachets. Lindane powder and other unknown chemicals were also used to formulate local rodenticides. These locally formulated rodenticides and insecticides were mainly hawked on the streets by mobile salesmen and patronized by the general public.

A visit to the Idi-Iroko border post revealed illegal trafficking of goods, but it was impossible for the study team to really ascertain the content of such goods because they were well packaged and carried no label on them. The Custom officers at the border post affirmed to the study team that there was no illegal trafficking of POPs pesticides at the border post. Though personal communication with the Custom Officers revealed that their knowledge on POPs pesticides was low and awareness on banned POPs pesticide was also very poor.

4.3.3 Sources and Type of POPs Pesticides in Ondo State

The brands of pesticides commonly used by the farmer/users in Ondo State were mostly obtained from the petty-traders/ distributor who got their supply mainly from Ibadan, Lagos and Oshogbo. Most of these compounds were found to be highly adulterated. However, another source of supply to the users in Ondo State was through the Ondo State Agric Input Supply Company (OSAISC), which usually obtained its supply through contracting services. In this case the supply sources could not be ascertained. The types of POPs pesticides obtainable in Ondo State were mainly Agro-Chemicals-Herbicides and they included: DDT, DD-force, Weed-Off, Round-up, Termicot, Atrazin, Glyphosphate, Metaclors-plus Alachlor 2-4 Amcine, Paraquent, C-methrine, Monochloro phous, Lindane (Gammalin 20 - the genuine and the fake ones), Thionex 35, aldrin, Toxaphere, Uden 20, Best, Kokotin, Netrogram, Neopybrutin.

4.3.4 Sources and Type of POPs Pesticides in Oyo State

POPs pesticides were mainly from importers who patronized ports. One of the importers (FITSCO) revealed that in Oyo state, they were already forming an association whose advice, views and opinion were put together and sent to the appropriate government quarters to form policies on importation, distribution and use of pesticides in general.

Types of POPs commonly used in Oyo state include gammalin 20, aldex 40, gramoxone, gramzone, anthrazine etc.

4.4 Distributors and Retailers in the Locality

4.4.1 Distributors/Retailers of POPs Pesticides in Lagos

Among the distributors studied 10 respondents (50%) were large-scale chemical dealers while another 50% were small-scale dealers who set up shops near their customers or source of supply as the case may be. These distributors sell measured quantity of chemicals from unlabeled drums or drums written in French to their patrons. The bigger distributors had more knowledge about chemicals including POPs and so were aware of the Stockholm Convention. They claimed they were not involved in the sale of POPs.

The big dealers had their offices and warehouses while the small ones conducted their trade in the open market and makeshift sheds near their patrons. The ten (10) large-scale marketers interviewed were reportedly aware of the usefulness of pesticides, especially the insecticides used for wood treatment and for vector control. They claimed selling only approved chemicals. The small-scale Marketers dispensed chemicals in cans and bottles from unlabelled drums or drum with French inscriptions. The survey team suspected that some of the drums perhaps contained DDT and Gammalin 20 which were sold in smaller containers and bottles to their clients including farmers.

The small scale distributors have a suspected source of POPs into the Nigerian markets because one of the chemicals widely sold has the characteristics of Lindane and they declined to disclose the names of the chemicals they dispense from the unlabeled drums

4.4.2 Distributors/Retailers of POPs Pesticides in Ogun

There were no empirical data on the distributors and retailers of POPs pesticides in Ogun state based on the survey conducted. However; this does not preclude the fact that they could be some obscured agents who were distributors and retailers.

4.4.3 Distributors/Retailers of POPs Pesticides in Ondo

Most of the retailers of Agro-chemical supply were based in Akure the Ondo State capital and some other towns where tree cash-crops farming are well established so as to meet the needs of the farmers at close proximity.



Independent Distributors were scattered all over the study Area with the largest concentration being in the Arakale, Ondo road area of Akure, Oke Odunwo, Sabo and Bagbe areas of Ondo, Sabo and Okitipupa road at Ore, Old garage at Okitipupa and Ilutitun market areas of Okitipupa. At Idanre the concentration was mainly at the Alade area. Some of the big names in the Agro-chemical trade in Ondo State included Bukedot and Soley-tech located at Arakale area of Akure Ondo State capital. Others include:

Plate 10.0 Chemical Store, Idanre, Ondo State

Kekerowo Trading Store; Ojo & Sons both of Akure. Paulad Enterprises/Tech of Sabo, in Ondo town; Uncle Sam Tech of Total area of Ore, Temi-tope Stores of Idanre and Uncle Gentle Stores of Okitipupa to mention but a few. Apart from the Independent Distributors, the Dept of agric services in the Ministry of Agriculture Fisheries and Forest Resources also had these pesticides in stock for distribution to local farmers as part of their Extension services. The same was also

applicable to the Agric Input Supply Company of the Agricultural Development Project [ADP] which applied some of these chemicals to treat maize and other grains preparatory to their storage.

4.4.4 Distributors/Retailers of POPs Pesticides in Oyo

Findings showed that 93.8% of the respondents indicated that the substances are not produced in Nigeria, that they were produced from China, India and Germany primarily. For those who indicated it was produced in Nigeria, they claimed companies such as CAPL in Nigeria are involved. Majority (90%) also believed that, these substances were imported legally into the country and that the seaport in Lagos was the major point of entry of these substances. Majority (70%) of the retailers was not involved in the importation of the POPs pesticides, and as such these substances were sold or distributed at the general market. Products mostly sold include grammozone, gammalin, altacide and aldrein. The duration of the products on the shelf was said to vary and expired products were either sold or disposed by open dumping. They reported gammalin 20, Lindane, DDT, Deldrin and Ghana Gammalin as major pesticides banned from Nigeria. And 80% indicated there was no illegal trading associated with the business except for those who mentioned smugglers of goods as those involved in such trading. About 56.3% of the distributors indicated that illegal transactions of some of these substances especially the Ghana gammalin was through the porous land borders into the general market.

4.5 Major Importers and Marketers

4.5.1 Major Importers and Marketers in Lagos

According to the survey outcome in this category large multinational companies dominate the Nigerian chemicals import trade. Some of these companies were also involved in the importation and marketing of other types of chemicals like industrial chemicals, pharmaceuticals etc. A few of these companies however traded only on agro-chemicals. The agro-chemical companies belong to trade groups such as Crop Life Nigeria and Pest Control Association of Nigeria (PECAN).

All (100%) the respondents reportedly knew about POPs pesticides, and the Stockholm Convention. Of this number (30%) belong to CropLife Nigeria. CropLife Nigeria is part of a global trade association called CropLife International which looks after the interests of its members in their respective countries. The remaining 70% of the respondents belong to the Pest Control Association of Nigeria (PECAN). They all claimed that they had never dealt with POPs chemicals since they knew the dangers associated in using them. No banned POPs were manufactured or imported into Nigeria through official means by the major importers.

4.5.2 Major Importers and marketers in Ogun State

The survey revealed that there was no POPs pesticide importer in the state, but these products still found its way into the state. The pesticide traders claim to get supply from importers in Lagos and at times from Ogunpa market in Ibadan.

4.5.3 Major Importers and marketers in Ondo State

There was no single identified importer on POPs pesticides based in Ondo State. Retailers and the Government supply agencies in the State obtained their supplies from wholesalers and government appointed contractors based in Lagos, Ibadan and Ogun border towns for their supply. The marketers of POPs pesticides in Ondo State were mainly in the form of retailers who are based in the major towns in the State. However, agents of the town –based retailers moved from one village to the other particularly on periodic market days for the sale of these POPs to the farmers. In addition, government established OSAISC in all the eighteen Local Government Areas in the state to be responsible for reaching farmers under the umbrella of Farmers Congress or Farmers Cooperative Societies so as to supply and sale agricultural input chemicals to the members.

4.5.4 Major Importers and marketers in Oyo State

The survey showed that Cypermethrin, dichlovus, herbicides and insecticides were mostly imported. Only 33.3% of the respondents agreed to be involved in the importation of these products otherwise they claimed that the pops pesticides were basically sold at the retailers shop. Gammalin 20, Lindane, DDT, heptachlor were mentioned as POPs pesticides banned from entering Nigeria. Majority (66.7%) indicated there was no illegal trading associated with this substances. Nevertheless, Illegal importers and touts were also engaged in this business and they operated at the local market or hide outs. They were also aware of government policy on the use of pesticides and mentioned FMEEnv, SON, and NAFDAC as institutions responsible for its regulation. They expressed that defaulters mainly were prosecuted and that the major factors responsible for stockpiling of the obsolete and illegal pesticides was weak enforcement as indicated by 83.3% of the respondents.

4.6 Common Users of Pesticides in the Locality

4.6.1 Common Users in Lagos

Of the number of people interviewed in this category eighteen(18) 51% saw millers and furniture makers while seventeen (17) 49% were farmers and other small scale users. Lagos has a very small land area and so its agricultural activities are small. Under agriculture, an important member of this category is the Agriculture Development Agency where not much information could be extracted because of the retirement of most of the senior staff members.

To this end information was largely sought from the Wood Industry (saw millers and furniture makers) which is a large and flourishing industry in Lagos State, urban farmers and other small-scale users. On-site physical observations indicated a wide variety of wood preservatives were used and it was well known that some wood preservatives are toxic, but the saw millers claimed they only used non toxic chemicals. However, the team of researchers identified a brown to black oil type preservatives decanted from French labeled drums as the most commonly used preservative in the saw mills visited. The odour of this chemical was very

pungent and its true identity was difficult to place since the chemical was purchased from bulk dealers co-located with the saw mills. These dealers on their own dispensed the chemicals from unlabeled 200 litre drums or drums with French instructions. These saw-millers also bought their chemicals from the open markets in Ojota and Idumagbo.

Some of the respondents also agreed that one of the wood preservatives they used regularly was Gammalin 20. About 10 respondents who were mainly furniture makers indicated that they do not use Gammalin, but other wood preservatives. Another 10 respondents who were mainly urban vegetable farmers used basically fertilizers. The results showed that the wood processing industry is the second most important user of Lindane in Lagos State. Most respondents claimed that the Gammalin 20 used in the wood industry was being smuggled into the country from Ghana and some neighbouring French speaking West African countries in small consignments.

4.6.2 Common Users in Ogun State

Common types of POPs pesticides identified in the state include Gammalin 20 (used for protecting kola nut from pest, fishing and also used for formulating local insecticides and rodenticides), Lindane (used for Cocoa protection), Grammasonne. Common types of locally formulated insecticides mostly used by household include 'ota pia pia' and G.O 90. They were mainly used for the control of mosquitoes, flies, crawling insects such as bed bugs and cockroaches, and also used to kill rodents. They were said to be far cheaper and faster in action than the branded pesticides. A brief interview with a mobile insecticide hawker revealed that the locally formulated insecticides were made from Gammalin 20 mixed with solvents like kerosene and packaged in small bottles or paper sachets. Lindane powder and other unknown chemicals are also used to formulate local rodenticides. These locally formulated rodenticides and insecticides were mainly hawked on the streets by mobile salesmen and patronized by the general public.

4.6.3 Common Users in Ondo State

About 43.73% of the users who are farmers that had information on the existence of these POPs confirmed that they had never used any of the POPs pesticides before. This might not be unconnected with their inability to afford the exorbitant costs of these pesticides as well as mere ignorance of their usefulness to their farming activities. The members of the general public were worse off because 76% of them interviewed had never use any of the POPs before (see table 6). Results revealed that some of the officials of farmers Association were not using these



POPs in their farms. Total abstinence from the use of pesticides was not likely to promote profitable agricultural practice in the state. However, training and awareness campaign on their uses in the most environmentally friendly manner would be the best for farmers in Ondo State.

Plate 7.0: Apefon Cocoa Farm, Ondo State

Table: 11: Experience of Usage of POPs Pesticides by Respondents
In Ondo State, Nigeria

<i>EXPERIENCE OF USAGE OF POPs</i>	<i>GENERAL PUBLIC</i>	<i>USERS</i>	<i>DISTRIBUTORS</i>	<i>REGULATORY BODIES</i>	<i>TOTAL</i>
<i>YES(Used before)</i>	96 (24.00%)	211 (56.27%)	27 (27.00%)	2 (100%)	336 (36.31%)
<i>NO (Not used before)</i>	304 (76.9%)	164 (43.73%)	73 (73.00%)	-	541 (61.69%)
<i>TOTAL</i>	400 (45.61%)	375 (42.76%)	100 (11.40%)	2 (0.02%)	877 (100%)

4.6.4 Common Users in Oyo State

Majority (86%) of the users do not know what POPs pesticides are. They received information on them mainly (46%) from Oyo-state Agricultural development programme (OYSADEP). The results indicated these products are used mainly on farmlands for pest control, wood pest control and vector control, while 92% indicated they have used any of the POPs pesticides. The types of POPs pesticides ranged from gammalin 20, aldex 40, gramoxone, gramzone, anthrazine etc. They used gramoxone, nuvacrone, solighum, gammalin 20 mostly and basically for pest control. About 60% indicated they used it yearly with the same percentage indicating that they were aware accumulation of POPs pesticides can affect the environment and health.

Majority (86%) kept these products in the store (farm store, farm house, hamlets, shop) and they lasted for about 12 months in the store. Most of the respondents (38%) indicated they obtained POPs pesticides from the general market, and 60% also indicated they dispose of these products when they expire.

4.7 Environmental and Health Impacts

4.7.1 Environmental and Health Impacts of POPs in Lagos State

The current survey did not indicate any empirical evidence on the environmental and health impact of POPs pesticides in Lagos State. This is not to say that such impacts do not exist.

4.7.2 Environmental and Health Impacts of POPs in Ogun State

An officer of the Ministry of Health informed the study team that cases of health hazards from pesticide and insecticide use in the state, but there was no proper documentation of such. A disheartening discovery was that, containers of used pesticides and insecticides were being used by the local people to store consumable products like water, palm oil and vegetable oil.

The Ministry of Environment has a laboratory for testing industry effluents and where necessary enforce mitigation measures. But it was discovered that the laboratory could only carry out simple physico-chemical analysis and could not test for POPs pesticides. Some of the

respondents claimed to suffer symptoms such as nervousness, irritability, dizziness, palpitation and dermatitis during or after application of pesticides and insecticides.

4.7.3 Environmental and Health Impacts of POPs in Ondo State

In Ondo State the public exhibited very low knowledge of the health and environmental implications associated with the use of POPs pesticides. The metallic and plastic containers used for packaging of these POPs pesticide were properly washed with detergent and used as containers for fetching water, storage of edible palm-oil and ground-nut oil for domestic uses. Vegetable and other farm produce harvested from farms where these POPs pesticides have been applied were generally consumed by members of the public without recourse to the sources of those vegetables. Available health records at the health centres do not have information related to death caused by poisoning simply because such cases were usually referred to the State Specialist Hospital.

4.7.4 Environmental and Health Impacts of POPs in Oyo State

About 70% of the general public indicated pesticides stockpiling impact on the environment, namely the soil, water, air, and food chain. Majority (26%) also indicated that the best method for disposing expired stockpiles was by ordinary burial followed by those (20%) who said the disposal was through incinerator. Majority of the general public indicated that they experienced irritation whenever they applied insecticides spray in their living room.

4.8 Regulation and Enforcement about POPs Pesticides

4.8.1 Regulation and Enforcement in Lagos

The regulatory agencies that were administered with the questionnaire were those responsible for Chemicals management in Nigeria. They were therefore very knowledgeable about the existence of POPs chemicals. They also were aware of the Stockholm Convention and thus they denied the existence of POPs chemicals in Nigeria since they were banned by the FEPA Decree in 1988. Unfortunately, there was no access to information regarding POPs regulation from NAFDAC Lagos which happens to be one of the key regulators.

4.8.2 Regulation and Enforcement in Ogun State

A visit to the Idi-Iroko border post revealed illegal trafficking of goods, but it was impossible for the study team to really ascertain the content of such goods since they were well packaged and carried no label on them. The Custom officers at the border post affirmed to the study team that there was no illegal trafficking of POPs pesticides at the border post. Personal communication with the Custom Officers revealed that their knowledge on POPs pesticides was low arising from poor awareness on banned POPs pesticide.

An attempt was made to obtain the records of enforcement and sanctions against use of banned pesticides from regulatory agencies in the state. Findings from the State Ministry of Environment indicated that officials of the ministry were not knowledgeable about POPs pesticide activities, policies, enforcement and sanctions in the state. The Ministry of Agriculture officials claimed to be aware of some existing regulations and sanctions on banned POPs pesticides, but that they were not involved in its enforcement. The Custom Officers at the

border post denied the existence of POPs chemicals in the state since they had enforcement mechanisms in place to check the importation of POPs pesticides.

Despite these assertions the fact remains that POPs Chemicals had since been banned by the FEPA Decree of 1988, and other efforts related to POPs chemicals in Nigeria include but not limited to the Ministry of Environment Guidelines on Pesticide Management Handbook 2000, NAFDAC Decree 15 of 1993, and the Nigerian Pesticide Council (Draft) Pesticide Legislation 1970

4.8.3 Regulation and Enforcement in Ondo State

In Ondo State, out of the five regulatory bodies examined only two gave positive response. These were: Ministry of Agriculture, Fisheries and Forest Resources; Ministry of Environment and Mineral Resources of Ondo State. Responses from the Nigeria Customs Service showed that the authority was not concerned with the regulation of POPs pesticides in the State. The officials claimed that only the detachment of the Custom Services at the border posts were involved in the regulation of POPs pesticides and this only affected importation of goods into the country.

Information related to NAFDAC indicated that the officials occasionally embarked on raiding of shops and markets for banned or and expired foods and drugs of which POPs pesticides was inclusive. However, records of their activities in Ondo State as to the control POPs pesticides could not be accessed. It is not unlikely that the Ondo State office of NAFDAC never made any significant impact in this area. Although the Akure office of NAFDAC claimed to have an on-going study on POPs they could not offer much as the questionnaires given to the officers were not completed.

At the premises of Ondo State Ministry Agriculture, Fisheries and Forest Resources, findings revealed that its extension field officers organized training and educative programmes for local farmers (rural farmers) in the State on the uses of Agro-chemical and pesticides as well as other agricultural production enhancement materials. In the process, herbicides were also distributed to farmers after they have been adequately educated informed and trained on their uses and handling. Stale or expired pesticides were also being disposed of through burying according to the reports.

At the Department of Environment and Mineral Resources they organized awareness campaigns and training programmes for local farmers, small scale industrialists and the general public on the inherent dangers and environmental damages associated with the wrong use and applications of these agro-chemicals and pesticides. Some of the personnel of the Department had undergone in-service training through workshops and seminars outside the State that equipped them with relevant knowledge on issues of POPs management. On the whole the regulatory body agreed that there was illegal trading of POPs pesticides and linked that to smuggling. The study also revealed that there were policies on ground against the importation of POPs pesticides that attracted sanctions such as payment of administrative cost, jail term, apprehension and out right confiscation.

The Environmental Unit of the State Ministry of Health was never involved in the regulation or the administration of or circulation of the POPs pesticides as envisaged by the general public.

This study however, revealed that the Ministry of health concerns itself mainly with environment related ailments which were documented in their records at the various hospitals and comprehensive health centres. Ailments such as malaria, guinea-worm, cholera and other environmentally caused diseases were their main focus.

4.8.4 Regulation and Enforcement in Oyo State

Most members (70%) of the general public indicated that POPs pesticides were produced in Nigeria and this was mostly in Lagos. About 82% believed the pesticides were imported in to the country and mostly through the sea port (88%). The pesticides were mostly sold at the general market as indicated by 68% of the respondednts and that Gammalin 20 was the most sold. Majority (68%) indicated that there was illegal trading of these pesticides, and those who smuggled the goods into the country were involved in its importation. Most people were not aware of any government policy on the use of pesticides, and those who were aware mentioned Standard Organization of Nigeria

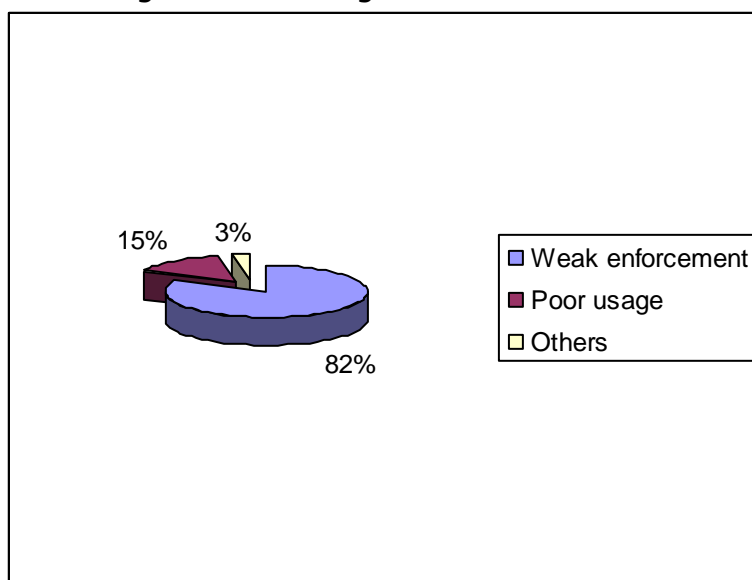


Fig 8.0: Reasons for Stockpiling of POPs Pesticides in Oyo State

(SON) as major the institution responsible for regulating pesticides trading followed by Federal Ministry of Environment and NAFDAC.

Regulatory Bodies viz: Federal Ministry of Environment, Oyo State Ministry of Environment, Oyo State Agricultural Development Programme (OYSADEP), Institute of Agriculture, Research and Training (IAR &T) Oyo state Agricultural Input and Credit (OYSAISCO) Plant Quarantine Office, Moor Plantation, Oyo State Tree Crops Development (TCDU), Standard Organisation of Nigeria (SON) were examined. According to reports the sanctions usually given to defaulters included prosecution, jail term, seizure and destruction of goods. Majority (84%) of them

indicated weak enforcement of law as the main factor responsible for the stockpiling of the obsolete and illegal POPs pesticides.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

The focus of this study was to examine issues related to POPs pesticides in terms of the knowledge, attitude and practices, production, importation, distribution, retailship, consumption pattern as well as regulation and enforcement in South Western Nigeria. The exploratory and descriptive study design employed mainly survey instruments and the findings have been presented in the previous section. In this section the high points of the study in line with the study objectives shall be elucidated.

5.1 Conclusions

The conclusions derivable from this study are as follows:

The low level of awareness and knowledge about POPs pesticides especially among the general public in all the four study areas in Nigeria viz: Lagos, Ogun, Ondo and Oyo States was apparently because these substances were presented and identified by their technical terms other than the popular trade names.

That knowledge level was particularly higher among the users was because of the existence of cooperative groups and some form of media activities in locations like Ondo. Also among the importers, distributors and regulators viz: ministry officials and NAFDAC awareness was relatively high. However, among the law enforcement agents at the border awareness was low. The apparent increase in the knowledge and awareness level among the regulators was because of their comparatively higher educational background compared to the rest of the target groups. This was found to be unconnected with their claims of obtaining information from office, schools and from publications. Among the regulators all indicated they knew what POPs pesticides are, and that the types used were – DDT, Benzofuran, Lindane, gammalin 20, aldrex 7, otapiapia, and organic pesticides.

POPs pesticides were imported mostly into Lagos through illegal channels from Asian countries like China and India with most of the dealers/importers based in Lagos and Oyo states respectively. There were hardly any importers from Ondo and Ogun states. Again Illegal trafficking of POPs pesticides were found to occur mostly in the border towns of Lagos and Ogun States which borders Nigeria's West African coast. This was largely associated with the low level of awareness on the part of the law enforcement agents at the border coupled with their non challant attitude with respect to POPs pesticides.

A large number of POPs pesticides were found to be present in the Lagos study area and most of them were perhaps imported illegally via the ports. Those imported include cypermethrin, dichlovus, gammalin 20, gammalin super, lindane, capsitox 20, herbicides, insecticide, fungicides while others such as ota pia pia and G.O 90 are formulated locally using Gamalin 20. Some of these are mainly hawked on the streets by pesticide vendors.

Lack of compliance with dose specifications and the use of protective clothings or safety wears during chemical application by farmers were considered poor practices that could pose serious hazards to most of the POPs pesticides users. Most users of POPs pesticides were reported as keeping their products in the store (farm store, farm house, hamlets, shop) with these chemicals usually lasting for a period of about 12 months in the store. Nevertheless, the stockpiling of POPs pesticides and their obsolescence was found to arise from the careless storage of the substances in different dwelling places viz under the bed, roofs/ceiling until they became expired.

Although there was a ban on some of the POPs pesticides such as Gammalin 20, Lindane, DDT and heptachlor from entering Nigeria. It was glaring that people still traded illegally on these substances. The Illegal importers and traders were mostly engaged in this business at the local market or hide outs. Even though there were sanctions (against illegal dealers on POPS pesticides) such as confiscation, payment of administrative fine, apprehension and jail sentence, there were still some ominous drawbacks and limitations such as the lack of enforcement of these sanctions and the clandestine smuggling activities that occur at the borders.

Improper disposal of the expired products by burial and uncontrolled incineration as reported in some of the locations was a serious threat to the quality of environment especially to the atmospheric, aquatic and terrestrial ecosystems and this has potential impacts on the food chain with corresponding implications on public health. And in addition even though data is scanty or non existent it was obvious that there were bound to be some toxicological implications associated with the application of expired POPs pesticides.

There was an increasing low knowledge level among members of the public including POPs pesticide users on the health risks associated with exposure to these substances going by the report of people storing consumable products like water, palm oil and vegetable oil in evacuated pesticide containers. Records of environmental impacts and health hazards associated with POPs pesticide use in the study communities were lacking although most members of the public reported experiencing some level of irritation whenever they applied insecticides spray in their living quarters.

There are problems among the various federal government ministries sharing responsibilities for the control and management of chemicals. The jurisdictional conflict and lack of coordination among the different ministries in charge of chemical management and across different levels of government have adversely affected the management of chemicals in Nigeria efficiently

The compliance monitoring mechanism of chemicals in Nigeria is very weak as there is lack of trained personnel to collect, interpret and use data necessary for chemicals management decision. Nigeria has sufficient legislation on the management of chemicals but the challenge remains enforcement and monitoring due to: Inadequate commitment from government through under funding of operating cost of enforcement, Inadequate commitment by the

private sector, Inadequate technology required for enforcement like laboratories, computers and access to international database.

5.2 Recommendations

Given the study outcome and the conclusions therein the following recommendations are therefore proffered:

There is need to carry out a comprehensive awareness campaign using all forms of communication channels especially the media and schools on the sources, trade local names, uses and management of POPs pesticides

There is need to sensitize, educate and empower the law enforcement agents operating at the International borders on POPs pesticide policy, trade and management issues to forestall smuggling.

Efforts should be made to improve surveillance and censoring of chemical products at the Seme and Idiriko borders and perhaps the Lagos Port where most of the POPs pesticides importation take place to circumvent flooding the market with the banned items

The regulatory agencies particularly NAFDAC and the Federal Ministry of Environment should penalize illegal formulation plants especially those producing derivatives of Gammalin 20

Regulatory agencies should review licences of POPs pesticide importers regularly and increase the frequency of inspection of their ware houses as well as the shops of the distributors and retailers

There is need to have regional centres for periodic censoring, screening and testing of POPs pesticides to ensure compliance with potency and validity parameters

All users of POPs pesticides should be educated on practices associated with safe storage, handling, application and disposal of the substances.

A thorough inventory of all locations where POPs pesticides is used is required to ascertain the status POPs pesticides stock, use and management pattern

There is need to carry out an assessment of the extent of pesticide contamination of the various environmental media and possible food matrices especially in locations where these substances are highly utilized

There is a need to conduct a health risk assessment (using appropriate biomarkers) among populations located within the vicinity of pesticide applications to ascertain the level of health hazards.

There is need for routine monitoring of the activities of POPs pesticide users to ensure compliance with guidelines

Proper record keeping and documentation by all stakeholders is highly imperative to ensure good feed-back mechanisms for planning, management and enforcement

There is need to optimally explore other non POPs pesticide options for instance use of Integrated Vector Management (IVM) and Integrated Pest Management (IPM) approach.

Harmonization of the existing laws and cooperation among the ministries is desirable for achieving a cost-effective integrated chemicals management programme beneficial to the environment and humans.

It is necessary to estimate national or provincial pesticide requirement before placing orders or making requests to aid agencies. Pesticides procurement should be based on planned actual requirement

Government should narrow down regulation to be specific on POPs pesticides, unlike the present broad regulations on toxic chemicals.

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APPENDICES

Appendix 1

CATEGORY A: GENERAL PUBLIC

QUESTIONNAIRE FOR ASSESSING THE STATUS OF POPs PESTICIDES TRADING, CONSUMPTION AND REGULATION IN SOUTH WESTERN NIGERIA

INSTRUCTION: Please fill in or circle the appropriate options.

Serial Number -----

Location of place -----

SECTION A: SOCIO – DEMOGRAPHIC INFORMATION

1. Age of respondent (last birthday) -----

2. Sex: 1 Male 2. Female

3. Occupation: 1. Trader 2. Farmer 3. Business 4. Civil servant 5. Student

6. Others (specify).....

4. Educational Level: 1. Non formal 2. Primary 3. Secondary 4. Tertiary

5. Description of location of residence-----

SECTION B: KNOWLEDGE ATTITUDE AND PRACTICE

6. Do you know what POPs pesticides are 1. Yes 2. No

7. If yes what are these types of pesticides-----

8. Where did you obtain information on them from? 1. School 2. Office 3. Friend
4. Media 5. Others mention -----.

9. What are these pesticides used for ? 1. Pest control 2. Insect control 3. Weed control
4. Vector control 5. All of the above 6. None 7. others mention-----

10. Have you ever used any of these pesticides? 1. Yes 2. No

11 If yes for what purpose did you use it for -----.

12. How often do you apply these pesticides 1. daily 2. weekly 3. twice a week 4. monthly 5. quarterly 6. every six months 7. yearly

SECTION C: SOCIO-ECONOMIC AND SOCIO-POLITICAL ISSUES

13. Are Ps pesticides produced in Nigeria 1. Yes 2. No
14. If yes where are they produced-----.
15. If No mention countries where they are produced-----.
16. Are these set of pesticides imported into the country legally? 1. Yes 2. NO
17. If yes from which ports are they mostly shipped into the country 1. Sea port 2. Airport 3. Road Boundaries 4. Others mention -----
18. Which of the POPs pesticides are mostly imported into the country-----.
19. Where are these substances sold or distributed? 1. chemists 2. pharmacy 3. retailer shops 4. supermarkets 5. general markets
20. Mention the POPs pesticides that are banned from entering Nigeria-----
21. Are there any forms of illegal trading associated with these pesticides that you know? 1. Yes 2. No
22. If yes who engages in this type of business? -----
23. Where are these kinds of transactions practiced?-----
24. Is there currently any form of government policy on the use of pesticides in Nigeria?-----.
- 25 Which institution is responsible for the regulation of pesticide trading in Nigeria? 1. NAFDAC 2. NDLEA. 3. FMENV 4. SON 5. NPA 6. Others mention-----
26. What are the sanctions against defaulters who engage in illegal POPs trading?-----.
27. What do you think is responsible for the stockpiling of the obsolete and illegal POPs pesticides 1. Poor usage 2. lack of patronage 3. weak enforcement 4. Others mention--

SECTION D: ENVIRONMENTAL IMPACTS

28. Does pesticide stockpiling impact on the environment? 1 Yes 2. Not sure 3. No
29. Banned and illegal POPs pesticides can pollute the soil. 1 Yes 2. Not sure 3. No
30. Banned and illegal POPs pesticides can pollute the water 1. Yes 2. Not sure 3. No
31. Banned and illegal POPs pesticides can pollute the air 1. Yes 2. Not sure 3. No
32. Banned and illegal POPs pesticides can pollute the food chain 1. Yes 2. Not sure 3 No
33. Which is the best method for disposing expired/stockpiled POPs 1. open dumping 2. open burning 3. incineration 4. water course 5. landfill 6. ordinary burial

SECTION E: HEALTH EFFECTS

34. What is your current state of health? 1. Good 2. Fair 3. Poor
- 35 If poor what is responsible for your current poor state of health?-----.
36. Does drinking water collected from a source close to an agricultural field affect you?
1. Yes 2. No
37. Does consumption of fresh vegetable taken from a fumigated farm land affect you?
1. Yes 2. No
38. Have you ever suffered from poisoning associated with consumption of fish. 1. Yes 2. No
39. What is the major symptom you experience whenever you apply insecticide spray in your living apartment : 1. Nervousness 2. irritability 3. dizziness 4. palpitation 5. Others---

Appendix 2

CATEGORY B: IMPORTERS

QUESTIONNAIRE FOR ASSESSING THE STATUS OF POPs PESTICIDES TRADING, CONSUMPTION AND REGULATION IN SOUTHWESTERN NIGERIA

Instruction: Please tick and or fill in the gaps as may be appropriate.

SERIAL NUMBER _____

Location of place -----

SECTION A: SOCIO – DEMOGRAPHIC INFORMATION

1. Age of respondent (last birthday) _____
2. Sex: (1) Male 2. Female
3. Educational Level: 1. No formal 2. Primary 3. Secondary 4. Tertiary 5. Others
6. Occupation: 1. Trader 2. Farmer 3. Businessman
4. Civil servant 5. Students Others (specify).....
7. Does your occupation entail importation of goods 1. Yes 2. No
8. If yes what kinds of imports? 1. textile 2. furniture 3. chemicals/drugs 4. beverage
5.others mention -----
9. How long have you been involved in this business 1.< 1 year
2. 1 – 10 years 3. 11 – 20 years 4. >20 years
10. Where is your importation business located? -----

SECTION B: KNOWLEDGE ATTITUDE AND PRACTICE

11. Do you know what POPs pesticides are 1. Yes 2. No
12. If yes what are these types of substances-----
13. Where did you obtain information on them from?
1. School 2. Office 3. Friend 4. Media 5. Others
mention -----.
14. What are these substances used for ?
1. Pest control 2. Insect control 3. Weed control 4. Vector control 5. All of the above
6. None 7. others mention-----
15. Have you ever used any of these substances? 1. Yes 2. No

- 16 If yes for what purpose did you use it for -----.
17. How often do you apply these substances ?1. daily 2. weekly 3. twice a week 4. monthly 5. quarterly 6. every six months 7. yearly
18. Are you aware that accumulation of POPs can affect the environment and health?
1. Yes 2. No

SECTION C: SOCIO-ECONOMIC AND SOCIO-POLITICAL ISSUES

16. Are POPs pesticides produced in Nigeria 1. Yes 2. No
17. If yes where are they produced-----.
- 18 If No mention countries where they are produced-----.
19. Are these set of substances imported into the country legally? 1. Yes 2. NO
20. If yes from which ports are they mostly shipped into the country
1. Sea port 2. Airport 3. Road boundaries 4. others mention
21. Kindly specify the location where such importations take place-----
22. Which of the POPs pesticides are mostly imported into the country-----
23. Are you involved in the importation of these kinds of POPs-----
24. Where are these substances sold or distributed?
1. chemists 2. pharmacy 3. retailer shops 4. supermarkets 5. general markets
25. Mention the POPs pesticides that are banned from entering Nigeria-----
26. Are there any forms of illegal trading associated with these substances that you know? 1. Yes 2. No
27. If yes who engages in this type of business? -----
28. Where are these kinds of transactions practiced?-----
29. Is there currently any form of government policy on the use of POPs pesticides in Nigeria?-----.
30. Which institution is responsible for the regulation of POPs pesticide trading in Nigeria? 1. NAFDAC 2. NDLEA. 3. FMENV 4. SON 5. NPA 6. Others mention
31. What are the sanctions against defaulters who engage in illegal POPs trading?-----.
32. What do you think is responsible for the stockpiling of the obsolete and illegal POPs pesticides1. Poor usage 2. lack of patronage 3. weak enforcement 4. Others mention-----.

Appendix 3

CATEGORY C: DISTRIBUTORS

QUESTIONNAIRE FOR ASSESSING THE STATUS OF POPs PESTICIDES TRADING, CONSUMPTION AND REGULATION IN SOUTHWESTERN NIGERIA

Instruction: Please tick and or fill in the gaps as may be appropriate.

SERIAL NUMBER

Location of place -----

SECTION A: SOCIO – DEMOGRAPHIC INFORMATION

1. Age of respondent (last birthday)-----
2. Sex: 1 Male 2. Female
3. Educational Level: 1. No formal 2. Primary 3. Secondary 4. Tertiary 5. Others
4. Occupation:1. Trader 2. Farmer 3. Business 4. Civil servant 5. Student .
6. Others (specify).....
5. Does your occupation entail marketing of goods 1. Yes 2. No
6. If yes what kinds of sales ? 1. textile 2. furniture 3. chemicals/drugs 4. beverages
5. others mention -----
7. How long have you been involved in this business? 1. < 1 year 2. 1 – 10 years
3. 11 – 20 years 4. >20 years
8. Where is your business located? -----

SECTION B: KNOWLEDGE ATTITUDE AND PRACTICE

9. Do you know what POPs pesticides are 1? Yes 2. No
10. If yes what are these types of substances-----
11. Where did you obtain information on them from?
1. School 2. Office 3. Friend 4. Media 5. Others mention -----.
12. What are these substances used for? 1. Pest control 2. Insect control 3. Weed control
4. Vector control 5. All of the above 6. None 7. Others mention-----
13. Have you ever used any of these substances? 1. Yes 2. No
- 14 If yes for what purpose did you use it for?-----.

15. How often do you apply these substances 1. daily 2. weekly 3. twice a week 4. monthly 5. quarterly 6. every six months 7. yearly
16. Are you aware that accumulation of POPs can affect the environment and health?
1. Yes 2. No

SECTION C: SOCIO-ECONOMIC AND SOCIO-POLITICAL ISSUES

17. Are POPs pesticides produced in Nigeria 1. Yes 2. No
18. If yes where are they produced-----.
- 19 If No mention countries where they are produced-----.
20. Are these set of substances imported into the country legally? 1. Yes 2. NO
21. If yes from which ports are they mostly shipped into the country
1. Sea port 2. Airport 3. Road boundaries 4. Others mention
22. Kindly specify the port location where such importations take place-----
23. Which of the POPs pesticides are mostly imported into the country-----
24. Are you also involved in the importation of these kinds of POPs 1? Yes 2. No
25. Where are these substances sold or distributed?1. chemists 2. Pharmacy 3. retailer shops 4. supermarkets 5. general markets
26. Do you sell or distribute POPs pesticides 1. Yes 2. No
27. If yes who are those that patronize these pesticides?-----
28. If yes kindly specify the ones you deal on-----
29. How long do these products last in your shop (in months)-----
30. What happens to the expired products in your shop? 1. Sell 2. Dispose 3. None
31. How do you dispose of the expired POPs 1. open dumping 2. open burning 3. incineration 4. water course 5. landfill 6.ordinary burial
32. Mention the POPs pesticides that are banned from entering Nigeria-----
33. Are there any forms of illegal trading associated with these substances that you know?1. Yes 2. No
34. If yes who engages in this type of business? -----
35. Where are these kinds of transactions practiced?-----

Appendix 4

CATEGORY D: USERS

QUESTIONNAIRE FOR ASSESSING THE STATUS OF POPs PESTICIDES TRADING, CONSUMPTION AND REGULATION IN SOUTHWESTERN NIGERIA

Instruction: Please tick and or fill in the gaps as may be appropriate.

SERIAL NUMBER _____

Location of place -----

SECTION A: SOCIO – DEMOGRAPHIC INFORMATION

1. Age of respondent (last birthday) _____
2. Sex: 1 Male 2. Female
3. Educational Level: 1. No formal 2. Primary 3. Secondary 4. Tertiary 5. Others
4. Occupation: 1. Trader 2. Farmer 3. Business 4. Civil servant 5. Students .
6. Others (specify).....
5. How long have you been involved in this occupation? 1.<1 year 2. 1 – 10 years
3. 11 – 20 years 4. >20 years
6. Where is your occupational activity located primarily? -----

SECTION B: KNOWLEDGE ATTITUDE AND PRACTICES

7. Do you know what POPs pesticides are 1? Yes 2. No
8. If yes what are these types of substances-----
9. Where did you obtain information on them from? 1. School 2. Office 3. Friend
4. Media 5. Others mention -----.
10. What are these substances used for ? 1. Farm land Pest control 2. Wood pest control 3.
Weed control 4. General vector control 5. All of the above 6. None 7. Others
mention-----

11. Have you ever used any of these substances? 1. Yes 2. No
12. If yes which types do you use often?-----
- 13 For what purpose did you use it for -----.
14. How often do you apply these pesticides 1. daily 2. weekly 3. twice a week 4. monthly 5. quarterly 6. every six months 7. yearly
15. Are you aware that accumulation of POPs pesticides can affect the environment and health? 1. Yes 2. No
16. Where do you store these pesticides prior to and after use? -----
- 17 . How long do these pesticides last in your storage on the average(in months)-----
18. What to you do when the POPs pesticides are expired? 1. Sell 2. Store 3. Still use 4. Dispose 5. None of the above
19. How do you dispose of the expired POPs pesticides 1. open dumping 2. open burning 3. incineration 4. water course 5. landfill 6.ordinary burial
20. How did you obtain these POPs pesticides?-----
21. Are you aware there are illegal trading on POPs pesticides?1. Yes 2. No
22. If yes who are those involved? -----
23. Do you patronize this banned POPs pesticides products? 1. Yes 2. No
24. If yes why?-----
25. Are you aware that there are sanctions against dealings on banned POPs pesticides?
1. Yes 2 No
26. Who is responsible for imposing sanctions against illegal POPs trade?-----

Appendix 5

CATEGORY E: REGULATORY BODIES

QUESTIONNAIRE FOR ASSESSING THE STATUS OF POPs PESTICIDES TRADING, CONSUMPTION AND REGULATION IN SOUTHWESTERN NIGERIA

Instruction: Please tick and or fill in the gaps as may be appropriate.

SERIAL NUMBER _____

Location of place -----

SECTION A: SOCIO – DEMOGRAPHIC INFORMATION

1. Age of respondent (last birthday)-----
2. Sex: 1 Male 2. Female
3. Educational Level: 1. No formal 2. Primary 3. Secondary 4. Tertiary 5. Others
4. Occupation: 1. Trader 2. Farmer 3. Business 4. Civil servant 5. Students .
6. Others (specify).....
5. How long have you been involved in this occupation?1.<1 year 2. 1 – 10 years
3. 11 – 20 years 4. >20 years
6. Where is your occupational activity located primarily? -----

SECTION B: KNOWLEDGE ATTITUDE AND PRACTICES

7. Do you know what POPs pesticides are 1. Yes 2. No
8. If yes what are these types of pesticides?-----
9. Where did you obtain information on them from?
1. School 2. Office 3. Friend 4. Media 5. Others mention -----.
10. What are these pesticides used for?1. Farm land Pest control 2. Wood pest control 3. Weed control 4. General vector control 5. All of the above 6. None 7. others mention-----
11. Have you ever used any of these pesticides? 1. Yes 2. No

12. If yes which types do you often use?-----
13. For what purpose did you use it for -----.
14. How often do you apply these pesticides?1. daily 2. weekly 3. twice a week 4. monthly 5. quarterly 6. every six months 7.yearly
15. Are you aware that accumulation of POPs pesticides can affect the environment and health? 1. Yes 2. No
16. How did you obtain these POPs pesticides?-----
17. Who are those involved in the genuine POPs pesticide trade that you know?-----
18. Are you aware that there are illegal trading on POPs pesticides?1. Yes 2. No
19. If yes who are those involved that you know? -----
20. What are the classes of POPs pesticides that you consider illegal?-----
21. Are there any sanctions against those engaged in illegal POPs pesticides trading?
1.Yes 2. No
22. If yes what are the type of sanctions?-----
23. Who is responsible for imposing sanctions against illegal POPs pesticides trade?-----
24. How often do you apply this sanctions?-----
25. What are the limitations of these sanctions? -----
26. What feedback mechanism is in place to ensure sanctions are enforced?-----.

Appendix 6

OBSERVATION CHECKLIST FOR ASSESSING POPS PESTICIDE TRADING IN SOUTH WESTERN NIGERIA

CATEGORY B/C: IMPORTERS/DISTRIBUTORS

Preliminary Information: Please express or mark 'X' where applicable

ID No-----

Location-----

Name of Assessor-----

S/NO	POPs(*)	S	A	NA	E	LP	LNP	GSC	PSC	QA	P	NP	EX
1	DDT(Bosan,Dedelo,Sesapox Agritan, Azotox,Supra Citox)												
2	Lindane (Gammalin 20)												
3	Aldrin(Aldrec, Aldrex,Altos Aldresol, Drinox,Seedrin)												
4	Chlordane(Aspon,Niran, M140,Corodan, Kypchlor)												
5	Dieldrin(Alvit,Panoram Dieldrix, Illoxon,Quintox)												
6	Heptachlor(Agroceres, Baskalor,Drinox,Heptox)												
7	HCB(Amaticin, Bunt- cure, Granox, Smut-go ,Sanocide)												
8	Toxaphene(Alltex,Attaxc 6-3,Atta 5, Sorol)												

KEY :

(*) Trade names ;S: Source; EX : Expired; NA : Not available; E : Exhausted ;A : Available ; LP: Labeling present; LNP : Labeling not present ; GSC: Good storage conditions; PSC: Poor storage conditions; QA: Quantity available; P: Prohibited; NP: Not prohibited

Appendix 7

OBSERVATION CHECKLIST FOR ASSESSING POPS PESTICIDE TRADING IN SOUTH WESTERN NIGERIA

CATEGORY D: USERS

Preliminary Information: Please indicate an 'X' where applicable

ID No-----

Location-----

Name of Assessor -----

S/NO	POPs(*)	S	A	NA	E	LP	LNP	GSC	PSC	QA	P	NP	EX	AA	PA
1	DDT(Bosan,Dedelo,Sesapox Agritan, Azotox,Supra Citox)														
2	Lindane (Gammalin 20)														
3	Aldrin(Aldrec, Aldrex,Altox Aldresol, Drinox,Seedrin)														
4	Chlordane(Aspon,Niran, M140,Corodan, Kypchlor)														
5	Dieldrin(Alvit,Panoram Dieldrix, Illoxon,Quintox)														
6	Heptachlor(Agroceres, Baskalor,Drinox,Heptox)														
7	HCB(Amaticin, Bunt- cure, Granox, Smut-go ,Sanocide)														
8	Toxaphene(Alltex,Attaxc 6-3,Atta 5, Sorol)														

KEY :

(*) Trade names; S : Source ; EX : Expired; A : Not available; E : Exhausted ; A : Available ; LP: Labeling present; LNP : Labeling not present ; GSC : Good storage conditions ; PSC : Poor storage conditions; A : Quantity available; P : Prohibited ; Not prohibited; AA: Active application; PA: Passive application

Appendix 8

OBSERVATION CHECKLIST FOR ASSESSING POPS PESTICIDE TRADING IN SOUTH WESTERN NIGERIA

CATEGORY E: REGULATORY BODIES

Preliminary Information: Please indicate an 'X' where applicable

ID No-----

Location-----

Name of Assessor -----

S/NO	POPs(*)	S	LP	LNP	GSC	PSC	QA	P	NP	EX	SE	SNE
1	DDT(Bosan,Dedelo,Sesapox Agritan, Azotox,Supra Citox)											
2	Lindane (Gammalin 20)											
3	Aldrin(Aldrec, Aldrex,Alttox Aldresol, Drinox,Seedrin)											
4	Chlordane(Aspon,Niran, M140,Corodan, Kypchlor)											
5	Dieldrin(Alvit,Panoram Dieldrix, Illoxon,Quintox)											
6	Heptachlor(Agroceres, Baskalor,Drinox,Heptox)											
7	HCB(Amaticin, Bunt- cure, Granox, Smut-go ,Sanocide)											
8	Toxaphene(Alltex,Attaxc 6-3,Atta 5, Sorol)											

KEY:

(*) Trade names ;S: Source ; LP: Labeling present ;LNP : Labeling not present ; GSC : Good storage conditions ; PSC : Poor storage conditions; QA : Quantity available; P : Prohibited ;NP: Not prohibited; SE: Sanctions enforced ;SNE: Sanctions not enforced.