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**Federal Republic of Nigeria**



**FEDERAL MINISTRY OF HEALTH**

**FINAL REPORT**

**INTEGRATED VECTOR MANAGEMENT PLAN**

FOR

**MALARIA CONTROL BOOSTER PROJECT**

**(MCBP)**

Submitted to:

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Maximizing Resources and Sustaining Development

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## **LIST OF ACRONYMS**

ACT	<i>Artemisinin</i> -based Combination Therapy
DDT	Dichlorodiphenyltrichloroethane
DFID	Directorate of Finance for International Development
FEPA	Federal Environmental Protection Agency
FMA&WR	Federal Ministry of Agriculture and Water Resources
FMOF	Federal Ministry of Finance
FMIfo	Federal Ministry of Information
FMEH&UD	Federal Ministry of Environment Housing and Urban Development
FMOH	Federal Ministry of Health
HSDP2	Second Health Systems Development Project
HPDP2	Second HIV/AIDS Programme Development Project
IPDs	Immunization Plus Days
IPM	Integrated Pest Management
IPT	Intermittent Preventive
ITN	Insecticide Treated Nets
IRS	Indoor Residual Spraying
IVM	Integrated Vector Management
LGA	Local Government Area
LIDs	Local Immunization Days
MCBP	Malaria Control Booster Project
M&E	Monitoring and Evaluation
NAFDAC	National Agency for Food, Drugs Administration and Control

NGO	Non Governmental Organization
NIDs	National Immunization Days
NMCP	National Malaria Control Program
PIU	Project Implementation Unit
POP	Persistent Organic Pollutant
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
RDT	Rapid Diagnostic Test
RBM	Roll Back Malaria
SP	Sulphadoxine Pyrimethamine
SMOH	State Ministry of Health
WHO	World Health Organization

## **EXECUTIVE SUMMARY**

### **Introduction**

Malaria is a major public health problem, and both a cause and a consequence of poverty, in Nigeria. The majority of cases are due to *plasmodium falciparum*, the life threatening form of the disease. Malaria accounts for about 110 million clinical cases annually, including 45-60% of all out-patient attendances of all hospital admissions. Although the entire population is at risk, severe morbidity and mortality is usually seen in children under 5 years and in pregnant women. Malaria is responsible for nearly 29 % of estimated deaths among pregnant mothers. The World Health Organization (WHO 2005) found out that total population at risk of Malaria in Africa was estimated at 127,111,873 persons; with 21,179,913 children under five (5) years; 4,235,983 children under one (1) year; and 5,000,179 pregnant women.

The Roll Back Malaria (RBM) process focuses on the three major interventions: Case Management, Promotion of Intermittent Preventive Treatment (IPT), and Promotion of the use of Insecticide Treated Nets (ITNs), with emphasis now on the Long Lasting Insecticides Nets (LLIN)/Vector management and with linkages to other cross-cutting issues such as monitoring and evaluation, focused Research and Information, Education and Communication (IEC)/ Behavioural Change and Communication (BCC). Integrated Vector Management (IVM) was adopted as a strategic approach. Accordingly, an operational definition, principles, objectives and strategies of IVM were agreed upon.

The content of the IVM plan includes: (i) Vector management approaches, (ii) Pesticides use and management, (iii) Policy, legislative and regulatory framework, (iv) Institutional arrangement, and (v) Capacity building.

### **The objectives of the Integrated Vector Management Plan are to:**

- a) reduce or eliminate breeding sources of malaria and other disease vector,
- b) improve vector-borne disease prevention and control through appropriate strategies;
- c) reduce human vector contact,
- d) boost malaria control intervention through environmental impact assessment using social, health and environmental indicators, and
- e) safeguard the management of Health Care Waste (HCW) generated or released in the process

### **Review of the Initial Integrated Vector Management Plan of the Malaria Control Booster Project**

The Integrated Vector Management Plan (IVMP) was reviewed as part of the safeguard policy assessment for additional financing. An environmental audit was also carried out to ensure that the initial IVMP developed was in line with both National and International regulations on the use of pesticides and insecticides and to strengthen its implementation and ensure compliance.

**The** review and audit of the initial Integrated Vector Management Plan (IVMP) was done by:

- Reviewing the Initial Integrated Vector Management Plan developed in 2005.
- Visit to four (4) of the seven (7) participating states – Anambra, Akwa Ibom, Gombe and Kano states.
- Administration of a questionnaire as seen in Annex B.

### **Out comes**

The following outcomes were derived from these reviews:

- The classification of the MCBP as a category B is correct.



- The appropriate World Bank’s safeguard policy (OP 4.09 – Pest Management) was triggered and therefore an IVMP has to be developed.
- The potential impacts were accurately projected; however, there is a major lack in the implementation which was derived from weak institutional framework and capacity of the state Project Implementation Units (PIUs) to implement the initial IVMP.
- There is also a need to update the IVMP in line with new national and international laws on the use of pesticides and insecticides for vector control and management.
- The use of Insecticides Treated nets (ITN) should be replaced with the use of Long Lasting Insecticide Nets (LLIN).
- The implementation of the MCBP in the participating states should be increased to cover all the LGAs in the states.
  - The extent of coverage in the LGAs in the states visited are as follows:
    - Twelve (12) out of the forty four (44) LGAs in Kano state;
    - Eleven ( 11) out of the twenty one (21) LGAs in Anambra state;
    - Eleven ( 11) out of the thirty one (31) LGAs in Akwa-Ibom state; and
    - Five ( 5) out of the eleven (11) LGAs in Gombe State

### **Recommendations**

- An Environmental/Social Officer should be employed at the federal (PCU) and state level (PIU), while a Malaria Focal person should be employed at the Local Government (LG) level for monitoring and supervision to ensure compliance with safeguard policies.
- An institutional and capacity building strengthening programme on the IVMP should be developed for the state PIUs incorporating the action plan as seen in Table 6.1.
- As a result of the waste that would be generated in the implementation of the MCBP, this project would adopt the HIV/AIDS Health Care Waste Management Plan (HCWMP) as seen in the Addendum on page 32.

### **Budget**

The indicative budget estimate for the Integrated Vector Management Plan for five (5) years in the seven (7) participating states as seen is:

**Two Hundred and Forty Four Thousand, Nine Hundred and Seventy Dollars (US \$ 244,970).**

## **CHAPTER ONE: INTRODUCTION**

### **1.1 Background**

Vectors are a major cause of disease and discomfort globally. Vectors borne diseases are common on the West African region including Nigeria. Malaria, lymphatic filariasis, trypanosomiasis, onchocerciasis, schistosomiasis, dracunculiasis and yellow fever are the predominant vector borne diseases. Malaria, however, tops the list and is a priority *Anopheles arabiensis*, *Anopheles melas*, and *Anopheles funestus*

Malaria is a major public health problem, and both a cause and a consequence of poverty, in Nigeria. The majority of cases are due to plasmodium falciparum, the life threatening form of the disease. Malaria accounts for about 110 million clinical cases annually, including 45-60% of all out-patient attendances of all hospital admissions. Although the entire population is at risk, severe morbidity and mortality is usually seen in children under five and in pregnant women. Malaria is responsible for nearly 29 % of estimated deaths among pregnant mothers. The northern states in Nigeria suffer some of the highest child mortality rate in Africa.

A Workshop of policy makers, experts and partners (FMH 2005) organized by the World Health Organization (WHO) Regional Office for Africa in Harare, from February 6-9, 2001 reviewed the malaria status and vector control coverage in the region and proposed a new orientation for the deployment of vector control interventions in the WHO African Region. The total population at risk of Malaria in Africa was estimated at 127,111,873 persons; with 21,179,913 children under five (5) years; 4,235,983 children under one (1) year; and 5,000,179 pregnant women.

Roll Back Malaria process focuses on the three major interventions: Case Management, Promotion of Intermittent Preventive Treatment (IPT), and Promotion of the use of Insecticide Treated Nets (ITNs)/Vector management and with linkages to other cross-cutting issues such as monitoring and evaluation, focused Research and Information, Education and Communication (IEC)/ Behavioural Change and Communication (BCC). The Integrated Vector Management (IVM) was adopted as a strategic approach. Accordingly, an operational definition, principles, objectives and strategies of IVM were agreed upon.

### **1.2 Nigerian Healthcare System**

The National Health Policy guideline was adopted in October 1988 by the various arms of government of Nigeria to give appropriate direction to the providers of Healthcare in both public and private sectors.

*“Federal, State and Local Government shall support in a coordinated manner a three-tier system of health care. Essential features of the system shall be its comprehensive nature, multi-sectoral inputs, community involvement and collaboration with non-governmental providers of health care.”*

This is with a view to achieving the goal for all using the primary health care approach as its main strategy. This is supported by well-mobilized Nigerian community, with adequate collaboration of the other related sectors and civil societies. Using appropriate locally available technology, the period 1985 through 1993 witnessed a purposeful direction. Significant improvements were observed in the health sector. The laudable objectives contained therein were sincerely pursued within the available resources through faithful implementation, close monitoring and continuous evaluation of the various programs.

Vector control unit exist in some states of the Federation but are more defined or articulated at the Federal level. Major vector born diseases include *malaria*, *lymphatic filariasis*, *onchocerciasis*, *schistosomiasis*, *dracunculiasis* and *yellow fever*. Malaria occurs throughout the country in holo-endemic pattern with perennial transmission all year round. It accounts for 25% in infant mortality, 30% under five years mortality, and

11% pregnant women mortality. The major vectors of malaria are *Anopheles gambiae*, *A. funestus* and *A. arabiensis*. *A. melas* was reported in the mangrove coastal areas. The entomological inoculation rate is 30 to 100 bites/person / year.

*Onchocerciasis* transmission is more prevalent along the Cross River in the South South zone, Kaduna River in the north and several other areas in the country. The *Ivermectin* distribution as a national strategy through National *Onchocerciasis* Control Program has considerably reduced the incidence in the recent years. *Trypanosomiasis* is mainly found in the middle belt area involving about six states in the federation affecting agricultural livestock activities. *Dracunculiasis* which was rampant in the country in the eighties has drastically reduced as a result of intense Nigeria Guinea-worm Eradication Program (NIGEP) supported by Global 2000 project. Today, the figures came down from 53,000 in 1988 to 120 in December 2005 and 14 during January – May, 2006. Yellow Fever epidemics occur with fatal results and in Sokoto region; they were attributed to uncleared refuse at one time.

Yellow Fever vaccination is mandatory for the visitors from other countries. *Schistosomiasis* started decreasing from the year 2000 which recorded 14,419 cases, in 2001 it dropped to 11,333 cases, in 2002, 13,952 cases, in 2003, 5802 cases (22 deaths) in 2004, 4,285 cases (9 deaths) and in 2005, 713 cases with no death ( from Epidemiological Division under the Department of Public Health, Ministry of Health 2006 ). Lymphatic filariasis is also widely distributed, but no reliable data are available, though it is related to blocked drainage in urban centers, thus, promoting the breeding of culicine mosquito

### **1.3 Federal Government of Nigeria: Malaria Control Strategy**

The Roll Back Malaria (RBM) Partnership was launched in 1998 to provide a coordinated global approach to fighting malaria and halve the burden of malaria by 2010. Nigeria's RBM was supported by a five-year Strategic Plan for the period, 2001-2005. The elements of Nigerian strategy are; (a) case management (b) prevention with a focus on insecticide treated nets (ITN) and Indoor Residual Spraying (IRS) (c) information, education and communication, and community mobilization (d) partnerships (e) operational research; and (f) monitoring and evaluation (M & E).

Nigeria is a signatory to the Abuja declaration which commits the country to deploy all necessary resources and raise funds to achieve the program's overall objectives and the Abuja target. However, none of these targets were close to being met by end of 2005 and coverage of key preventive and curative interventions remains low. With the change in leadership at the helm of Nigeria's National Malaria Control Program (NMCP), and significant support for malaria control from the office of the President, the programme has received a fresh impetus.

With the Country Strategic Plan for 2001-2005 now at a close, the National RBM Program is leading a process to develop a new Country Strategic Plan for 2006-2010. The government strategy to accelerate and intensify efforts on malaria control is reflected in the National Malaria Strategic Plan that was developed by the NMCP, in partnership with the RBM Partners, States Ministries of Health and their LGAs, and other stakeholders. The collaboration and involvement of all these partners is expected to enable a national scale-up of key preventive and curative interventions.

The program aims to halve the burden of malaria by 2020, which is expected to reduce all-cause child mortality by 20 %. To achieve this objective, the program envisages a massive scale-up of vector control interventions for all at-risk population and a strong focus on preventive measures, coupled with the introduction of more effective case management, including the use of Artemisinin-based Combination Therapies (ACT) for treatment of uncomplicated malaria cases, with an initial focus on children under five.

The National RBM Program scale-up will support all 36 States, plus the Federal Capital Territory (F.C.T), to achieve results at national, regional and community levels, using a phased approach. Coverage of

interventions will be scaled-up in two phases, focusing on increasing coverage to levels close to 80 % among vulnerable groups. Phase two will consolidate these achievements and extend coverage to the general population at risk.

The Country Strategic Plan builds on a set of core as well as cross-cutting interventions:

- *Access to treatment*, to ensure that at least 80 % of Malaria is approximately diagnosed and effectively treated by 2020.
- *Integrated Vector Management*, to achieve insecticide-treated mosquito nets (ITN/LLIN) distribution and coverage of at least 80 % by 2020. Selected areas with suitable epidemiological characteristics will be covered by IRS interventions with a goal to achieve 85 % coverage in all eligible households.
- *Prevention during pregnancy*, at least 90 % of women have access to directly observed IPT with SP twice during the second and third trimesters of pregnancy, through public and faith-based/NGO antenatal facilities.
- *Effective programme management* to, strengthen the capacity of program management systems at all levels of the health system.

#### **1.4 Integrated Vector Management (IVM)**

The IVM is broadly defined as a process of evidence based decision making procedures aimed to plan, implement, monitor and evaluate targeted, cost effective and sustainable combinations of regulatory and operational vector control measures. The IVM is a process for the management of vector populations, so as to reduce or interrupt transmission of disease. It applies multidisciplinary methodologies and ecosystem approaches with judicious blending of disease control programmes. The characteristics features of IVM include;

- Methods based on knowledge of factors influencing local vector biology, disease transmission and morbidity
- Utilization of a range of interventions, often in combination and synergistically;

Integrated Vector Management Involves;

- Collaboration within the health sector and with other public and private sectors that impact on vectors;
- Engagement with local communities and other stakeholders;
- A public health regulatory and legislative framework.

The content of IVM plan include: (i) Vector management approaches, (ii) Pesticides use and management, (iii) Policy, legislative and regulatory framework, (iv) Institutional arrangement, and (v) Capacity building.

#### **1.5 Objectives of the IVMP**

The objectives of the IVM plan described here are:

- a). to reduce or eliminate breeding sources of Malaria and other disease vector,
- b). to improve vector-borne disease prevention and control through appropriate strategies;
- c). to reduce human vector contact,
- d). to boost malaria control intervention through environmental impact assessment using social, health and environmental indicators, and
- e). to safeguard the management of Health Care Waste (HCW) generated or released in the process

## **CHAPTER TWO: VECTOR MANAGEMENT APPROACH**

### **2.1 Introduction**

The Integrated Vector Management (IVM) approach to malaria control emphasizes the development of country-specific programs that integrate the use of chemical and non-chemical vector control methods in a way that reduces or interrupts the transmission of diseases. The IVM approach may be broadly classified into three categories: Chemical, Biological and Environmental Control.

### **2.2 Chemical Control**

The most commonly used, is based on the use of pesticides. The approach is further grouped under

- (a) Larvicide Treatment (LT)
- (b) Insecticide Treated Bed Nets (ITN)
- (c) Indoor Residual Spray (IRS)

#### **2.2.1 Larvicide treatment (LT)**

Most of the drains or puddles of stagnant water are found to contain *Anopheles larvae*. Traditionally communities use waste oils. However, this practice though cheap and affordable, is not safe from environment point of view as these oils contain toxic heavy metals and other chemicals. Nigerian petrol is known to contain lead to the extent of 700mg/l or more. Though lead is being phased out in the country, certain other chemicals (e.g benzene, cadmium, aromatic hydrocarbons) may prove hazardous to health. The choice chemical for treatment is *Temephos (Abate)*, an organo-phosphorous insecticide. The advantages of using this insecticide is that it is less toxic to mammalian species and also can be applied to water bodies used for drinking purposes.

The World Health Organization (WHO) has recommended *Temephos* for global use and Nigeria was using this chemical in early 1970-1980s but discontinued due to lack of funding. During the Guineaworm eradication programme, this chemical was found very useful at 1 mg/l and communities did not complain of smell, taste or side effects after consumption. Other most effective biodegradable larvicides are *Bacillus thuringiensis (Bti)* or *B. sphaericus (Bs)*. Even though these chemicals are costly, Nigeria should try and equip their armory for future use as alternatives. In this context trial runs and costing will be useful as data base for the future activities. Nigeria has banned the 12 Persistent Organic Pollutants (POPs) which also included *Dichlorodiphenyl-trichloro-ethane (DDT)*.

#### **2.2.2 Insecticide Treated Bed Nets (ITN)**

The ITNs are prepared according to specifications approved by Standard Organization of Nigeria (SON) and consist of:

- 75-100 denier strength
- Warp knitted polyester (polyfibre)
- Mesh size 156
- less than 5% shrinkage
- At least 220Kpa breaking strength (for 7 denier netting)
- 405 Kpa (for 100 denier)
- Fire safety according to CFR 161-CS 191-53
- Standard labelling with type of etting size, washing instructions.

The chemical being used in treating ITN is *permethrin*, a biodegradable insecticide recommended all over. There are other chemicals on an Africa-wide scale; it is difficult to precisely describe the current level of ITN coverage or the progress in increasing ITN usage.

Of the 45 African countries where ITNs form part of National Malaria Control Strategy, 36 has a representative household survey that measured child usage of nets and or ITNs at some point between 1999 and 2004. Only Eritrea, in 2003 reached the Abuja target of 60% ITN usage. The use of ITN in Nigeria is the current government thrust. In the period year 2000-2003, a total of 2,912,643 were either distributed or sold. In spite of this, the coverage is only 6.8% (accessed in 5 areas) which is very low when compared with Senegal (40%), Malawi (30%). Republic of Benin (7%) and Kenya (4%). In 2004, several other states viz Oyo, Lagos, Osun, Yobe and Kaduna launched the distribution of ITN. AFFCOT in Nigeria also organised distribution of 100,000 ITN at the 2004 Farmers' day, where it was combined with the sensitizations of the farmers on the use of ITN and its benefits.

The alternative chemicals for use in preparing the ITNs are *Cypermethrin*, *lambda-cyhalothrin*, *Cyfluthrin* and *Deltamethrin*. These are approved by WHO and are grouped under class II and are moderately hazardous. These compounds with properties of high vapour pressure and low toxicity are choice chemicals for ITNs

### **2.2.3 Indoor Residual Spraying (IRS)**

IRS is a highly effective method for Malaria Vector Control that is particularly useful to achieving a rapid reduction in transmission during epidemic and other emergency situations provided it is well timed and high coverage is achieved. Nigeria was implementing the IRS programme during pre and post independent period. Experience has shown that *Pyrethrum* and *Deltamethrin* could be used for IRS. This practised was discontinued in 1990 due to lack of commitment and funds.

The Federal Government through the Federal Ministry of Health (FMOH) initiated the use of IRS and distributed *Deltamethrin* in July 2004 for trial runs. Some 370 drums of the chemicals were obtained from China and each state was given 10 drums for the activities to commence. Also, 37 knap sacks sprayers were complimented with those efforts. A few training programmes were organized in 2004 in Calabar (Cross River state) and Port Harcourt (Rivers state) to implement this strategy. This strategy may be encouraged in the future for effective control indoors.

IRS is the act of spraying inside walls, ceilings and sometimes eaves, porches and animal sheds with persistent insecticides. It is based on the behaviour of these *anopheles species* that rest on the walls before or after biting humans. The conditions for using IRS are based on the facts that the majority of the local vectors are endophilic, a large proportion of structures have adequate sprayable surfaces and the vector is susceptible to the insecticides to be used. This effectiveness of the IRS could be determined by;

- Types of Surfaces Sprayed
- Public Acceptance
- Availability and maintenance of equipment
- Trained personnel available
- Adequate finances
- Political Will
- Types of insecticides used
- Development of Insecticide resistance

Stockholm convention on Persistent Organic Pollutants (POPs) in May 2004 stated that DDT is still needed in some countries for disease vector control and WHO recommends that countries select the insecticide for IRS based on local situation analysis. However DDT is banned in Nigeria along with other POPs in the early 1990's.

Pilot Areas for IRS testing are selected in Nigeria: Sahel-Dambua LGA in Borno State, using *A. Arabiensis*, 95% (PCR&ELISA); Mangrove/Rain Forest-Epe LGA in Lagos State using *A.gambiae* ss 80% (PCR&ELISA). Internal walls of identified houses will be sprayed with long lasting insecticides

using manual knapsack spray. The pyrethrum spray catch technique will be used to collect mosquitoes killed or knocked down by the insecticide. Consequently the mortality of the mosquitoes will be observed. The data will help in the scaling up of IRS in Nigeria.

### **2.3 Biological Control**

In Nigeria, the Biological methods of vector management have not been popular. One of the most effective means of applying this approach is through *Larvivorous* Fish introduction. As its name suggests, this approach introduces fish that prey on mosquito larvae into mosquito breeding sites. The use of predatory fish to feed on water-borne mosquito larvae has been one of the most effective biological control interventions for Malaria. *Gambusia affinis*, a native of Texas, and *Poecilia reticulata*, a native of South America, have been used in vector control programs around the world for the past 50 years.

To be successful, certain characteristics are required of the fish species. The fish selected must be a surface feeder, as mosquito larvae are only found on the water surface. In addition, the fish must be hardy enough to survive transport to the breeding area, variations of water quality and turbidity, and temperature variations. Several potential negative environmental impacts are associated with introducing *larvivorous* fish. For example, the introduced fish could potentially have a severe impact on local indigenous fish populations. For this reason, introducing fish into natural environments (e.g., rivers, streams, and ponds) is not recommended. Instead, the introduction of larvivorous fish should be limited to man-made environments— underground and overhead tanks, abandoned septic tanks, open and blocked drains, storm water drains, road culverts, irrigation canals, abandoned wells, and commercial fish ponds.

With the above considerations in mind, the use of local indigenous fish species are preferred over the introduction of exotic fish species. Unfortunately, there remains a need to find species that are adapted to survival under local conditions and in temporary habitats

### **2.4 Environmental Control**

The objectives of Environmental Control are to reduce the Malaria mortality and morbidity through the application of targeted, cost effective and site specific activities, and to prevent man–vector contact. This approach essentially depends on the source reduction and elimination of vector breeding sites. The potential mosquito breeding habitats are clogged rain gutter, disused tyres, poorly –drained flat roofs, plant hollows and cavities, abandoned wells storage tank, disused utensils, tins, flower pots, clay liners, rice field, depressions in boat cover-tarps, large body of fresh/salt water, small collection of seepages and stagnant water.

Drainage clearing, filling burrow pits and abandoned ditches, holes, flushing, drying of breeding places, management of irrigation water, removal of marginal and other vegetation, removing shade where mosquitoes breed, disposal of empty cans discarded tyres are some of the activities to offset the breeding of mosquitoes.

Environmental management can be divided into two compatible approaches:

(1) ***Environmental Modification.*** Environmental modification implies permanent changes such as landscaping, drainage, land reclamation and filling. It will often entail minor or major infrastructure and may require significant capital investment.

(2) ***Environmental Manipulation.*** Environmental manipulation is a recurrent activity, requiring proper planning and operation, such as removing aquatic weeds from irrigation and drainage canals, and environmental clean up in urban areas. Environmental manipulation can also include the introduction of

larvivorous fish. Environmental manipulation can be incorporated into conventional agricultural practices. Its costs are usually modest, but recurrent.

Some earlier researches on environmental control of Malaria Vector Control in Igboora, Oyo State revealed that through health education and community mobilization, the malaria was reduced by about 10 to 12 % .This is included in the IVM plan and consists of filling and or draining standing or slowly flowing waters that may serve as *Anopheles* breeding sites .This method requires concerted efforts on a long range basis. Cooperation of communities is very important.

At the moment a document, “Guidelines in Environmental Management for Malaria Control” was prepared and submitted to the sub committee on ITNs/ Environmental Management of National malaria Control Committee (NMCC). A workshop was organized in the south –south geo-political zone in 2004 where 20 participants received training .This needs to be further strengthened as the benefits derivable are many. A plan of action for IVM was developed and submitted to WHO for funding support.



## CHAPTER THREE: PESTICIDE USE AND MANAGEMENT

### 3.1 Pesticides Commonly Used

The most commonly used pesticides are grouped under 5 categories:

- *Organochloride compounds*: These were widely used in the past but are now being abandoned for household use because of persistence in the environment and bio accumulation. They are a risk to non–target organisms, .DDT,BHC etc are typical examples.
- *Organophosphates*: These are derivatives of phosphorus based acids and are generally active against a broad spectrum of insects. They do not persist in the environment and do not bio – accumulate .They are used for residual activity, targeting crawling pests .
- *Carbamates*: These are derived from carbamic acids and have properties similar to organophosphate group.
- *Pyrethroids*: These are synthetic chemicals similar to those extracted from *Chrysanthemum* plant. They have low mammalian toxicity .They are further sub divided into two sub groups :active ingredients mostly known for their residual activity such as *permethrin*
- *Synergist*: These are not active ingredients but they enhance insecticidal activity of some groups such as *pyrethroids*. The most commonly used synergist is *piperonyl butoxide*.

These pesticides are available in various forms

- a) Space sprays production (Flying insect killer aerosols or FIK aerosols): These are aerosol cans designed to release small droplets suspensions into the air to control flying insects.
- b) Residual spraying (Crawling Insect Killers or CIK aerosols)  
Residual or surface sprays are aerosols cans design for the control of crawling insects and to be applied on surfaces (e.g cracks and crevices, under appliances etc.).These normally contain oil or water based aerosols formulations containing one or more active ingredients – a killing (at higher concentrations) and another knockdown agent for induced killing .The residential effect may last 4 to 8 (or 12) weeks.
  - Oil Sprays: These are one of the older versions and are simple formulations containing kerosene or paraffin oil in which one or more ingredients are dissolved. These need spray pumps and may be used as many times as possible.
  - Mosquito coils: Coils consist of a base made up of wood, powder, starch, dyestuff, glues and burning regulators. The active ingredients are quick knock down pyrethroids or natural pyrethrins which are not persistent. One should be cautious as some countries permit use of organochlorine compounds. The coils are very effective and burning lasts for about 6-8 hours.
  - Electric Vaporization Systems; Here a mat, liquid or membrane vaporizes through an electrical device .these chemicals may be refilled. Mat vaporizers are available as a plug in type .Liquid vaporizers are economical as the supply contains 30-45ml of solution and lasts for 30 to 45 cycles of 8 hours each .In the membrane vaporizer which is a new arrival in the market, the active ingredient is formulated in a gel-type formation.
  - Traps: These are insecticide free devices designed to control cockroaches and flies .They are similar to baits and kept on the path of suspected insects.
  - Strips: These consist of a substrate of polyurethane or carton board compounded with an active ingredient which vaporizes fairly readily at room temperature. These contain higher dose of the active ingredient which may be acutely toxic.

### 3.2 Criteria for Selection of Residual Insecticides.

The criteria used for selection of insecticides are:

- Residual effectiveness
- Safety ( Safe for humans and non-target organisms)

- Vector susceptibility
- Impacts on diseases
- Excito-repellency
- Costs and availability
- Odour
- Visibility of spray deposits
- Efficacy against nuisance pests

Only pesticides approved by the WHO Pesticide Testing Scheme (WHOPES) are to be used in Nigeria.

### 3.3 Specifications and Quality Control

#### 3.3.1 Mosquito Nets

International technical norms for net products have been developed by WHO and are therefore recommended as minimum standards for production and use. The national standards have been reviewed by the Standard Organization of Nigeria (SON) to be in line with the international standards. These include:

- 75-100 denier strength
- Warp knitted polyester ( multi- filament)
- Mesh size at least 156
- Less than 55 shrinkage
- Breaking strength: at least 220 Kpa for 75 denier netting and 405 Kpa for 100 denier
- Fire safety according to CFR 1610-CS 191-53
- Standard labelling with type of netting, size, washing instructions (do not wash above 300 C), water absorbency and manufacturers name and contact and address.

#### 3.3.2 Insecticides

The Insecticides approved by WHOPES and used in Nigeria are given in the table below:

**Table 1.1: Insecticides/pesticides approved for use in IVM activities**

Insecticide Compounds and Formulation/Class	Trade Name	Dosage	Duration of Effective Action (months)	Remarks
<b>For ITNs</b>				<u>Manufacturer</u>
<i>Alphacypermethrin SC,P</i>	<i>Fendona</i>	-	-	<i>Cyanamide/ BSF</i>
<i>Deltamethrin SC and Tablet, P</i>	<i>K-Otrine, KO Tab</i>	-	-	<i>Aventis</i>
<i>Etofenprox EW</i>	<i>Vectron</i>	-	-	<i>Mitsui</i>
<i>Permethrin EC</i>	<i>Peripel, Imperator</i>	-	-	<i>Aventis</i>
<i>Cyfluthrin EW</i>	<i>Solfac EW</i>	-	-	<i>Bayer</i>
<i>Lambdacyalothrin CS</i>	<i>Icon (Kit/Sache called Iconet)</i>	-	-	<i>Zeneca / Syngenta</i>
<b>For IRS</b>				
<i>Alphacypermethrin WP/SC,P</i>	-	0.02-0.03	4-6	-
<i>Bendiocarb WP, C</i>	-	0.1-0.4	2-6	-
<i>Bifenthrin WP, P</i>	-	0.025-0.05	3-6	-
<i>Cyfluthrin EW, P</i>	-	0.02-0.05	3-6	-
<i>Deltamethrin WP/WG, P</i>	-	0.02-0.025	3-6	-
<i>Etofenprox WP, P</i>	-	0.1-0.3	3-6	-
<i>Fenitrothion WP, OP</i>	-	2.0	3-6	-
<i>Lambdacyalothrin WP, C</i>	-	0.02-0.03	3-6	-
<i>Malathion WP, OP</i>	-	2.0	2-3	-
<i>Pyrimiphos-methyl WP ad EC/OP</i>	-	1.0-2.0	2-3	-
<i>Propoxur WP, C</i>	-	1.0-2.0	3-6	-

### **3.3.3. List of Banned Pesticides**

Below are pesticides that have been banned by WHO and should not be used in Nigeria:

- Aldrin
- Chlordane
- *Dichloro-Diphenyl-Trichloroethane* Dieldrin (DDT)
- Endrin
- Heptachlor
- Toxaphene
- Chlordimeform
- Mercury compounds
- Luidane
- Parathion
- Methyl Marathion
- Methyl bromide
- Hexachlorobenzene

### **3.4 Safe Use of Insecticides**

In view of the toxic nature of the insecticides, certain precautions should be taken while handling and disposing of insecticides.

Store the insecticides out of reach of children, unauthorised persons and domestic animals, and

- preferably in an enclosed and locked location
- Storage areas should be isolated from workmen and others
- Post on storage and mixing areas signs, such as DANGEROUS-CHEMICAL KEEP OFF.
- Always keep spray equipment clean and in good repair, preventing leakage and accidental contamination of skin and clothing
- Avoid prolonged contact with spray materials; provide soap and water at all times so that materials can be washed from hands and body. Wash hands immediately after handling the concentrates or when wet with dilute spray.
- Avoid undue applications to drying clothes, automobiles, freshly painted surfaces and plate glass.
- Exercise care in applying insecticidal materials wherever drinking water (for man or animals) because it may be contaminated.
- Take special precautions to avoid contamination of foods or forage for livestock, particularly where there are daily cattle.
- Use all pesticides in strict conformance with the precautions warning and directions on the label.
- Chemicals should always be stored in their original and properly labelled containers.
- If repackaging is necessary from the original containers (drums or bags) use appropriate warning labels. Never use beverage or food containers.
- If a flagman is used in aircraft spraying operations, instruct him to get out of the planes run or switch to avoid contamination by the spray material.

### **3.5 Maintenance of Vector Control Equipment**

To obtain the best service from any kind of vector control equipment, preventive maintenance procedures are essential and the following are recommended:

- Provision of trained personnel should be an integral part of any vector control programme in order to ensure an effective and uninterrupted operation of equipment
- All equipment should be inspected immediately on receipt for any damage and any loose or missing parts
- Damaged equipment must be repaired immediately or replaced

- When transporting equipment to the field, it must be adequately protected against damage while in transit
- All personnel using, or supervising the use of equipment in the field should be fully trained in the routine techniques required for proper preventive maintenance and replacement of worn parts
- Supervisory personnel must accept responsibility for the maintenance of all equipment assigned to them.
- Ensure thorough flushing of equipment with clean water, the flushing should include all the components, parts through which the pesticide pass or comes in contact
- Ensure the careful inspection of the equipment and the reporting of any damaged, defective or missing part. Any equipment not suitable for repair in the field should be immediately returned to the nearest depot and a replacement obtained
- At least one depot should be provided for the repair or replacement of equipment that has suffered more serious damage

### **3.6 Resistance of Mosquitoes**

The following vector species developed resistance to DDT and other insecticides in Nigeria:

*Anopheles gambiae* Giles to BHC cyclodienes (1956)  
*Anopheles funestus* Giles to BHC cyclodienes 1961  
*Distantiella theobroma* Dist to BHC cyclodienes 1965  
*Aedes aegypti* (Linnaeus) to BHC cyclodienes 1968  
*Culex tritaeniorhynchus* Giles to DDT 1976  
*Anopheles gambiae* Giles to DDT 1976  
*Anopheles arabiensis* Patton to BHC cyclodienes (1980)  
*Culex tritaeniorhynchus* Giles to BHC cyclodienes (1980)  
*Pediculus humanus humanus* Linnaeus to BHC cyclodienes (1980)  
*Aedes aegypti* (Linnaeus) to dichlorvos (1985)

The emergence of *anopheles.funestus* which is resistant to synthetic pyrethroids is hampering the malaria control effort and it has therefore been necessary to introduce carbamates as an alternative insecticide. Initial reports suggest that resistance is also developing to the carbamate insecticides, which could further destabilise the malaria control programme. Carbamates have an additional problem in that they are highly effective in exterminating cockroaches, crickets and other insects living in and around dwellings and these insects are then eaten by ducks frequently proves fatal, which makes the spraying programme unpopular with householders. While these social and environmental problems can be addressed by ensuring that all insects are cleared away and poultry locked up during spraying, the issue of resistance cannot be dealt with.

Pesticides use also demand safety of chemicals at use and the handling and disposal of leftovers or containers. This demands a very effective HealthCare Waste Management Plan (HCWMP).

## **CHAPTER FOUR: LEGISLATIVE, POLICY AND REGULATORY FRAMEWORK**

### **4.1 Introduction**

Long-term sustainability of any economic or social development project requires that the development interventions be well conceived and that a regulatory framework with enforcement capacity exists. The overarching regulatory framework guiding this Integrated Vector Management Plan (IVMP) for Malaria Control are the National Health Policy (NHP,1988) and the National Policy on the Environment (NPE,1988); annexes A and B. However other national and international policies, laws, agreements and regulations were consulted and considered in preparing this IVMP as summarized in this section.

#### **4.1.1. National Policies and regulations**

- FEPA decree 58 of 1988 as amended by Decree 59 of 1992 and 1999 but complemented by rules and regulations such as FEPA S.1.5, FEPA S.1.9 dealing with disposal and distribution/use of pesticides
- NAFDAC Decree 15 of 1993, as amended by Decree 19 of 1999; ensures that active components of drugs are up to acceptable standards
- The Harmful Waste (Special Criminal Provisions, etc) decree 42 of 1988

#### **4.1.2. International Treaties**

International transport and use of pesticides are governed by three major international treaties:

- The **Basel Convention** on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
- The **Rotterdam Convention** on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade
- The **Stockholm Convention** on Persistent Organic Pollutants (POPs)

Nigeria is a signatory to the Stockholm convention on POPs, and Malaria control is prioritized in the draft policy framework for development and implementation of integrated vector management in Nigeria prepared by the FMOH in July 2005.

The Basel Convention addresses the transboundary movement, management, and disposal of hazardous wastes, including waste pesticides. Transboundary movements of hazardous waste between Parties can take place only on prior written notification by the exporting state to importing (or transit) states, and the inclusion of movement of documents with each shipment. In addition, Parties may not permit hazardous wastes to be exported to or imported from a non-Party except pursuant to an agreement or arrangement that stipulates provisions no less environmentally sound than those provided for by the Basel Convention. Finally, trade in hazardous waste cannot take place under conditions in which such wastes cannot be handled in an environmentally sound manner. Parties are obligated to consider illegal traffic in hazardous wastes as criminal and to notify other

Party states upon prohibition of import of hazardous wastes for disposal. Export of waste pesticides may require specific compliance activities by the host-country government. The Rotterdam Convention addresses the transboundary movement of 22 chemicals, including one chemical used for malaria vector control, *Dichloro-Diphenyl-Trichloroethane* (DDT). Parties to the Convention must make decisions on each chemical regarding its import, abide by export limitations delineated in the treaty, and notify Parties receiving exported waste according to treaty conditions. Host-country governments are responsible for complying with any import or export treaty conditions applicable to their status as a Party or non-Party.

Import or export of the 22 chemicals covered by the Rotterdam Convention, including DDT, may require specific compliance activities by the host country government.

The Stockholm Convention addresses the production, import, and export of 12 POPs, including DDT. Currently, Parties to the Convention must take measures to eliminate releases of each chemical, with the exception of certain uses listed in the Convention (for example, the exception of DDT use for “disease vector control”). Parties to the Convention must also abide by the Convention’s stockpile handling, transport, and disposal requirements intended to eliminate persistent by-products; thus, management and export of obsolete pesticides may require specific compliance activities by the host country government.

#### **4.1.3. World Bank Safeguard Policy**

There are set of environmental safeguard policies that the World Bank uses for projects requiring its participation or assistance. As regards the IVMP the safeguard policy triggered is the ***Pest Management (OP 4.09)***

The policy supports safe, affective, and environmentally sound pest management. It promotes the use of biological and environmental control methods. An assessment is made of the capacity of the country’s regulatory framework and institutions to promote and support safe, effective, and environmentally sound pest management.

## **4.2 The National Framework**

Prior to the establishment of the Federal Ministry of Environment, over 16 legislations were made by the Federal Environmental Protection Agency (FEPA which are related to environment without adequate mechanism for coordination. FEPA provided the nucleus of the Federal Ministry of Environment which was created in 1999. The activities, personnel, structures and functions of FEPA were subsumed in the Ministry.

The mandate of the Federal Ministry of Environment includes

- (i) Preparation and periodic review of a comprehensive National Policy for the protection of the environment and conservation of natural resources, including procedure for environmental impact assessment for all development projects,
- (ii) Preparation accordance with national policy, periodic master plan for the development of the environment, sciences and technology and advice the Federal Government on the financial requirement for the implementation of such plans, and
- (iii) Advise the Federal Government on environmental matters including the conservation of natural resources and sustainable development, and scientific and technological activities affecting the environment and natural resources.

To achieve its policy, the Ministry is guided by eight principles which include:

- Respect and care for the community,
- Conservation of the earth, vitality and diversity,
- Change of personal attitudes and practises,
- Keeping developmental process within the earth carrying capacity,
- Enable communities to care for their environment,
- Implementation of the national framework which integrates development and conservation,
- Creation of global alliance and
- Minimizing the depletion of non-renewable resources

**Table 4 1. Milestones in Legislation, Policy and Regulations on Environment.**

<b>Year</b>	<b>Law, Decree and Regulation</b>
1909	Public Health Act
1917	The Township Ordinance
1928	The Lagos Colony Ordinance
1946	The Town and Country Planning Ordinance
1958	The Public Health Law (amended)
1969	Petroleum Act
1972	Stockholm Conference on Human Environment
1975	Creation of Division of Urban Development and Environment in Federal Ministry of Economic Development
1979	Environmental Planning and Protection Division in Federal Ministry of Works and Housing
1980	Regional Initiative Lagos Plan of Action
1981	Bill for the establishment of Federal Environmental Protection Agency
1985	A National Committee on Ecological Problems (NCEP) was established in 1985 to assist states in controlling environmental degradation. The projects to be funded under this scheme included oil spillage and industrial pollution and general environmental pollution.
1988	Creation of the Federal Environment Protection Agency (FEPA) by Decree 58 as a parastatal under the Federal Ministry of Works and Housing
	Hazardous Waste Criminal Provision Act Decree 42
1990	Promulgation of the Harmful Waste (Special Criminal Provisions Act)
1991	National Effluent Limitations Regulations S.1.8.
	The Population Abatement in Industries and Facilities Generating Regulations S.1.9.
	The Management of Solid and Hazardous Waste Regulations S.1.15
1992	The FEPA Decree was amended by Decree 59 of 1992, to strengthen EIA Decree 86
1995	EIA Procedural Guidelines
1999	Federal Ministry of environment was created
2000	An amendment was made to the Public Health Law of 1978 (referred to as Principal Law) and Mobile Courts was added to the lists of courts empowered to try matters relating to sanitation. They are established for the purpose of trying any offence under the law summarily making any order for the abatement of any nuisance and imposing any punishment. The mobile court also has the jurisdiction of a Senior Magistrate who may sit alone or in the company of the Chief Environment Health Officer.
2004	Policy on Environment Sanitation.
2007	Creation of the National Environmental Standards and Regulations Agency (NESREA) under Act No 25 of July 2007; with mandate of enforcement of environmental standards, regulations, rules, laws, policies and guidelines.

**Table 4.2 Government Institutions with Malaria Control Mandates or Related Functions**

Institutions	Information and Data
Federal Ministry of Health (FMOH)	<ul style="list-style-type: none"> <li>• Documents pertaining to malaria control policies, history of control in the country</li> <li>• Insecticides registered for use against mosquitoes, pesticide use policies, all donor programs active in the country</li> <li>• Maps of vectors and malaria distribution, information about insecticide resistance, pesticide testing procedures, inventories of pesticides and equipment available</li> <li>• Organization and malaria control responsibilities in the ministry</li> <li>• Measures for treating pesticide poisoning</li> </ul>
Federal Ministry of Environment Housing & Urban development (FMEH&UD)	<ul style="list-style-type: none"> <li>• Potential institution for environmental monitoring</li> <li>• Documents and maps pertaining to the presence of sensitive habitats, such as world heritage sites, national parks and forests, lists of endangered species and their locations, game parks, bodies of water, and other environmental resources</li> </ul>
Federal Ministry of Agriculture (FMOA)	<ul style="list-style-type: none"> <li>• Pesticide registration</li> <li>• Listing of agricultural development programs currently using pesticides, and information on classes of pesticides used in various agricultural activities and locations, ways to prevent public health pesticides from being used for agriculture</li> <li>• Potential agricultural export impacts isolated to use of various pesticides</li> </ul>
Environmental Non-Governmental Organizations (NGOs)	<ul style="list-style-type: none"> <li>• Potential institutions for environmental monitoring</li> <li>• Information and maps pertaining to the presence of sensitive habitats, such as world heritage sites, national parks and forests, lists of endangered species and their locations, game parks, bodies of water, and other environmental resources</li> </ul>



## **CHAPTER FIVE: INSTITUTIONAL ARRANGEMENTS AND IMPLEMENTATION RESPONSIBILITIES.**

### **5.1 Introduction**

Nationally, the project will be placed under the overall responsibility of the National Malaria Control program (NMCP) created out of the existing National Malaria and Vector Control Unit within the FMOH. The NMCP will coordinate the project activities, specifically with other Ministries, particularly the Federal Ministry of Environment, Housing & Urban Development (FMEH&UD), Federal Ministry of Agriculture and Water Resources (FMA&WR), faith-based and private sector healthcare providers. The National Malaria and Vector Control Unit within the FMOH has overall responsibility in the country for setting the Malaria Control Policy and ensuring the coordination of Malaria control activities across ministries.

Within the proposed project, NMCP is responsible for setting priorities for action and financing, approving eligible action plans prepared by FMOH and national Civil Society Organizations proposing multi-state programs for financing, monitoring the epidemiological situation in the country, and evaluating the national response. Under this project, NMCP's capacity was strengthened considerably particularly on financial management and procurement issues.

In addition to the overall coordination, the NMCP will also be responsible for the following;

- i) Overall technical management;
- ii) Procurement of malaria commodities;
- iii) Overall accountability for the financial management of the credit at the federal level; and
- iv) Monitoring, evaluation and reporting on progress.

The NMCP's role vis a vis the SMOH is to provide the overall national strategic direction within which participating states will tailor their activities based on the particular characteristics of the state's epidemic status. The NMCP will organize the work planning exercises and review all state work plans and procurement plans before processing by the World Bank. It will also promote the sharing of best practice experiences and develop capacity-building activities to address needs at the state level.

At the state and local levels, project activities will be based at the Project Implementation Unit (PIU) in the SMOH. The PIU will be in charge of the implementation of the project activities at the state and local levels. The PIUs will also serve as the liaison between the federal and state levels.

Each state PIU has the following staff designated to support the project: **Project Manager**, the **Accountant**, the **Internal Auditor**; the **Procurement Officer**; the **Community Mobilization Officer**; the **Monitoring and Evaluation Officer** and the **Environmental/ Social Officer**. The Organogram of a state PIU can be seen in figure 5.1 on page 24.

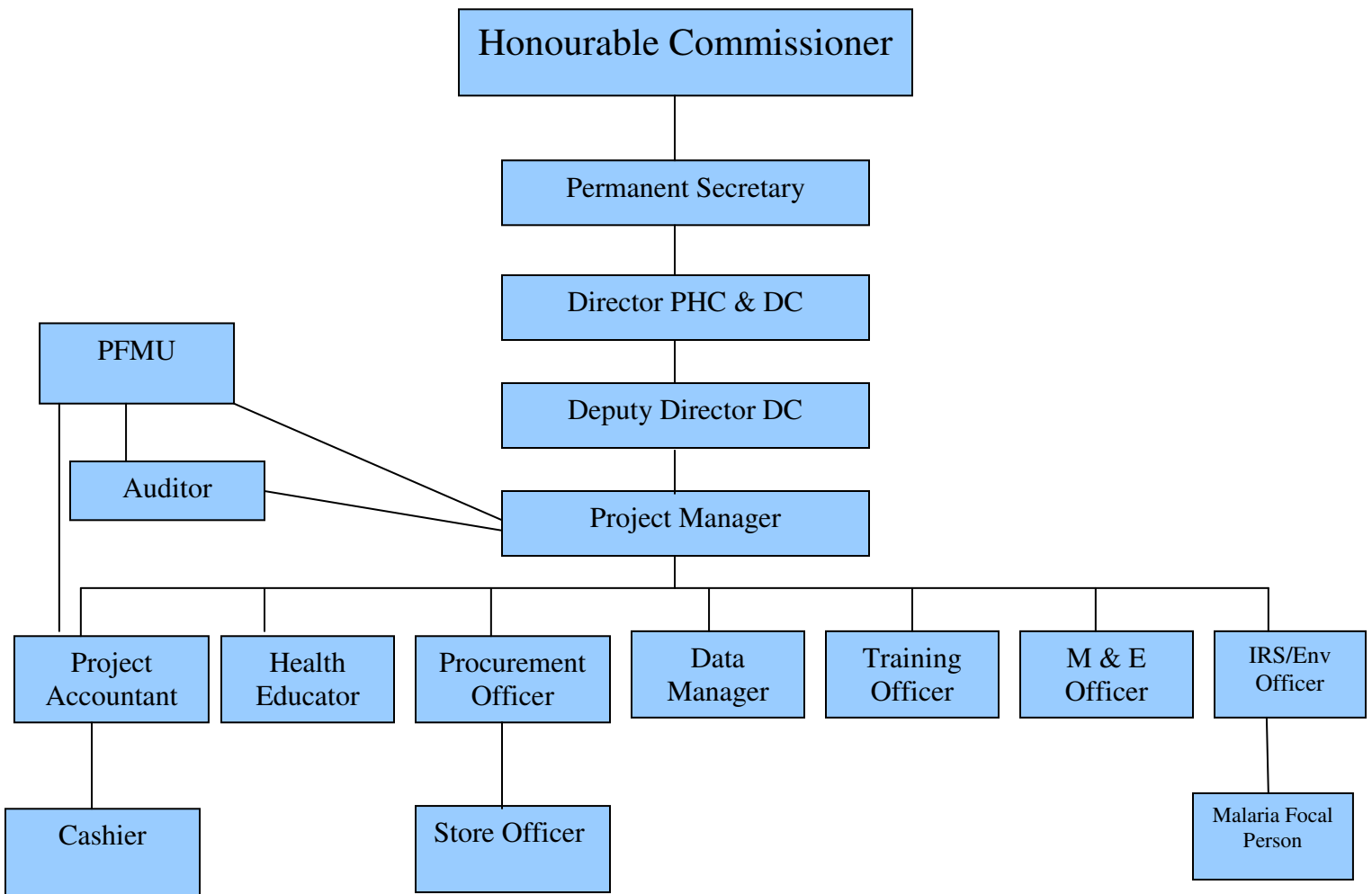


Fig 5.1 Organizational Structure for a State Project Implementation Unit (PIU) for MCBP

## 5.2 Specific Responsibilities

The Federal Ministry of Health (FMOH) is responsible for delivering health care services in Nigeria. This implies that FMOH will ensure collaboration of relevant programs, Departments and Ministries in reinforcing implementation. All existing channels to reach the target groups (pregnant women and children less than 5 years of age), will be explored and if found appropriate and cost-effective, they will be utilized.

In addition, the FMOH through the NMCP shall:

- Develop and update from time to time the policy guidelines on IVM
- Encourage States to ensure compliance with laid down safeguard policy guidelines
- Organize a Training programme on IVM at National level and train all the states for effective implementation.
- Provide technical support to states on IVM implementation
- Support the provision of basic logistics for effective take off of the programme
- Collaborate with other relevant Stakeholders and Donor Agencies

At the project level, the coordinator of the NMCP will be responsible for the implementation, regular supervision, monitoring and evaluation of IVM and will be supported by the Environmental /Social Officer attached to NPCU.

The **State Ministry of Health** through the PIU shall:

- Implement the policy guidelines on IVM in all LGAs
- Liaise with State Ministry of Environment and other relevant Ministries on IVM implementation
- Encourage LGAs to ensure compliance with laid down policy guidelines
- Organize a Training programme on IVM at State level and train all the LGAs focal persons on IVM for effective implementation
- Support the provision of basic logistics at State level for effective take off of the programme.
- Collaborate with other relevant Stakeholders at State level
- Collect all the data relevant to IVM and send to FMOH

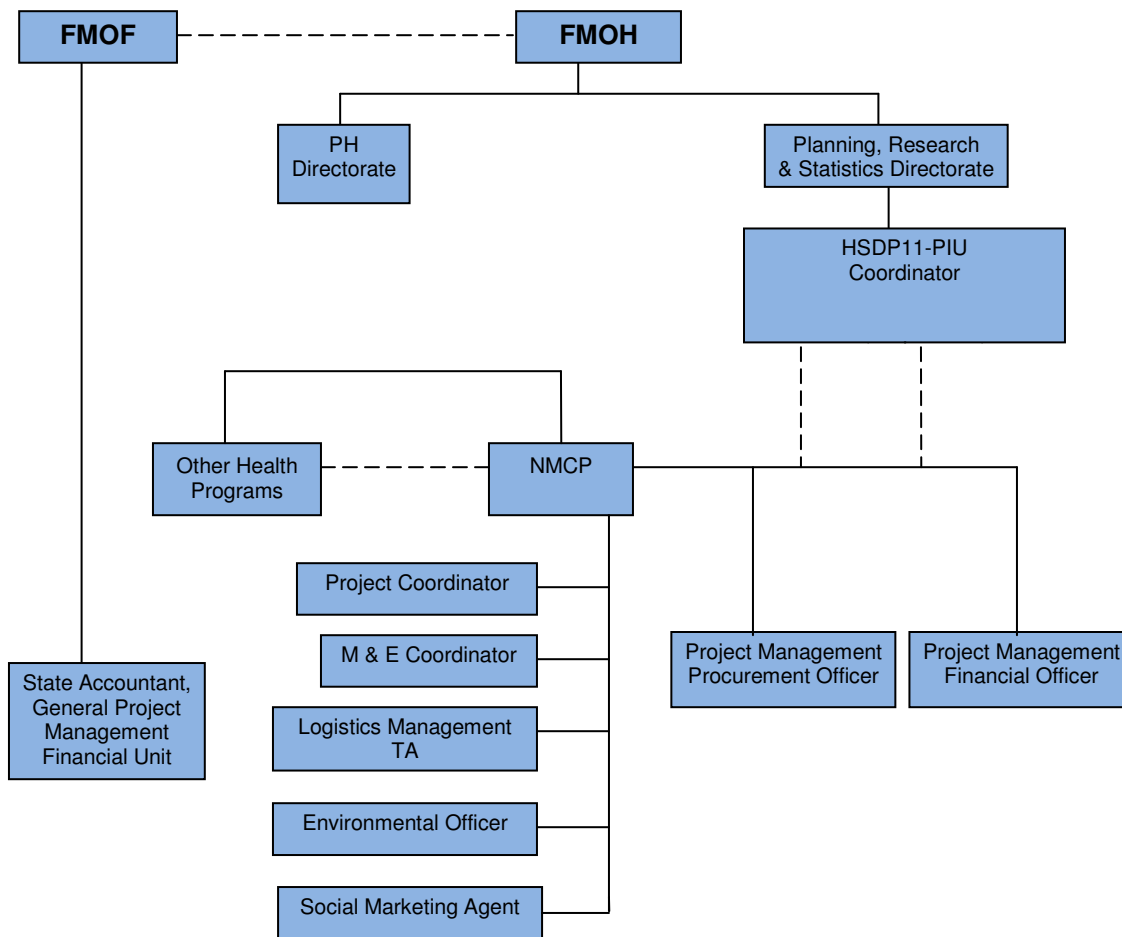
The Environmental/Social Officer shall be responsible for the implementation of the safeguard policies that are triggered by the project and reports progress to the Environmental Officer at the federal level through the Project Manager in the PIU.

The **LGAs** shall take part in the IVM implementation more actively at the grass roots level. For this to be effective, the LGA shall:

- Implement the policy guidelines on IVM at community level
- Liaise with State Ministry of Health and relevant NGOs on IVM implementation
- Comply with laid down policy guidelines
- Organize Training and Retraining programmes on IVM at community level
- Provide technical support to communities
- Support the provision of basic logistics at community level for effective take off of the programmes
- Collaborate with all stakeholders at community level
- Collate all the data relevant to IVM and send to SMOH

The Malaria Focal Person at the LGA/community level is responsible for ensuring full compliance of the integrated vector management plan. He/she ensures that safeguard issues dealt by the project are monitored and complied with. This officer will report directly to the IRS/Environmental officer at the PIU.

Figure 5.2 shows the institutional arrangement of MCBP as it relates to other health programmes such as the Second Health Systems Development Project (HSDP2) and the Second HIV/AIDS Program Development Project (HPDP2).



**Fig 5.2 MCBP Institutional Arrangement at the Federal level**

## **CHAPTER SIX: INSTITUTIONAL CAPACITY BUILDING AND TRAINING**

### **6.1 Introduction**

Training and capacity building are essential components of efforts to assist the NMCP in developing a sustainable malaria vector control program that ensures the protection of human health and the environment. Different types of training and capacity building are necessary, ranging from in-field training of those who apply pesticides, to local-level management capacity, to Ministry decision making.

The NMCP is led by a competent Coordinator and comprises a strong technical team of epidemiologists, parasitologists and environmental health specialists. Project personnel will undergo short training courses in IVM during project implementation. The sum of Fifty Two Thousand Dollars (\$52,000) should be dedicated to cover the training requirement in the first year, while the total cost of training for the project life span is estimated at One Hundred and Sixteen Thousand Two Hundred Dollars (\$116,200). Additional capacity building will be required during the scale up of the project.

### **6.2 Training Needs.**

The principal groups involved in Integrated Vector Management are:

- Primary group: (i) management and administrative staff; (ii) medical and laboratory staff; (iii) IRS personnel, (iv) ward attendants and other support staff; and
- Secondary group: patients, pregnant women, children, scavengers and the local communities.

The training needs identified based on interview of the categories of actors involved are presented below:

#### ***6.2.1 Training of Trainers***

The World Bank through the National Malaria Control Program (NMCP) will provide short training course to Project Coordinators, Senior Ministry officials (Environmental and social officers, logistics officers, Monitoring and evaluation officers), Integrated Vector Management campaign team including pesticide sprayers and LLIN distributors (Social marketing personnel. This training should inform project managers of the importance and methods of integrating human health and environmental concerns into malaria vector control. It should also inform program managers of World Bank's expectations for implementation of best practices for human health and the environment as detailed in the Environmental Assessment (EA).

Finally, the training should express World Bank's expectations that measures to protect human health and the environment be factored into program evaluation. Additional topics for discussion may include:

- Factors to consider in intervention selection
- Factors to consider in pesticide selection
- Potential impacts of pesticides
- Best practices and mitigation measures (throughout the life cycle of the intervention or pesticide)
- Adaptive management

#### ***6.2.2 Training for Senior Ministry Officials***

State Ministry of Health (MOH) staff have various specialties within malaria control. It is not always guaranteed that the Federal Ministry of Health staffs has knowledge and training on all aspects of malaria vector control, or that decision making for malaria vector control takes into account all appropriate facets.

As a way of supporting sound decision making on malaria vector control across the nation, and as part of country-specific intervention support, World Bank should support training for SMOH malaria control program managers and other relevant staff to orient them to the elements of well-run integrated vector management (IVM) programs, environmental design, monitoring, and mitigation, including the following:

- Factors to consider in intervention selection
- Factors to consider in pesticide selection
- Potential impacts of pesticides
- Best practices and mitigation measures (throughout the life cycle of the intervention or pesticide)
- Appropriate timing and logistics
- Adaptive management

Additionally, Consultants should be paired with counterparts from the SMOH Focal Unit to provide any on-the-job guidance necessary.

### ***6.2.3 Training for Local Level Management***

Although health systems in Nigeria have decentralized and placed responsibility for malaria program implementation on SMOH through the MCBP managers, the management skills necessary for these project managers to perform effectively have not filtered down from the FMOH. The result is a lack of capacity to manage malaria vector control programs at the local level. During the period of World Bank support, Consultant Specialist should be paired with state project managers to provide on-the-job guidance, training, and practice for the staff of LGA Health Authorities. The training should focus on

- Logistics
- Data management
- Best practices and mitigation measures
- Monitoring and evaluation
- Surveillance systems
- Adaptive management
- Local community/Household representatives

Additionally, World Bank will facilitate knowledge sharing between the FMOH staff and project team (NPCU and State PIUs).

### ***6.2.4 Training of Implementers***

Every Malaria vector control intervention requires staff that implements interventions in the field:

- spray operators,
  - larvicide applicators,
  - insecticide-treated net (ITN) impregnators,
  - environmental management or sanitation workers, and
  - intervention supervisors.
- 
- Each “agent of implementation” should be trained according to the highest standards available—World Health Organization (WHO) guidelines, United Nations Food and Agriculture Organization (UNFAO) guidelines, equipment manufacturer guidelines, pesticide industry guidelines, ministry guidelines, etc. Because some interventions are seasonal, refresher training prior to each intervention may be necessary. When pesticides are used, storekeepers, medical practitioners, individuals transporting pesticides, and communities need to be educated on their roles and responsibilities in preventing unwanted exposure to pesticides (or treatment of pesticide exposure, in the case of medical practitioners).

### **6.3 Capacity Building outside the Malaria Sector**

Malaria vector control activities interact with other sectors, most importantly Agriculture and Environment, by extension both Federal Ministry of Agriculture and Water Resources (FMA&WR), State Ministries Agriculture and Federal Ministry of Environment & Urban Development (FMA&UD) To the extent that these institutions wants to become involved in environmental monitoring of malaria vector control interventions, promote responsible pesticide use and prevent pesticide pilferage, etc. The project's interventions should include measures to build the capacity of these institutions and facilitate collaboration between them and the malaria control program.

Table 6.1: Action Plan with Strategies and Responsible Agencies.

Activity	Strategy/Actions	Tools/Instruments/skilled Personal Required	Responsible Persons/Actors	Time Required	Cost
Geographical Reconnaissance	<p>Site visits</p> <p>Mapping</p> <p>Training materials</p> <p>Training</p>	<p>GPS equipment, Stationery, Training materials, Logistics, Facilitators</p>	<p>The World Bank, FMOH, WHO, UNICEF, USAID, UNDP, NGOs and NMCP</p>	<p>3 months</p>	<p>To be captured during tables preparation</p>
Vector Management	<p><b>Chemical control</b> (Larvicides, ITNs, IRS)</p> <p>Training</p> <p>Field activity</p> <p>M &amp; E</p> <p>Data collection and periodic reporting.</p>	<p><b>Chemicals:</b></p> <p>Temephos, Pyrethrin, Pyrethrum, all other approved by WHOPEs and NAFDAC, kerosene, diesel.</p> <p><b>Equipments:</b></p> <p>Bed nets, knapsack sprayers, hand compression sprayer, ultra low volume vehicle mounted sprayer, PPE.</p> <p>Human Resources:</p> <p>EHOs, spray men, logistics.</p>	<p>FMOH, mosquito net manufacturers and suppliers, insecticide dealers, NAFDAC, SON, State Gov, LGAs, WHO, UNICEF, NMCP, UNDP, World Bank, DFID, USAID, BASICS, Netmark, MSO, NGO</p>	<p>All through project.</p>	<p>Same as above</p>
	<p><b>Biological control</b></p> <p>Training</p> <p>Field activity</p> <p>M &amp; E</p> <p>Data collection and periodic reporting</p>	<p>Fish species, Fish supplier, Bti and Bs, Logistics.</p>	<p>FMOH, suppliers, SON, State Gov, LGAs, WHO, UNICEF, NMCP, UNDP, World Bank, DFID, USAID. BASICS, MSO, NGO</p>	<p>All through project</p>	<p>Same as above</p>
	<p><b>Environmental control</b></p> <p>Training</p> <p>Field activity</p> <p>M &amp; E</p> <p>Data collection and periodic reporting</p>	<p>Drainage clearance tools, masonry tools, vegetation clearing tools, PPE, logistics</p>	<p>FMOH, SON, State Gov, LGAs, WHO, UNICEF, NMCP, UNDP, FMEH&amp;UD, World Bank, DFID, USAID, BASICS, MSO, NGO</p>	<p>All through project</p>	<p>Same as above</p>
Pesticides Use and Management	<p>Training</p> <p>Spraying technique and safe use</p> <p>Chemical handling and waste management</p> <p>Data analysis</p> <p>Record keeping</p> <p>Reporting</p> <p>M &amp; E</p>	<p>Stationery, Training materials, Insecticides, Equipments, PPEs, Logistics, Facilitators</p>	<p>Consultants, FMOH, FMEH&amp;UD, FMA&amp;WR, FMAWR, SON, NAFDAC, State Gov, LGAs, WHO, UNICEF, NMCP, UNDP, World Bank, DFID, USAID. NGO</p>	<p>All through project</p>	<p>Same as above</p>
Legislation, Policy and	<p>Stakeholder meeting</p> <p>Harmonization of</p>	<p>Meeting and Information dissemination, Logistics.</p>	<p>Consultants, FMOH, FMEH&amp;UD, FMA&amp;WR.</p>	<p>4 weeks</p>	<p>Same as above</p>



Regulatory Framework	environmental legislation, policies and guidelines to capture the national scenario.		FMWR, FMFin, FMJst, FMInfo, SON, NAFDAC, State Gov, LGAs, WHO, UNICEF, NMCP, UNDP, World Bank, NGO		
Institutional Arrangement	Stakeholder meeting Data base creation Information dissemination	Stationery, Information, Logistics	Consultants, FMOH, FMEEnv, FMAgric. FMWR, FMFin, FMJst, FMInfo, SON, NAFDAC, State Gov, LGAs, WHO, UNICEF, NMCP, UNDP, World Bank, NGO	2 weeks	Same as above
Capacity Building	Training programs (local and international) Hands-on-skills development Workshops	Stationery, Training materials, Computers, Tools and Equipments, Logistics.	Consultants, FMOH, FMEH&UD, FMAgric. NGO	3 months, periodic, need based.	Same as above

### ***Work Plan and Budget***

Total indicative budget estimate for the implementation of the IVMP for the NMCBP in the seven (7) target states for five (5) years is given as Two Hundred and Forty Four Thousand, Nine Hundred and Seventy Dollars (USD 244,970) made up of:

<b>Item</b>	<b>Cost (\$)</b>
Capacity building	116,200
Advisory services	61,000
Environmental management	25,000
Project management	20,500
Sub-Total	222,700
Contingency (10% of Sub-Total)	22,270
<b>Total</b>	<b>244,970</b>

Annual work plan will be developed in consultation with the NMCP and other relevant agencies  
The budget breakdown can be seen in table 6.2

**Table 6.2 Budget Summary**

Budget summary						
Line item	Yr. 1	Yr. 2	Yr.3	Yr.4	Yr.5	Total
<b>1. Capacity building</b>						
IVM orientation workshop	1500	1200	0	0	0	2,700
Training of Trainers	17,500	0	0	0	0	17500
Senior Ministry Officials	12000	12000	12000	0	0	36000
Training of Implementers	10000	10000	10000	0	0	30000
Local Level Mgt	10000	10000	10000	0	0	30000
<b>Sub-total</b>	51000	33200	32,000			116200
<b>2. Advisory services</b>						
IVM problem diagnosis	12000	7000	7000	0	0	26000
Field guides/IVM materials	1500	7500	6000	0	0	15000
Public awareness campaigns	2000	2000	2000	2000	2000	10000
Pest/Vector surveillance	2500	2500	2000	2000	1000	10000
<b>Sub-total</b>	18000	19000	17000	4000	3000	61000
<b>3. Environmental management</b>						
Equipment; bed nets; chemicals,	4000	4000	3000	3000	1500	15500
Support to IVM R&D	2000	2000	2000	2000	1500	10000
<b>Sub-total</b>	6000	6000	5000	5000	3000	25000
<b>4. Project management</b>						
IVMP coordination	2500	2000	2000	2000	1500	10000
M&E	2500	2500	2500	1500	1500	10500
<b>Sub-total</b>	5000	4500	4500	3500	3000	20500
<b>Total</b>	<b>80000</b>	<b>62700</b>	<b>58,500</b>	<b>12,500</b>	<b>9500</b>	<b>222700</b>
<b>Contingency (10% of Total)</b>						<b>22270</b>
<b>Grand Total</b>						<b><u>\$24, 4970</u></b>

## **ADDENDUM 1: SECOND HIV/AIDS PROGRAM DEVELOPMENT PROJECT (HPDP2) HEALTH CARE WASTE MANAGEMENT PLAN**

In 2007, the World Bank and the Federal Government of Nigeria developed the National Health Care Waste Management Plan (NHCWMP), which was too broad to address specific project issues. In 2008, the World Bank launched the HIV/AIDS Program Development Project (HPDP2) for Nigeria. This project specific HIV/AIDS HCWMP derived most of its strategies from the NHCWMP. It was therefore required by the World Bank that a project specific HIV/AIDS Health Care Waste Management Plan (HCWMP) should be developed and disclosed. As most recent HCWM reports, it addresses the safeguard policies with respect to HIV/AIDS intervention and Health Care Facility (HCF) waste generation in general.

This HIV/AIDS HWMP would be utilised in the MCBP to address the Waste Management issues emanating as a result of the MCBP intervention activities in the participating states. The seven (7) states in the MCBP are also participating in the HPDP2 and therefore the HIV/AIDS HCWMP would accommodate medical wastes generated by the MCBP.

The objective of the plan is to provide processes that the implementing agencies (NACA and SACAs) will follow to maximize project compliance with international and national environmental regulation and ensure that the disposal of medical wastes is conducted in an environmentally safe and sustainable manner.

The study shows that infectious and non-infectious wastes are dumped together in most hospitals, resulting in a mixing of the two, which are then disposed of with municipal waste at the dumping sites. It also assessed the level of knowledge among health-care staffs about the practices to be adopted, and the availability of treatment equipment such as incinerators, autoclaving and chemical treatment.

The results of the study demonstrate the need for strict enforcement of existing provisions, capacity building and a better environmental management system for the disposal of medical wastes. The project which has a 5 year plan has since successfully passed public disclosure and is now being implemented.

With respect to the Nigeria's MCBP, the additional medical waste (needles and syringes, gloves and glass slides) to be generated is related to the diagnosis and treatment of Malaria but not exclusive to Malaria. Although Malaria is not transmitted via unsafe handling of healthcare waste, the material may be infected with HIV/AIDS, Hepatitis A, B and C and therefore needs to be handled with care.

The HPDP2 HCWMP included the broad definitions of various HCW, available information on generation rate, recommended procedures on the waste segregation, collection and storage within and outside the HCF, transportation and final disposal including best disposal technologies.

Other key areas addressed by the plan include an action plan with identified stakeholders, time frame, cost and identifiable indicators. Training needs and capacity building are also included in the action plan. Monitoring and evaluation strategy is also suggested in addition to a periodic reporting system.

## **REFERENCES**

- Federal Government of Nigeria (2006), Integrated Vector Management Plan for the malaria Control Booster Project
- Federal Government of Nigeria (2007); Policy for the Implementation of Insecticides Treated Mosquito Nets in Nigeria
- Federal Ministry of Agriculture and Water Resources (2007), Pest Management Plan for the Fadama III Project, Final Report
- Federal Ministry of Health (2005); Guidelines for integrated vector management in Nigeria, Abuja, pp. 1-27
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- Federal Ministry of Health (2005); A road map for impact of malaria control in Nigeria, A 5- year strategic Plan: 2006-2010, Draft report, National Malaria Control Programme, Abuja, pp. 1-37
- USAID (2007), Integrated Vector Management Programmes for Malaria Vector Control; Programme Environmental Assessment
- World Bank/Corridors Project (2006); Harmonized Plan for the management of Waste Resulting from Healthcares in the Corridor Countries, Draft Final Plan, May 2006

***Annex A1: The National Health Policy (NHP) (1988)***

The policy is aimed at providing comprehensive health care to every Nigerian through:

- adequate health education concerning prevailing health problems and the methods of preventing and controlling them;
- promotion of proper nutrition, family planning etc;
- immunization against the major infectious diseases e.g. measles, meningitis etc;
- prevention and control of locally endemic (lesser) and epidemic (widespread) diseases; and
- provision of essential drugs and supplies.

The policy gives appropriate direction to the health care providers in both public and private sectors with a view to achieving the goal of 'health for all' using the 'primary health care' approach as its main strategy.

***Annex A2: National Policy on the Environment (1988)***

The National Policy on the Environment aims to achieve sustainable development in Nigeria, and in particular to:

- secure a quality of environment adequate for good health and well being;
- conserve and use the environment and natural resources for the benefit of present and future generations;
- restore, maintain and enhance the ecosystems and ecological processes essential for the functioning of the biosphere to preserve biological diversity and the principle of optimum sustainable yield in the use of living natural resources and ecosystems;
- raise public awareness and promote understanding of the essential linkages between the environment, resources and development, and encourage individuals and communities participation in environmental improvement efforts; and

co-operate with other countries, international organizations and agencies to achieve optimal use of trans-boundary natural resources and effective prevention or abatement of trans-boundary environmental degradation

**Annex B: Questionnaire on the Integrated Vector Management Plan**

1) Please answer the following questions

S/N	KIND OF ITEM	NUMBER RECEIVED FROM DONORS	NO DISTRIBUTED		AMOUNT SOLD PER ITEM	NUMBER OF DISTRIBUTION SITES			
			NUMBER OF ITEMS GIVEN FREE	NUMBER OF ITEMS SOLD		HCF	LGA	NGOs	SMOH CENTERS
1	ITN								
	LLIN								
2	IRS								
3	Larvicide's Treatment								

2) What is the no of ITN/LLIN distributed to children under 1 year of age during immunization sessions?.....

3) What is the no of ITN/LLIN distributed to children under 1-5 years of age during immunization sessions?.....

4) Was there any complain from the use of the ITN/LLIN? Yes.... No.....

i) If yes, then please state.....  
 .....  
 .....  
 .....

4) What pesticides are used in the vector management approaches?

5) Do you carry out indoor residual spraying (IRS)? Yes or No

a). If yes, what are the insecticide used?

b) Has there been any complain from the use of these pesticides

6) Are personal protection equipments worn by the personnel during the spraying exercise?

If yes, kindly state the PPEs in use.....

S/ N	Training Program	Frequency	Year	Target Audience	No of Participants		Training Cost
					Male	Female	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Please answer the following questions

7). Do you have capacity building/training program?