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**Matters for consideration or action by the Conference of the Parties:
measures to reduce or eliminate releases from intentional production and use: DDT**

**Information from selected countries on DDT data collection and
reporting processes^{**}**

Note by the Secretariat

As referred to in the note by the Secretariat on evaluation of the continued need for DDT for disease vector control and alternative strategies to replace DDT, contained in document UNEP/POPS/COP.2/4, the annex to the present note, which has been prepared by the World Health Organization (WHO) in cooperation with the United Nations Environment Programme (UNEP) and the Secretariat of the Stockholm Convention on Persistent Organic Pollutants in accordance with decision SC-1/25 of the Conference of the Parties of the Stockholm Convention, sets forth information from selected countries on DDT data collection and reporting processes. The annex is being circulated as received by the Secretariat and has not been formally edited.

* UNEP/POPS/COP.2/1.

** Stockholm Convention, Article 3 and Annex B, part II; report of the Conference of the Parties on the work of its first meeting (UNEP/POPS/COP.1/31), annex I, decision SC-1/25.

Annex

Information from selected countries on DDT data collection and reporting processes

ESTABLISHING NATIONAL MECHANISMS FOR ACTIVE INFORMATION COLLECTION AND REPORTING ON THE USE OF DDT FOR DISEASE VECTOR CONTROL

REPORT OF STUDIES IN FIVE COUNTRIES

ESTABLISHING NATIONAL MECHANISMS FOR ACTIVE INFORMATION COLLECTION AND REPORTING ON THE USE OF DDT FOR DISEASE VECTOR CONTROL

REPORT OF STUDIES IN FIVE COUNTRIES

EXECUTIVE SUMMARY

BACKGROUND

An expert group report (UNEP/POPS/COP.1/4) on the evaluation of the continued need for DDT for disease vector control, was considered by the First Conference of Parties to the Stockholm Convention (COP 1), in May 2005. The report recommended that the COP ensures adequate investment for the reporting and assessment processes, to provide a sound and reliable basis for the evaluation of the continued need for DDT. In this regard, it was recommended that a well-resourced mechanism for reporting and assessment on DDT use for disease vector control, be set up under the auspices of the Secretariat and the WHO. Furthermore, the expert group report recommended that such a mechanism involve active data collection and appropriate verification and validation processes, and should also enable systematic strengthening of relevant country capacity for data collection and management to progressively increase the role of countries in the reporting and monitoring process.

In response to the above recommendation, the COP requested the Secretariat in cooperation with the WHO, to further elaborate the reporting and assessment process on DDT for consideration at its second meeting in May 2006. As part of the Decision, the COP requested that adequate resources be made available for a work plan of immediate actions (annex III to document UNEP/POPS/COP.1/4 of the conference) to support the preparations of Parties for reporting on DDT and the review and assessment processes required for future evaluations of the continued need for DDT.

Activity 2 of the work plan requests a study on possible mechanisms for active information collection to provide an adequate information base for the evaluation of the continued need for DDT. Five countries were selected for the study. The individual country reports are attached to the executive summary.

Objectives of the country studies

Recognizing the varying country situations and level of development of the national vector control programmes, the studies had an overall objective of obtaining first hand information on the range of priorities for, and the cost of, establishing and maintaining active national data collection and reporting mechanisms.

The specific objectives of the study were to:

1. assess the current mechanisms being employed to collect information on the use of DDT and its alternatives for disease vector control;
2. identify the gaps in the information that is currently collected, compared to what Parties are required to report on (ref. questionnaire adopted under the Stockholm Convention on POPs for reporting by Parties that use DDT to the Secretariat and WHO every three years);
3. identify barriers/inadequacies that prevent the effective collection and management of relevant information ;
4. recommend a possible mechanism for the efficient collection and management of such information in (3) above. These should take into account experiences from similar reporting systems in other fields; and
5. estimate the initial and recurrent cost implications of establishing and maintaining such country mechanisms.

Country selection

Five countries were selected for the study. The generic criteria for country selection were that the country (i) is either a Party or Signatory to the Convention, and (ii) is either using or planning to use DDT for disease vector control. Table 1 presents additional specific criteria for each of the five countries selected for the study

Table 1: List of study-countries and specific selection criteria

Country/Status	Selection criteria
Papua New Guinea (Party)	The country has a long standing DT based indoor residual spraying (IRS) programme. It has successfully reduced the annual amount of DDT used over the years. Will provide priority needs for a reasonably stable vector control programme.
Zambia (Signatory)	DDT is used for vector control in selected areas. Typifies difficulties faced by African countries that are implementing a mix of DDT and pyrethroids based IRS programmes.
Zimbabwe (Signatory)	The country recently reintroduced the use of DDT. It will provide lessons on monitoring and evaluation difficulties faced by countries with recent re-introduction of DDT based programmes.
Uganda (Party)	The country has advanced planning for the reintroduction of DDT-based IRS. It will provide lessons and priorities for Parties with very limited relevant infrastructure that are seeking to initiate a significant national programme on IRS .
Morocco (Party)	The country has a long standing programme on DDT-based IRS. The country has successfully eliminated local transmission of malaria and subsequently moved DDT-based IRS from routine implementation to special programmes. It has a unique priorities for sentinel based M& E and reporting needs.

METHOD OF ASSESSMENT

Expert consultants, and in some cases national experts as well as staff of the World Health Organization, were engaged for the study. Information was gathered through focused group discussions, individual interviews with key country officials and the review of relevant country reports. The questionnaire, which was adopted by COP 1 for country reporting on the production and use of DDT, was used as the reference in assessing the availability of needed information.

The studies were conducted between January and April 2006.

MAJOR FINDINGS

Current mechanisms for collection and management of information.

Information is generated and collected as a routine part of the monitoring and evaluation scheme of national vector control programmes. Data is routinely collected at all levels of a vector control programme (national/central; middle-provincial/regional; periphery-district/sub-districts). At the periphery levels where actual vector control implementation occurs, information is gathered through the use of data sheets or daily reporting cards of spray teams.

While each level undertakes limited aggregation of data, final aggregation and analysis usually occur at the central level, which are relatively better equipped with electronic data management facilities (computers etc.). The mode of transfer of information between the various levels is usually through scheduled periodic reporting (monthly, quarterly reports etc.). Electronic data transfer is often limited by financial constraints.

Gaps and constraints for effective data collection and management

Largely as a result of inadequate funds and technical skills, some critical activities to support vector control are not carried out by country programmes. The monitoring and evaluation schemes are similarly less than adequate and limited in scope. None of the study countries is able to fully satisfy the entire reporting requirement with regards to the questionnaire that was adopted by COP 1 for country reporting.

Inadequate country capacity to generate and manage information

The study countries lacked the capacity to generate information that is crucial to the evaluation of DDT, including those addressed below. The only way to secure such vital information is to assist countries to establish such capacities. This confirms the COP-1 Decision (8b), which concludes that *"...sufficient capacity at the national and sub-national levels is necessary for effective implementation, monitoring and impact evaluation (including associated data management) of the use of DDT and its alternatives in disease vector control....."*

Priority capacity strengthening needs to address the current gaps in information, include:

- *The establishment or strengthening of insectaries and associated capacities for entomological evaluations* - to support entomological evaluations, including vector resistance/susceptibility evaluations. Such capacities are vital for assessing (i) whether or not the continued use or

decision to re-introduce DDT is justified, (ii) whether it is possible to switch to alternative insecticide, (ii) the continued effectiveness of alternative insecticides.

- *Strengthening capacities for spray team supervision* - Spray teams are the primary source of end-use information (data on amounts used, coverage, acceptability etc.) The spray teams are usually composed of temporary labour who are engaged, as needed, and quickly trained to undertake the spraying activity in a local area. For Parties with ad-hoc or little infrastructure for indoor residual spraying programmes, the quality of the supervision is directly linked, both to the quality of the end-use information that is generated, as well as the capacity of Parties to adhere to the guidelines and recommendations of WHO on the use of DDT for disease vector control.
- *Strengthening capacities for stock management of DDT and other pesticides* - inadequate stock management capacities will compromise the gathering of relevant information on DDT stocks, usage levels, as well as the status of both usable and obsolete stocks.
- *Weak capacity for data management* - inadequate infrastructure for information management, as well as the lack of requisite data skills and personnel, will compromise the ability of countries to adequately gather process and analyse data for DDT reporting and evaluation.
- *Weak inter-sectoral collaboration* - Weak inter-sectoral collaboration was generally recognized in all the study countries. The information required to complete the questionnaire comes from different sectors (e.g. health, environment, law enforcement). The studies revealed that countries do not have functional intersectoral mechanisms to facilitate a full completion of the questionnaire. However, other intersectoral mechanisms already exist that could be adapted and strengthened to serve this specific purpose.

Cost implications of establishing active national data collection and reporting mechanisms

The estimated cost for establishing active national mechanisms for collecting, managing and reporting for COP evaluation were US\$298,500 (Zambia), US\$276,900 (Papua New Guinea), US\$248,000 (Zimbabwe), US\$195,000 (Uganda) and US\$122,000 (Morocco). Recurrent cost ranged from US\$24,000 to US\$47,000.

CONCLUSIONS

The format and questionnaire for Parties to report on the use of DDT (and its alternatives) for disease vector control, demands a comprehensive coverage of information by reporting Parties. This is however necessitated by the full range of data needed for COP evaluation of the continued need for DDT, and the need to ensure that any future decision for withdrawal is based on sound and complete information.

The capacity of Parties to provide full and timely reporting to COP is directly linked to the ability of Parties to routinely undertake critical activities in support of disease vector control. Some activities, particularly relating to entomological evaluations and vector resistance monitoring, not carried out due to financial and technical constraints. These activities were identified as immediate capacity strengthening needs in all the study countries.

Parties will need direct external support to establish national mechanisms to actively collect validate and manage relevant data through inter-sectoral collaboration mechanisms. Such support should be tailored to individual country situations, as the needs differ between countries. As the study shows, the cost of establishing and maintaining such mechanisms are not so high as to be prohibitive, and would be a worthwhile investment towards achieving the objectives of the Convention in relation to DDT.

Initially (possibly through the 2nd and 3rd DDT reporting cycles) some Parties may require external technical support to gather the relevant data needed for full and complete reporting to COP. Any such external support should be seen as part of country. capacity strengthening.

A trainer-trainee scheme should be explored to assist Parties to build the requisite capacities, with a short-term objective of institutionalizing such training as routine in-service activity of national vector control programmes.

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PAPUA NEW GUINEA

**ESTABLISHING NATIONAL MECHANISMS FOR ACTIVE INFORMATION
COLLECTION AND REPORTING ON THE USE OF DDT FOR DISEASE VECTOR
CONTROL**

BY

Mr Tan Soo Hian

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1. PURPOSE OF MISSION

The writer visited Papua New Guinea from 21 to 30 March 2006 in accordance with the following terms of reference:

1. assess the current mechanisms being employed to collect information on the use of DDT and its alternatives for disease vector control
2. identify the gaps in the information that is currently collected, compared to what parties are required to report on (ref. questionnaire adopted under the Stockholm Convention on POPs for reporting by Parties that use DDT to the Secretariat and WHO every three years)
3. identify barriers/ inadequacies that prevent the effective collection and management of relevant information
4. recommend a possible mechanism for the efficient collection and management of such information in (3) above, These should take into account experiences from similar reporting systems in other fields; and
5. estimate the initial and recurrent cost implications of establishing and maintaining such country mechanisms.

2. BACKGROUND

The joint report of WHO and the Secretariat of the Stockholm Convention to the Conference of Parties to the Stockholm Convention (COP) on the use of DDT for disease vector control, was considered by the first meeting of COP in Punta del Este, Uruguay in May 2005. The report recommended that COP ensures that adequate investment is made for the reporting and assessment processes to provide a sound and reliable basis for the COP evaluation of the continued need for DDT. In this regard, it was recommended that a well-resourced mechanism for reporting and assessment on DDT use for disease vector control, be set up under the auspices of the Secretariat and the WHO.

In responses to the above recommendation, the COP requested the Secretariat in cooperation with the WHO, to further elaborate the reporting and assessment process on DDT for consideration at its second meeting in May 2006.

As part of the Decision, the COP requested that adequate resources be made available for a work plan of immediate actions (annex III to document UNEP/POPS/COP.1/4 of the conference) to support the preparations of Parties for reporting on DDT and the review and assessment processes required for future evaluations of the continued need for DDT.

Activity 2 of the work plan requests a study on possible mechanisms for active information collection to provide an adequate information base for the evaluation of the continued need for DDT. Papua New Guinea was selected for the study as it is one of the countries that have registered under the Stockholm Convention for the continued use of DDT.

3. ACTIVITIES AND FINDINGS

3.1 Activities

The writer had discussions with several persons associated with the use and management of DDT and reviewed several papers on work related to DDT carried out in the last few years in the country. The list of persons met during the mission is in Annex 1.

3.2 Findings

3.2.1 Sources of DDT

Records from the National Department of Health (NDH) and the Department of Environment and Conservation (DEC) show that the last import of DDT was from China in 2000. 20,000 t was imported in that year. Records also show that DDT was imported from the US and Indonesia in the 1970s and 1980s. DDT is not manufactured, formulated or repackaged in the country.

3.2.2 Import

Under the Environment Act 2000 (Amended 2004) and Environmental Contaminants (Pesticides) Regulations 1988 all pesticides imported into the country require a permit issued by the DEC. The Customs on the other hand control imports through the Customs (Prohibited Imports) Regulation. Under this Regulation, a pesticide can only be imported if it has been issued a permit under the Environmental Contaminants (Pesticides) Regulations 1988. A permit is valid for 5 years and there is no restriction on the quantity or the number of consignments of pesticide that can be imported during this period. Only the NDH has been issued a permit to import DDT for use as indoor residual spray in the control of vectors of malaria. There is presently no requirement for any importer to inform the DEC on the quantity of pesticides imported. The Customs, at the time of import of a consignment of pesticide, does not have prior information as to whether the product has been issued with a permit. Applications for permit to import are presently evaluated by the DEC in consultation with relevant departments when necessary. There is no formal committee to carry out the evaluation process. The NDH is responsible for its safe use and storage and would have information on the quantity of DDT imported.

3.2.3 Stock Information

The NDH is the authority responsible for information on usable stock of DDT as they are the only agency that imports DDT. However, the present situation regarding usable stock is rather complex because of the stockpile of old pesticides dating back to the 1970s. The Malaria Surveillance and Control Unit (MSCU) located in Goroka has the responsibility of collecting information regarding stocks of DDT from the Provincial Department of Health. There are however, gaps in the information as not all the Provinces submit their report on time.

3.2.4 Disposal

An inventory on stocks of DDT carried out in 2000 found that there was about 64 t of the pesticide in the country. A more recent survey carried out in 2005 to prepare the inventory and assessment of DDT in the health sector in Papua New Guinea under the UNEP/GEF pilot project on persistent organic pollutants found that there was a stock of about 44 t. The NDH has information regarding the locations where stocks of DDT are kept.

The need for the disposal of obsolete DDT has been highlighted for many years but the lack of funding is the main problem. The Government has repeatedly requested for assistance to resolve this problem. In the preparation of the National Plan of Action on the Management of DDT and the Development of its Alternatives in the Health Sector, developed with the assistance of UNEP and GEF last year, the government requested assistance for funding to address this problem. The NDH that is responsible for the imported DDT is also responsible for its disposal.

3.2.5 DDT use

DDT is used only in unstable malaria areas in the Highlands. This involves only 5 of the 20 provinces. The incidence of malaria in this region has only been recent due to increased movement of people to and from the coast where high malarial prevalence has been recorded. With minimum natural immunity to malaria in this population group, the malarial epidemic had reached a level that warranted the use of DDT for control of malaria vectors. The Malaria Surveillance and Control Unit (MSCU) in Goroka is tasked with keeping records on the amounts, formulation type and % active ingredient of DDT used annually. There are however, gaps in the information as Provincial Departments of Health are sometimes not up to date in their submission. This information is also available in the office of the Technical Advisor (Malaria). Information regarding population at risk and disease burden as well as local areas where DDT is used is also being collected by the MSCU and the same problem as above is encountered. In other provinces where DDT is not used, control of vectors of malaria is mainly by using Long Life Mosquito Nets (LLMN).

3.2.6 Regulation and control

The NDH under the present legislations [Environment Act 2000 (Amended 2004) and Environmental Contaminants (Pesticides) Regulations 1988] is the only agency permitted to import DDT by the DEC for use in vector control. The overall managing authority for DDT is the NDH and it is responsible for authorizing its use for vector control purposes.

Enforcement of the above 2 legislations comes under the purview of the DEC. There is a shortage of pesticide enforcement officers in the DEC as well as officers responsible for approval of permit for import of pesticides. Information required for application of permit for import is very minimal which include summary of intended use patterns, evidence that the product is registered overseas, two original copies of labels and copy of MSDS.

There is also a lack of analytical facilities to support enforcement. Quality control of pesticides imported as well as those in the market is not carried out due to the absence of facilities. Anecdotal reports have indicated that there have been abuses of the DDT in the agricultural sector. At present it is not possible for the enforcement officer to check locally if DDT has been sold in the market as some other pesticides.

3.2.7 End-use information

The NDH is the only agency authorized to use DDT for vector control. Other private agencies/organizations such as the mines and the plantation companies may use other chemicals in their own premises and surrounding areas for the control of vectors. Fogging with malathion and larviciding with temephos are also being carried out in urban areas for the control of mosquitoes. The NDH would be in the position to provide information regarding the average cost per house sprayed with DDT. The acceptance of DDT for indoor application by households is generally high and this is particularly so during peak periods of malaria transmission. The criteria for selecting an area for the use of DDT indoor residual spray is that it should be in the highlands where the malaria is unstable and is carried out

irrespective of house-types or households. The Technical Advisor (Malaria) in collaboration with the WHO advisor determines the timing of DDT application.

3.2.8 Resistance Monitoring

Resistance monitoring is an area where very limited work has been done so far in the country. Records of work on DDT resistance are lacking. It should be noted that facilities are available in the country to carry out such monitoring but there is a shortage of funds to carry out the work. The Papua New Guinea Institute Medical Research (PNGIMR) has good facilities for testing pesticide resistance and the NDH have existing collaboration with them in a number of areas such as bioassay of mosquito nets, combination treatment for malaria and mapping projection of malaria in the Highlands. Information on insecticide residual efficacy is also lacking and is another area that needs to be addressed. There are presently no surveillance mechanisms in the country for DDT resistance.

3.2.9 DDT alternatives

The amount of DDT used in the country has decreased significantly in recent years. This is in part due to the restriction on its use to only in the highlands where the malaria is unstable. In all other areas, LLIN is the alternative to DDT. Mass drug administration (MDA) is also carried out quite extensively in these areas. There is however, very limited work done on the alternatives to DDT in the highland areas. LLIN is not suitable in the highlands because many of these houses are very small and in addition residents tend to keep themselves warm by burning a fire in the house. In addition to the constraint of space, the danger of the net being burnt is too great to be ignored.

Efforts in the past by encouraging the use of fish (gambusia) to control mosquito larvae particular in the islands and coastal areas was not sustainable due to the lack of funds. Its effectiveness however, has also not been evaluated.

3.2.10 Disease Management Strategies

Integrated Vector Management (IVM) is not actively implemented and there is no vector resistance management strategy in place. PNGIMR has good entomology facilities for carrying out work on resistance testing and related work. There is at the moment some collaborative work being done by the NDH and the PNGIMR. There is no research into development of locally appropriate alternative intervention options to DDT.

3.2.11 General Human and Environmental Safety Issues

There is no systematic recording of insecticide incidents in relation to vector control or any other situations. The Monitoring and Research Branch of the NDH operates a National Health Information System in which data on the major diseases such as malaria, tuberculosis, leprosy etc. is collected at the district level. The data is then collated at the provincial level before submission to the headquarters for collation electronically for the whole country. Information technology expertise is available in the Branch and would be in the position to contribute towards the setting up of a database for DDT.

The NDH and the DEC have programmes to raise awareness among communities on safety issues relating to pesticides. There is however, very little collaboration between the departments on this. The common methods used include the use of radio, printed materials and face-to-face meetings with the community. In addition, the NDH also uses community theatres to convey messages to the community. These theatre groups will present dramas that will incorporate the intended messages in their presentations.

3.2.12 Systems Strengthening in Disease Vector Control

The NDH recently underwent a re-organization and additional staff is being recruited. There is however, a shortage of technical staff in the provinces and districts to implement vector control programmes. There is a shortfall in the budget for vector control. This explains why many of the initiatives were not sustainable. The PNGIMR would be in the position to provide in-service training in certain aspects of vector control. The University of PNG on the other hand offers a degree course on biology including entomology.

The NDH used to conduct training courses on vector control for supervisors but have not done this for many years due to the lack of funds. There is a lack of formal mechanism for inter-sectoral collaboration in disease vector control, although there is some understanding between NDH and some big mining and plantation companies that they control vectors in their premises and the surrounding areas. These companies are not allowed to use DDT in their operations.

The NDH does not have the technical expertise to carry out monitoring and evaluation of vector control programmes and is in need of assistance to overcome this limitation.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

4.1.1 Legislation is in place to control the importation of DDT, but there is a need to strengthen the capacity of the Branch responsible for Approval of Pesticides, DEC. Existing restriction which limits the importation of DDT to only the NDH is a step in the right direction, as this would facilitate post-importation control and prevent or minimize un-recommended use.

4.1.2 The present system of issuing a permit for a 5-year period does not allow DEC to keep proper track of the amount of DDT that is imported. The Customs Division is facing problems in deciding whether or not a consignment of pesticides had already been issued a permit, as it does not have the necessary information readily available to make a decision. This lack of communication between the DEC and the Customs could lead to unauthorized pesticides being imported and the existing system should be amended to ensure that the Customs receives timely information on all pesticide permits issued by the DEC.

4.1.3 Accurate information on usable DDT stocks is lacking, although estimates have been made in 2 recent exercises to obtain the inventory of DDT stocks in the country. Steps should be taken to verify the usable DDT stocks.

4.1.4 There is uncertainty as to the quality of the DDT stocks in NDH and action is necessary to resolve this issue to ensure that pesticides used are effective, while the obsolete is properly identified and separately stored until they can be disposed of safely.

4.1.5 There are substantial amounts of obsolete DDT stocks requiring disposal. However, the activity cannot be carried out due to the lack of funds.

4.1.6 The present practice where the applications for import of pesticides is evaluated mainly by the pesticide officer in DEC, needs to be reviewed. The evaluation process requires the expertise in many scientific disciplines. This is a need to strengthen this evaluation process.

4.1.7 Enforcement of legislations on pesticides is weak and should be addressed.

4.1.8 Quality control of pesticides imported and sold in the market is non-existent and needs to be addressed.

4.1.9 Very limited monitoring of vector resistance to pesticides has been done so far in the country. Records for work on DDT resistance are lacking. There is presently no viable alternative to DDT in the Highland Region. Hence, it is important to ensure that the targeted vectors remain susceptible.

4.1.10 Information on insecticide residual efficacy is lacking and is another area that needs to be addressed.

4.1.11 Work on alternatives to DDT is presently limited to the use of LLIN. There is a need to expand this area of work particularly on alternatives suitable for the highlands where LLIN is not suitable.

4.1.12 Although information on DDT use in the districts and provinces, is in principle, collected by the MSCU, returns from the districts and provinces are incomplete and thus the data is not up-to-date. There is a need to review the mechanism for data collection to ensure that relevant data is efficiently collected as a routine programme activity.

4.1.13 IVM is not actively being implemented and there is no vector resistance management strategy in place. There is a lack of local expertise in this area and assistance is needed for the NDH to train their officers in this field.

4.1.14 There is no record of incidences involving pesticides. A mechanism for the collection of these incidences needs to be developed.

4.1.15 Programmes to raise awareness among communities on safety issues related to insecticides use in disease vector control are carried out mainly by the NDH, although the DEC also carries out awareness programmes for pesticides, in general. Using community theatres to transmit messages appear to be popular and effective but is costly. There is a need for greater collaboration among the departments on such programmes.

4.1.16 The training provided to supervisors involved in Vector Control Programmes is inadequate, largely because of lack of funds. Assistance is needed to carry out programmes to train these supervisors to ensure that WHO recommendations for indoor residual spraying are adhered to.

4.1.17 There is a lack of formal mechanism for inter-sectoral collaboration in disease vector control. A formal mechanism would be necessary to improve vector management in the country and ensure that DDT is not being misused.

4.1.18 Monitoring and evaluation of vector control programmes is rarely carried out due to lack of expertise and assistance is needed to overcome this limitation.

4.1.19 There is a shortfall in the budget for vector control and this could be one of reasons why some of the vector control activities are not carried out. The funds required for the initial and recurrent cost implications of establishing and maintaining the proposed mechanisms is estimated to be (US\$276,000) and US\$47,000 respectively and the details of which are in Annex 2 & Annex 3.

4.2 Recommendations

The recommendations for establishing a possible national mechanism for active collection of information on DDT in Papua New Guinea are as follows:

4.2.1 Mechanisms for coordinating the active collection of information on DDT

It is evident that the NDH and the DEC each has its own records on different aspects on use and management of DDT. However, in order to improve the management and use of DDT and also to meet with the requirements of the Stockholm Convention on the continued use of DDT, it would be imperative for these two Departments to form a formal coordinating committee that could be chaired by the local focal point of the Convention. The committee could comprise three senior members from each department, a representative each from the Department of Agriculture and the Customs with the terms of reference to actively and effectively collect information on the management and use of DDT as required under the Stockholm Convention. The Committee should also have the mandate to identify the responsibilities of each department in the data collection process and set suitable deadlines. It could also include members from other relevant agencies if necessary. The committee should meet regularly, at least 4 times a year, to monitor and ensure that appropriate actions have been taken by the relevant parties in a timely and effective manner. It would be useful for the committee to set up a joint database for DDT.

4.2.2 Mechanism for keeping track of imported DDT

To facilitate keeping track of DDT and other pesticides imported, the DEC should impose a condition that permit holders provide information on every consignment that is planned for importation. Information required should include the name of the pesticide, permit number, amounts to be imported, the port of entry and the expected date of arrival. The DEC would then issue a certified photocopy of the original providing the above information. The importer should attach a copy of the certified permit with the invoice and other documents to the Customs for clearance of his consignment. The Customs should keep the certified copy of the permit and use it to collate information on all imported pesticides that can then be shared with the DEC and other relevant agencies. In addition, the Customs Division should be provided with a list of permits (with details of the pesticide, name of importer and validity period) issued on a monthly basis to enable it to effectively control the imports of pesticides at all customs entry points.

4.2.3 Mechanism for evaluating applications for import permit of pesticides

The previous system involving a multi-sectoral committee that evaluates applications for import of pesticides should be revived. The relevant departments/research institutions that should be in the committee include the DEC, NDH, PNGIMR, Department of Agriculture, a University and the National Agricultural Research Institute. Other departments/ institutions could also be included as necessary. The technical expertise required to evaluate the applications for the registration of pesticides should include at least chemistry (formulation and residue), toxicology, environmental science, entomology, plant pathology and weed science. Advantage should be taken under the current review of the Environmental Contaminants (Pesticides) Regulations 1988, to require applicants for import permit to provide more information regarding the pesticides. This would enable the DEC make better decisions when evaluating applications for import permits. The *FAO Guidelines on the Registration and Control of Pesticides* (FAO, 1985), as well as the *Addenda to the Registration and Control of Pesticides* (FAO, 1988) are competent references on the types of information required.

4.2.4 Mechanism for keeping active database on DDT stocks

The NDH should keep an active database on DDT stocks including stockpiles. In this regard, NDH should issue a clear set of guidelines and directives to the relevant agencies (i.e. The Malaria Surveillance and Control Unit, the provincial and district Departments of Health) on the types of information that should be submitted to the MSCU, which will act as the coordinating unit for collating the information. It is also important to set deadlines for submission of the required information.

4.2.5 Mechanism for the collection of incidences involving pesticides

A mechanism for the collection of pesticide incidences should be developed, in involving the staff of the NDH, provincial hospitals, district health centres, Department of Agriculture, DEC and NGOs. An inter-sectoral committee should be formed comprising senior members of the various departments and organizations to implement this mechanism. Field staff of the various departments (including Health, Agriculture, Environment and Conservation, Provincial and Local Government Affairs) hospitals, clinics and NGOs should be instructed to report to a coordinating center in each province that would then, in turn, report to a coordinating office at the central level. A set of guidelines should be drawn up by this Committee for the field staff to ensure that they know what they are supposed to do. To ensure that the field staff receive clear instructions on what need to be done a workshop should be held to familiarize all the key officers in each province on the procedure. These officers in turn are expected to brief staff of their own departments. The IPCS INTOX Programme (<http://www.intox.org>) and Pesticide Data Management System, exclusively developed for recording, collecting, and analyzing the information on pesticide exposures and poisonings should be referenced. Steps should be taken to explore the possibility of incorporating the collection of these data under the National Health Information System, which is presently under review by the NDH.

Persons involved in spraying operations and in particular the spray-men, should be monitored for exposure. This may require blood samples to be taken and analysed overseas. Funds should be allocated for this purpose.

4.2.6 Mechanism for checking the quality of DDT stock

Representative samples from each batch should be analysed as soon as possible. Assistance to have the samples analysed at designated WHO Collaborating Laboratories should be sought. Batches that are so determined to be obsolete should be labelled and stored separately if possible. Batches with poor packaging should be repacked in water-resistant containers to avoid leakage during storage. Batches that still meet WHO Specifications for Public Health Pesticides should also be labelled and issued for use. Adequate funding should be allocated to repackaged badly damaged stocks.

Capacity Strengthening needs

To support the smooth functioning of the above mechanisms and processes, the capacity of the relevant departments will need to be strengthened, so that information required could be obtained and provided in a timely manner, as required under the Stockholm Convention. The priority capacity strengthening needs of the major agencies are described in the following sections.

4.2.7 Capacity strengthening priorities: Department of Environment and Conservation

The expertise of technical officers involved in the evaluation of applications for import of pesticides should be further improved. At least two scientific officers responsible for evaluating the applications for import permit, should undertake job attachment training at appropriate pesticide regulatory authorities in other countries with a good pesticide regulatory system. The returning officials could then implement activities to improve the local system. It would not be useful to choose a country with very sophisticated systems of pesticide regulatory control as experiences gained may not necessarily be practical for the local country situation.

The need to ensure good quality of the pesticides that are sold in the country, cannot be overemphasized. The establishment of a modest laboratory to check for quality of pesticides is strongly recommended. A prudent location for the proposed laboratory should be either the National Agricultural Research Institute or the University of Papua New Guinea. The facility could also be used to ensure that DDT is not sold in the market labelled as some other pesticides.

4.2.8 Capacity strengthening priorities: National Department of Health

IVM should be an integral part of the national vector control policy. This is important to strengthen the overall vector control programme in the country, and most specifically, to facilitate the rational incorporation of cost-effective and locally appropriate alternative vector control interventions. As expertise in this field is rather limited locally, it is proposed that a short-term consultant be employed to assist the NDH to develop a national IVM plan of action. The terms of reference are as shown in Annex 4.

Supervisors of pesticide applicators in vector control programmes will need to upgrade their knowledge on vector control and spray operations. As the pesticide applicators are casual workers recruited for the job and hence are generally untrained, a well-trained supervisor is the only guarantee that the casual sprayers receive appropriate training, instructions and effective supervision during the spray operations. Relevant WHO guidelines (WHO, 1990, 2000 & 2001; Najera & Zaim, 2002) should be used as reference.

Monitoring and evaluation of vector control programmes is essential to ensure that the programmes are being implemented effectively and in a timely manner. The NDH should set up a mechanism to monitor and evaluate their programmes on vector control. A short-term consultant is required to assist the NDH to set up the mechanism for monitoring and evaluation of its vector control programmes. The terms of reference are as shown in Annex 5.

Inter-sectoral Collaboration

In view of the limited resources available to obtain the information required, it would also be prudent to strengthen inter-sectoral collaboration to optimize resources as well as saving of funds

4.2.9 Inter-sectoral collaboration for work on DDT alternatives

LLINs have gained wide acceptance in provinces not using DDT, there is a pressing need to also look for alternatives to DDT in the highlands particularly taking into consideration the important factor of affordability. The determination of cost should be based on the cost of implementation and not strictly on its purchase price of the product. This includes consideration of the amount of active ingredient in the formulation, cost of shipment and handling (including local transport and storage), as well as dosage, frequency and cost of application. Trials should be carried out by the NDH in collaboration with PNGIMR to test potential insecticides and other interventions as alternatives to DDT.

4.2.10 Inter-sectoral collaboration on monitoring resistance and insecticide residual efficacy

The NDH should use the existing good collaboration with the PNGIMR for testing pesticide (including DDT) resistance. This collaboration should also include insecticide residual efficacy testing. Allocations should be made for the purchase of WHO test kits and other basic laboratory glassware and equipment.. The WHO guidelines on monitoring resistance should be used as reference (WHO, 1998a, 1998b & 2003). Officers from the NDH and PNGIMR that are identified to carry out the above work will need training. One possibility is for them to undergo the training at the WHO Collaborating Centre responsible for preparing the Test Kits for Monitoring Insecticide Resistance in Vector Diseases. Funds should be made available for this purpose.

4.2.11 Inter-sectoral collaboration with private sectors

The NDH should strengthen inter-sectoral collaboration in disease vector control taking into consideration the limitations in resources. Formal inter-sectoral collaboration particularly with the private sector could further improve the present situation. Such collaboration would not only enable the NDH to have better regulatory control of the insecticides that are used, but also encourage the private sector to carry out their control programmes more effectively.

4.2.12 Inter-sectoral collaboration for work on raising awareness among communities on safety issues relating to pesticides

Community awareness among communities on safety issues relating to pesticides needs to be intensified. To optimize the utilization of resources, the NDH and the DEC should implement joint programmes. There may also be a need to collaborate with the Department of Agriculture.

5. ACKNOWLEDGEMENTS

The friendly assistance and warm hospitality given by all the persons met during this mission and particularly, Mr. Leo Makita of the National Department of Health and Ms. Katrina Solien of the Department of Environment and Conservation is gratefully acknowledged.

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ANNEX 1

LIST OF PERSONS MET

Dr. Dr. Timothy Pyakalyia,
Deputy Secretary,
National Department of Health

Dr. James Wangi
Director (Disease Control Branch)
National Department of Health

Mr. Lindsay Piliwas
Director
Health Promotion Branch
National Department of Health

Ms Anna Irumai
Acting Director
Monitoring & Research Branch
Health Promotion Branch
National Department of Health

Dr. Dino Babona
Acting Director
Central Public Health Laboratories
Health Promotion Branch
National Department of Health

Mr. Leo Sora Makita
Technical Advisor (Malaria)
National Department of Health

Mrs. Roslyn Bobom Kera
Traditional & Popular Media Officer
Health Promotion Branch
National Department of Health

Mr. John Honani
Senior Radio Officer
Health Promotion Branch
National Department of Health

Mr. Tonny Nouairi
Scientific Officer (Pesticide)
Department of Environment and Conservation

Ms. Katrina Solien,
Scientific Officer Hazardous Substances
Department of Environment and Conservation

Mr. Tau Vali
Deputy Secretary (Monitoring and Technical Services)
Provincial and Local Government Affairs

Mr. Walya Abilo
Director
Investigation and Enforcement Branch
IRC Customs Operation

Dr. Eigil Sorensen
WHO Representative
World Health Organization
Papua New Guinea

Dr. Luo Dapeng
WHO Malariologist
World Health Organization
Papua New Guinea

Dr. Yogendra P. Pradhananga
Health Education Specialist
World Health Organization
Papua New Guinea

ANNEX 2

**COST ESTIMATES FOR ESTABLISHING THE PROPOSED MECHANISMS FOR ACTIVE
INFORMATION COLLECTING AND REPORTING ON THE USE OF DDT**

No.	Activity	Units	Unit cost US \$	Total cost US \$	Total US \$
1	Purchase and install GC with FID including data station and accessories for analysis of pesticide formulations	1	50000	50,000	
	Glasswares and reagents			5000	
	Training in use of GC			5000	
	Equipment for physical tests of pesticides			3000	
				63,000	63,000
2	Purchase of WHO test kits for Monitoring	50	42	2100	
	Insecticide resistance in Disease Vectors bioassay kit	50	42	2100	
	Insecticide impregnated paper (box of 8 pcs) for DDT	200	12	2400	
	Insecticide impregnated paper(box of 8 pcs)- other pesticides	100	18	1800	
	glassware and other small lab. equipment			1000	
				9400	9,400
4	Monitoring and Evaluation				
	Short-term consultant (1 month) including internal travel	1		2 2,000	22,000
5	Cost for sending & analysing DDT samples	50	100	5000	
	cost of containers for keeping leaked DDT	200	5	1000	
				6000	6,000
7	Cost of establishing database on DDT (including hardware)	1	10000	10000	10,000
11	Training of supervisors of vector control				
	Operations to be carried out based on region				
	(5 days) Highlands Region	40	500	40000	
	Islands Region	20	500	10000	
	Papua Region	25	500	12500	
	Momase Region	30	500	15000	
	For lecturers (4 lecturers x 4 regions)	16	500	8000	
	Miscellaneous			2000	
				87500	87,500
12	Attachment training of scientific officer on pesticide registration on regulatory matters at identified regulatory authorities (1 month each)	2	7000	14000	14,000
13	Workshop for officers from the provinces on procedures for collection of data on pesticide incidences (2 days)	100	600	60000	60,000
15	Training on testing for insecticide resistance (1 week)	2	2500	5,000	5,000
	Total				276,900

ANNEX 3

**ESTIMATES FOR RECURRENT COST IMPLICATIONS FOR MAINTAINING THE
PROPOSED MECHANISM**

No.	Activity	Cost US\$
1	Running and maintenance of GC	8000
2	Resistance, bio-efficacy monitoring	5000
3	Trials to evaluate alternative chemicals (1 pesticide)	15,000
4	Cost for sending & analysing DDT samples	2,000
5	Cost of maintaining mechanisms for collecting information on pesticide incidences	2000
6	Training of enforcement officers by trained enforcement officers	5000
7	External consultant to support collection of data for reporting**	10000
Total		47,000

** Activity 7 will be required during the first 1-2 rounds of reporting, to ensure that the appropriate skills are transferred to the country.

ANNEX 4

TERMS OF REFERENCE FOR SHORT TERM CONSULTANT ON INTEGRATED VECTOR MANAGEMENT

1. Review the existing vector control management programmes identifying the technical and capacity needs.
2. Conduct workshop for all national stakeholders in vector control management programmes to develop a National Integrated Vector Management action plan.
3. Prepare report including the Integrated Vector Management plan of action and recommendations to address constraints and barriers on its implementation.

ANNEX 5

TERMS OF REFERENCE FOR SHORT TERM CONSULTANT ON MONITORING AND EVALUATION OF VECTOR CONTROL PROGRAMMES

1. To review the existing Monitoring and Evaluation methods used in vector control programmes
2. To identify weaknesses and barriers in the methods used.
3. To consult and agree with stakeholders on the indicators to be used and the methods for measuring them.
4. To make recommendations (including capacity building) for establishing a practical Monitoring and Evaluation Mechanism for vector control programmes in Papua New Guinea taking cognizance the available resources in the country.

MOROCCO

**ESTABLISHING NATIONAL MECHANISMS FOR ACTIVE INFORMATION
COLLECTION AND REPORTING ON THE USE OF DDT FOR DISEASE VECTOR
CONTROL**

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Terms of reference

1. Assess the current mechanisms being employed in Morocco to collect information on the use of DDT and its alternatives for disease vector control.
2. Identify the gaps in the information that is currently collected, compared to what Parties are required to report on (ref. questionnaire adopted under the Stockholm Convention on POPs for reporting by Parties that use DDT to the Secretariat and WHO every three years)
3. Identify barriers/inadequacies that prevent the effective collection and management of relevant information.
4. Recommend on a possible national mechanism for the efficient collection and management of such information in (3) above, These should take into account experiences from similar reporting systems in other fields; and
5. Estimate the initial and recurrent cost implications of establishing and maintaining such country mechanisms.

1. BACKGROUND

The most important vector-borne diseases in Morocco are malaria, leishmaniasis and schistosomiasis. During the last decade years, there has been a clear improvement of the epidemiologic situation of these diseases, with significant reductions in the number of reported cases. However, all the conditions for high level transmission of the vector diseases are still present within the country. Therefore there is an urgent need to strengthen the capacity of the vector control programme to consolidate the gains so far achieved.

Malaria control programme began in the early 1960s, when thousands of malaria cases were recorded. The main malaria control activities at this stage (at the time?) were based on diagnosis and treatment of cases and indoor residual spraying using DDT.

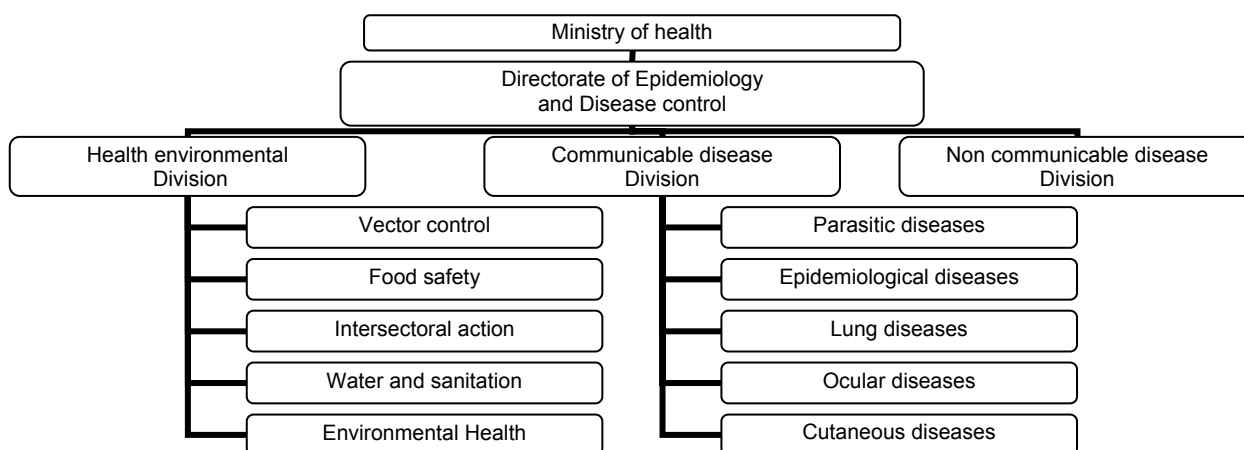
The most important achievement of the programme was the elimination of malaria due to *Plasmodium falciparum* in 1975. Following which malaria was generally considered under control, with less than 100 cases per year. A re-emergence of the disease in 1983, led to the development of a control strategy based on a stratification of areas in accordance with the disease risk they present. By 1995, the disease was again brought under control and an elaborate strategy of elimination of local transmission of malaria was embarked throughout the country. In 1999, the process of elimination was initiated and the last focus of malaria was reported in 2002, since then no local transmission has been reported.

2. ORGANISATION OF VECTOR CONTROL ACTIVITIES

Figure 1 provides the structure of the Within the Ministry of Health. The malaria control programme is managed by the Parasitic Disease Department, which is located within the Communicable Disease Division, Directorate of Epidemiology and Disease Control. The core functions at this central level include strategic direction, monitoring and evaluation of the malaria control programme, funding responsibilities, training and support of local staff and promotion of operational research.

The Vector Control Department, which is within the Environmental Health Division, Directorate of Epidemiology and Disease Control, is responsible for all vector control activities, including malaria vector control. The department is in charge of the development of the national strategy of vector control at the national level. The core functions at this central level include strategic direction to programme, monitoring and evaluation, programme funding responsibilities, training and support for local programmes, evaluation and validation of operational research related to vectors.

Figure 1: Location of vector control department and parasitic disease department



The responsibility for vector control in the provinces lies with the Health Ministry delegations and especially their Provincial Services of the Infrastructure and Ambulatory Actions (SIAAP). Core functions at this level include decision-making and planning of provincial implementation, training of district/sub-district personnel on relevant aspects of vector control, monitor and evaluation of implementation within the districts, prioritization and allocation of financial resources within the province, as well as determination of human resource needs within the province.

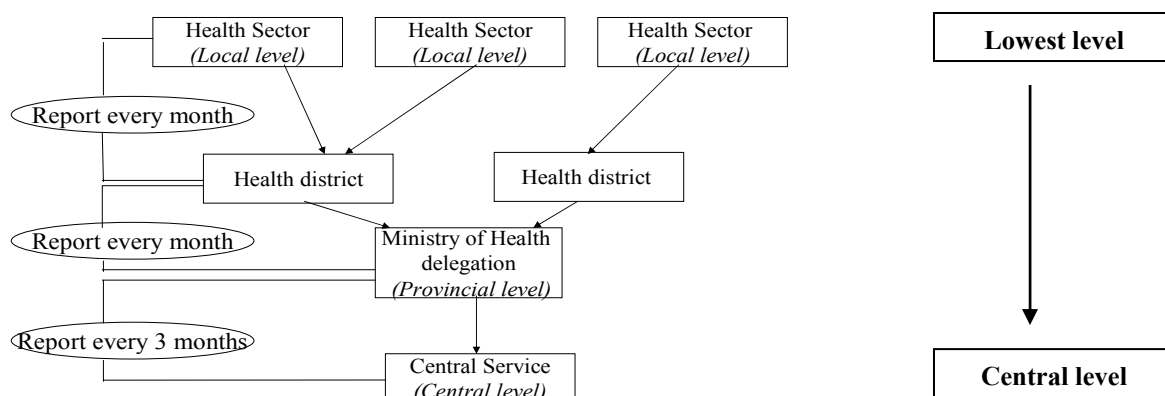
The health ministry delegations are subdivided into health districts, which are in turn, subdivided into health sectors. The health sectors represent the lowest level of programme administration. Core functions at this level include local programme planning, resource allocation, disease surveillance, health education, implementation of vector control activities, assist in operational research, monitoring and evaluation (i.e. collection and initial collation of local data on various aspects of vector control). There is a responsible official for general vector control programme and also one responsible for malaria control programme at each level of the programme administration (central/national, provincial, district and sub-district).

The vector control activities that are carried out in the localities are recorded in the register of monitoring activities. The register, which is called “monitoring book”, was developed by the central department to help the focal points at local level to record all activities of vector monitoring and vector control. This book is also the tool used by the staff from the provincial or central level on the occasion of field supervision.

The sector report is completed every month based on the information that is recorded in the monitoring book and sent to the Health districts every month. The districts, the information from all sectors is gathered and sent to the province every month. At the level of the Province, the information of all the health-districts are gathered and then sent on to the central level every three months.

This National Health Information System related to vector control is the routine way to get the information of the activities of vector control activities.

The following figure is showing the data elements that are routinely collected by the vector control programmes in the 3 main levels of the administration (Central, provincial and local), the destination of the data that is collected.

Figure 2 : Destination of vector control data collected

While data is generated at all levels of the national vector control programme, some specialized data sets, such as those relating to resistance monitoring, vector control policy and importation of insecticides, are managed at the Central level. In addition, indoor residual spraying of DDT is no more considered as a routine activity, which means that the reporting is made immediately to the Central Services (Parasitic disease and vector control department) as soon as it takes place.

The vector control programme and other health programmes, still face serious challenges due to the process of decentralization, which has been initiated from many years ago and is aimed at providing a mid-level administration of health sector between the provincial and central level. But still the political decision is not clear in this regard.

Beside the MOH, municipalities are in charge of vector control activities at the local level, especially in urban areas where they have a hygiene office. Actually, they have to report to the respective MOH delegations. However the information reported is not standardised. Municipalities are not involved in this process of DDT notification as they are rather in charge of nuisance control and malaria vectors are mostly in rural areas.

Research institutions also carry out research especially on monitoring vector resistance to insecticides, information that is relevant for policy change. However it is a problem for the MOH to access this information formally and so difficult to implement any policy change arising from such studies. In essence, there is no formal arrangement/coordination with research institutions and academia.

3. DDT NOTIFICATION

Morocco ratified the Stockholm Convention on Persistent Organic Pollutants (POPs) that restricts the production and use of DDT to disease vector control in accordance with World Health Organization recommendations and guidelines on the use of DDT and when locally safe, effective and affordable alternatives are not available to the Party in question (Annex B, Part II, paragraphs 1 and 2).

The annex B, Part II, Paragraph 6 of the Convention reads as follows:

“Commencing at its first meeting, and at least every three years thereafter, the Conference of the Parties shall, in consultation with the World Health Organization, evaluate the continued need for DDT for disease vector control on the basis of available scientific, technical, environmental and economic information, including:

- (a) The production and use of DDT and the conditions set out in paragraph 2 [of Part II of Annex B];
- (b) The availability, suitability and implementation of the alternatives to DDT; and
- (c) Progress in strengthening the capacity of countries to transfer safely to reliance on such alternatives.”

The joint report of WHO and the Secretariat of the Stockholm Convention to the Conference of Parties to the Stockholm Convention (COP) on the use of DDT for disease vector control, was considered by the first meeting of COP in Punta del Este, Uruguay in May 2005. The report recommended that COP ensures that adequate investment is made for the reporting and assessment processes to provide a sound and reliable basis for the COP evaluation of the continued need for DDT. In this regard, it was recommended that a well resourced mechanism for reporting and assessment on DDT use for disease vector control, be set up under the auspices of the Secretariat and the WHO.

We propose in the present report to look through the DDT questionnaire first, to know how the information is generated at the level of the kingdom of Morocco. Therefore, we will try to analyse one by one the availability and also, the adequacy of the information that should be given. Mechanisms to address the gaps and to improve the quality of data collection will be proposed.

4. AVAILABLE INFORMATION

The existing procedure for completing the questionnaire

The Secretariat of the Stockholm Convention sends the DDT questionnaire to the national focal point of the Stockholm Convention, which is located in the Ministry of the Environment. The questionnaire is then subsequently sent officially to the Ministry of Health for completion by the focal point of the vector control department. The completed questionnaire is returned to the focal point of the Convention who then submits it to the Secretariat of the Convention.

Invariably, the above process does take some time and it means that only the Ministry of Health is in charge of giving the information. There is a need for an effective inter-sectoral arrangement that will enable the active participation of critical partners agencies, such as the Ministry of the Environment.

Production and use of DDT

In-country production and import

From 1985 to 1992, the malaria control programme imported DDT, mostly from Indonesia. There has been no more importation since then.

Stock information

The DDT in Morocco is mainly stored in one warehouse, which is located in Oued Zem city (Khouribga Province). In addition small amounts of DDT is also stored in some other provinces, namely: Khénifra, Kénitra, Larache, Chefchaouen, Fès and Settat. All the stocks of DDT are officially considered as still effective by vector control and malaria control programmes. However, a visit to the main warehouse showed that some DDT is leaking into the soil and DDT is stored in very bad condition. It is therefore important that urgent steps are taken to validate the effectiveness or otherwise of the stocks.

Generally, information on DDT stocks are available and easily verifiable.

DDT disposal

As mentioned in the section above, all the DDT is considered effective so officially, there is no obsolete pesticide. Although the need of quality assessment of the stocks is recognized. There is no DDT disposal system in Morocco. However, Morocco is a part of the Pesticide African Stockpiles Programme, which is aimed the inventory and the elimination of the stockpiles of pesticides. The elimination of DDT is a one of its activities highlighted under the National Implementation Plan on POPs.

DDT use

Since 1984, the use of DDT in Morocco has been restricted to vector control in the framework of diseases control by the Legislative Text Number 466-84 of 19 March 1984, governing the trade of organochlorine pesticides.

DDT is only used by the Ministry of health (MOH) in indoor spraying in localities where malaria cases are detected and where there is active transmission of the disease. Decision to use DDT for indoor residual spraying is the responsibility of the central level (that is the parasitic disease service and the vector control service). DDT spraying takes place only after testing the resistance of local mosquito vectors to DDT by the personnel of the central laboratory.

The spraying operation, when it occurs, is conducted by the local staff of vector control with the supervision of the provincial and central level. The operation starts by recruitment and training of sprayers. Specially prepared daily reporting forms are used to record the activities. The data to be recorded includes:

- the amount of insecticide received at the start of the day;
- the amount used for spraying;
- geographical area where it was sprayed;
- the number of targeted houses/rooms sprayed;
- corresponding persons protected;
- acceptability information;
- amount of insecticide left over at the end of the day;
- the size of the spray-team.

Once the operation is over, a final report summarizing the whole operation is developed by the focal point of vector control activities at the provincial level, who also submits the report to the central service. The report summarizes the following information:

- The number of households sprayed
- The population protected
- The amount of DDT used
- The amount of DDT left in the province after the spraying operation
- Information about the acceptability of the operation

At the central level, all the information received on DDT use at all levels in the country is gathered, and a yearly achievement report is developed on DDT use.

However, as may have been observed in other countries, many of the well trained personnel in malaria have retired. In addition, with the improvement of the malaria epidemiological situation and elimination of local transmission, there seem to be some relaxation in the vector control activities and reporting. Indeed, in many cases, although activities are actually carried out, they are not done as efficiently or not well recorded. The personnel in charge of vector control require regular retraining. It is hoped that funds and resources allocated to vector control will also not be withdrawn or allocated elsewhere, as this will erode the entire capacity of the vector control programme to respond in the event of an outbreak.

Regulation and control

The Ministry of Agriculture is responsible for developing regulations governing the use of insecticides, particularly DDT and the laws are enforced by the fraud services of the Ministry of Agriculture and by heightened awareness of the population.

The most important limitation with the current regulations and regulatory mechanisms is that public health pesticides are not subject to registration and therefore, the trade of all pesticides that are not used in agriculture is free within the country.

End-use information

DDT is used only by the Ministry of Health. Neither municipalities, nor other agencies are involved in using DDT for vector control purposes.

Resistance monitoring

Monitoring of insecticide resistance in Morocco dates back more than 10 years, and tests have always been conducted by the personnel of the laboratory of entomology of the National Institute of Hygiene.

Following the elimination of local malaria transmission in 2002, a sentinel system established to monitor mosquito susceptibility to insecticides. There are 9 sentinel sites and the personnel in charge of this activity have been trained in the conduct of bio essay tests and in medical entomology, in collaboration with WHO. The laboratories have been equipped by test kits provided by WHO and the equipment of these laboratories were upgraded during 2004 and 2005.

Systematic monitoring of DDT susceptibility of anopheles to DDT are routinely carried out at the sentinel sites. In addition, wherever a DDT residual spraying is indicated, a susceptibility test is conducted to make sure that there is no resistance in the particular area to be sprayed. Subsequent to the spraying, a bioassay is conducted to validate the efficacy of the spraying operation.

It is important to note here that the bioassays conducted in the localities that are sprayed by DDT are done using mosquitoes that are captured from field. This is not recommended by WHO, which recommends laboratory reared mosquitoes of known susceptibility. However, in the absence of functioning insectaries in the country, the integrity of the results cannot be assured. Indeed, the mosquitoes collected from field could be resistant to DDT and this will affect the outcomes of the bioassays.

Normally an insectary will enable:

- stocks of sensitive specimen to determine the basic sensitivity of a species to various insecticides, to control the quality of the pesticide products;
- stock of reference to control the effectiveness and the persistency of operational treatments (indoor residual spraying)
- selection of resistant stocks of reference to characterize the implied mechanisms of resistance in the specie.

The establishment of an insectary is therefore one of the capacity strengthening priorities for the vector control programme, as it will improve the quality of the resistance monitoring in the country.

DDT ALTERNATIVES (insecticides, methods and strategies)

DDT alternatives

Apart from indoor spraying of DDT, many other vector control activities are carried out in the framework of integrated vector control, notably:

- Biological control using a larvivorous fish, *Gambusia holbrooki* which have been shown to be very effective against mosquitoes, especially *Anopheles* sp.
- Environmental management activities
- Larviciding using temephos, for which no resistance has been noted to date
- Indoor residual spraying using pyrethroïds (Lambdacyhalothrine).

All the information related to these alternatives is provided routinely. However the reporting system need be strengthened to adequately capture critical lessons, which may be valuable to other countries with similar climatic conditions.

Information related to the annual import of chemicals should be given from the pesticide companies. In the framework of quality control of pesticides product, there are two laboratories that analyse pesticides in Morocco. One belongs to the Ministry of Agriculture and is located in Casablanca city. The second one is within the national Institute of Hygiene in Rabat. The two laboratories however limit the quality control to the analysis of the amount of active ingredient in the product. It is important that the quality control process is also able to check whether or not the pesticides meet WHO standards.

Main vector susceptibility to insecticides

The information requested is also provided through the system described previously under the section related to DDT susceptibility monitoring. The routine method for monitoring resistance to larvicides treatments in routine remains the use of the diagnostic concentration. Although the diagnostic dose of temephos recommended by WHO for the *Anopheles* gender, is of 0.25 mg/l, the operational treatment is carried out with the dose of 50 g/ha, which for breeding sites of approximately 10 cm of depth corresponds to a dose of 0.05 mg/l. This dose is in conformity with the standards of use of the temephos and till now has always proved effective in the field.

In order to have an early tool for detection of resistance, it is necessary to determine a diagnostic dose for the larvae of *An. labranchiae* in Morocco.

Insecticide residual efficacy

Tests conducted for lambda-cyhalothrin (Pyrethroid) used in indoor spraying, have shown that this insecticide is effective against mosquitoes but its persistency is quite low (six weeks) relative to DDT. In 2003, lambda-cyhalothrin was used for indoor spraying of some localities around Al Massira Dam where the density of *Anopheles* was high. The remaining localities were sprayed by DDT. It is an interesting finding from this exercise that indoor spraying using lambda-cyhalothrin showed a good efficacy in the field, compared to the laboratory test. In fact, one cycle per year was enough to control the *Anopheles* species.

GENERAL HUMAN AND ENVIRONMENTAL SAFETY ISSUES

The Ministry of Health in Morocco is responsible for assessing the risks posed by the use of insecticides for public health by its anti-poisoning centre and there are efforts by the MOH and the Ministry of Agriculture to educate the population on safety issues relating to insecticides. This however needs to be proved.

The information related to poisoning incidents is provided by the Anti-poisoning Centre.

5. AREAS REQUIRING STRENGTHENING

1. The information related to DDT stock is not adequate and needs to be updated, especially that relating to assessment of the quality of the stocks;
2. The stock management of DDT and other pesticides needs to be improved to provide up to date information;
3. The system of monitoring of pesticide management needs to be strengthened
4. The diagnosis dose used to test the susceptibility of *Anopheles* mosquito to temephos is not known and should be established;
5. The bioassays done do not meet WHO standards. The establishment of an insectary is an urgent need to enable credible resistance monitoring;
6. The capacity of the vector control staff needs strengthening especially in the areas of vector surveillance and reporting and in overall planning and implementation of vector control in the context of IVM.
7. There is a lack in the facilities of quality control of pesticides.

6. RECOMMENDATIONS

Intersectoral collaboration

- Enhancing communication between the Stockholm Convention focal point and the Ministry of Health to fill in the questionnaire in an adequate time.

DDT stocks and stock management

- Clarifying the situation of DDT stock
- Capacity building on inventory and stock management
- Office equipment
- Capacity development for quality control of pesticides

Resistance monitoring

- Set up the insectary
- Reinforcement of resistance monitoring activities
- Determining a diagnosis dose of *Anopheles* to temephos

Use of DDT and alternatives

- strengthen country capacity to collect and manage information in vector control activities
- Office equipment (Computers)

7. CONCLUSION

The significant achievement of Morocco in eliminating local transmission of malaria needs to be consolidated. The experiences of Morocco needs to be properly documented and shared with countries with similar climatic and other operational setting.

The review of this questionnaire showed that the information needed to fill it in, is general available from the national vector control manager. However, some information will need to be actively generated or improved. There is already exist a robust mechanism for routine information management which need limited critical improvements. The recommendations suggested in the present report to provide an adequate information base for future evaluations of the continued need for DDT is estimated at US\$122,000, with a recurrent cost estimate of about US\$30,000.

ANNEX 1

**ESTABLISHING AN ACTIVE SYSTEM FOR COLLECTION AND MANAGEMENT OF
INFORMATION ON THE USE OF DDT FOR DISEASE VECTOR CONTROL AND
RELATED COST**

Information section	Major constraints	Needs to address the constraints	Budget (US\$)	Recurrent cost (US\$)
Use	<ul style="list-style-type: none"> Reporting of vector control alternatives is weak 	<ul style="list-style-type: none"> Strengthen country capacity to collect and manage information in vector control activities. Including office equipment (computers) 	30,000	5,000
Resistance monitoring	<ul style="list-style-type: none"> The bioassays used do not meet who standards The diagnosis dose of anopheles to temephos is not known and will need to be established urgently. 	<ul style="list-style-type: none"> Establish an insectary to undertake credible resistance monitoring programme. Reinforcement of resistance monitoring activities Determining a diagnosis dose of <i>anopheles</i> to temephos 	55,000	10,000
Stocks & stock management	<ul style="list-style-type: none"> The quantity of stock is not adequate The quantity of obsolete stock is not known Stock manager are not well trained Quality control of pesticides is not adequate 	<ul style="list-style-type: none"> Clarifying the situation of ddt stock Capacity building on inventory and stock management Office equipment Capacity development for quality control of pesticides 	35,000	10,000
Intersectoral collaboration	<ul style="list-style-type: none"> The communication between the ministry of health and the stockholm convention focal point is weak 	<ul style="list-style-type: none"> Enhancing communication between the sc focal point and the ministry of health 	2,000	5,000
Total			122,000	30,000

UGANDA

**ESTABLISHING NATIONAL MECHANISMS FOR ACTIVE INFORMATION
COLLECTION AND REPORTING ON THE USE OF DDT FOR DISEASE VECTOR
CONTROL**

Acronyms

GFATM	Global Fund for HIV/AIDs, TB and Malaria
IEC	Information, Education and Communication
IPT	Intermittent Preventive Treatment
IRS	Indoor Residual Spraying
ITNs	Insecticide Treated Nets
MCP	Malaria Control Programme
MOH	Ministry of Health
POPs	Persistent Organic Pollutants
TOTs	Trainer of trainers programme

Terms of Reference for the study

The terms of reference for the study were to:

1. assess the current mechanisms being employed to collect information on the use of DDT and its alternatives for disease vector control
2. identify the gaps in the information that is currently collected, compared to what parties are required to report on (ref. questionnaire adopted under the Stockholm Convention on POPs for reporting by Parties that use DDT to the Secretariat and WHO every three years)
3. identify barriers/ inadequacies that prevent the effective collection and management of relevant information
4. recommend a possible mechanism for the efficient collection and management of such information in (3) above, These should take into account experiences from similar reporting systems in other fields; and
5. estimate the initial and recurrent cost implications of establishing and maintaining such country mechanisms.

The study was carried out between February and March 2006.

Background:

Malaria is endemic in 95% of Uganda, the remaining 5% are epidemic - prone highland areas of the South West and East of the country (*MOH Malaria Control Strategic Plan: 2001 – 2005*). Malaria is the leading cause of mortality and morbidity particularly among children and pregnant women in the country: it accounts for 20-40% of outpatient visits, 25% of health facility admissions and 20-23% of deaths in children under five years. HMIS reports indicate that the number of clinically diagnosed malaria cases at Government and Private-not-for profit health facilities increased from 2.3 million in 1997 to about 20 million in 2004. Access to effective antimalarial treatment is constrained by low health facility coverage and increasing parasite resistance to more readily available antimalarial drugs. Household ownership of at least one treated mosquito net is below 15%.

According to the baseline study, morbidity attributed to malaria in children aged less than 5 years presenting to outpatient departments was 44.4% and 41.6% for those above 5 years of age. For all age groups, it was 38.8 %; while mortality attributed to inpatients was 42.9% in the under 5 years and 25.1% for those above 5 years.

The incidence of epidemics has increased in the highland areas in recent years. Uganda experienced malaria epidemics in 1992, 1994, 1997/8 and in 2000/1. The most affected areas were Kabale, Rukungiri and Kisoro districts (*MOH Malaria Control Strategic Plan: 2001 – 2005*).

The National Malaria Control Strategy is based on four main interventions: Case Management, Vector control, Intermittent Preventive Treatment (IPT) of pregnant women and Epidemic Preparedness and Response. The two vector control methods promoted under the strategy are: i) use of insecticide treated mosquito nets (ITNs) especially in highly endemic areas and, ii) Indoor Residual Spraying (IRS) with insecticide in epidemic prone areas. However, until recently both vector control methods have been implemented in a non-systematic manner as means of fighting epidemics and other emergency situations.

Indoor Residual Insecticide Spraying (IRS):

The Government of Uganda is committed to strengthening the vector control component of its National Malaria Control Strategy. Using funds secured from the Global Fund for HIV/AIDs, TB and Malaria, up to 1.79 million ITNs will be provided free-of-charge to children <5 years and pregnant women. A policy and strategy for Indoor Residual Spraying (IRS), together with checklists for monitoring, have been developed. Uganda intends to re-introduce DDT for IRS. The IRS (vector control) target, under the Health Sector Strategic Plan II (HSSP2) is to increase the proportion of targeted structures for IRS in epidemic prone areas successfully sprayed from 0% to 80%. However, the current IRS system is adhoc and the relevant infrastructure is too weak to ensure effective routine IRS, more so, to ensure judicious use of DDT. There is therefore need to develop the requisite infrastructure.

In recognition of the present limitations, the ministry of health (MOH), through the malaria control programme (MCP), intends to first develop capacity and systems for routine pyrethroids-based IRS, initially in the 1 district of Kabale, before introducing the use of DDT. As first steps in this direction, the MCP intends to conduct capacity building for IRS through the training of National and District TOTs, as well as conduct generic IRS-IEC and behavioural change communication. For IRS to be successful, the support of communities support is very essential. It is therefore important that target communities are well informed on the benefits of IRS and what is required of them during IRS operations.

The IRS deployment will then be expanded, initially to 7 highly epidemic prone districts of Kabale, Kisoro, Kanungu and Rukungiri in Southwest of Uganda and Sironko, Kapchorwa and Bukwo in Eastern Uganda. Under the Round 2 of Global Fund disbursement, 3 districts - Kabale and Rukungiri in SW Uganda and Sironko District in Eastern Uganda, will be targeted for IRS.

Uganda is a Party to the Stockholm Convention on POPs (acceded in July 2004). The introduction of DDT is a political decision of the Government, because malaria remains a major disease burden, despite increased efforts to reduce the morbidity and mortality. The use of DDT will form part of an IVM strategy, in line with the Poverty Eradication Action Plan of the country.

Needs for completing the Form for Reporting by Party using DDT for Disease Vector Control:

Uganda intends to re-introduce the use of DDT for malaria control and is not currently collecting any information on DDT. However, based on the checklists developed by the MOH for IRS, the following information will be collected

At the district level (using designated forms):

- Number of rooms sprayed
- Number of houses sprayed
- Amount DDT used
- Population at risk, targeted, protected
- Spraying period
- Agencies spraying
- Geographical coverage
- Adverse effects
- Disease notification
- Amount/type of DDT stored, received
- Location and status of Storage facilities
- Waste quantities (empty DDT sachets or containers)
- Information relating to disposal of unused small quantities and residues
- Compliance to relevant existing legislation

The district data will to be sent to the national level for further analysis and dissemination to all the relevant stakeholders.

At the national level, the following data will be collected:

- Aggregated data from district
- Information on costs (product and operational aspects)
- Consumption rate and projected use of DDT
- Distribution and procurement data
- Import/Export related data
- Type of legislation in place
- Compliance to relevant existing legislation
- Data on incidents and accidents
- Availability of Emergency response plans and centres
- Vector Susceptibility to DDT
- Bioassays results
- Vector behavioural change
- Information on national stocks
- Availability of obsolete stocks (Quantities and location)
- Waste quantities (empty sachets containers, obsolete stocks)
- Information relating to disposal of unused small quantities and residues as well as bulky disposal
- Status of ratification of multilateral environmental agreements.

2. Gaps and barriers preventing effective collection of information on the management and use of DDT - Major needs for reporting

IRS has been ad hoc and very limited to date. Therefore significant capacity strengthening is required to enable timely and full reporting on the use of DDT (when its is reintroduced). There is currently inadequate capacity in the following areas:

2. data collection and management
3. geographical information system (GIS)
4. mosquito sampling, insecticide resistance monitoring and bioassays

5. inventory and stock management
6. requirements for environmentally sound disposal wastes

Other areas requiring strengthening are:

- Training of law enforcement officers on regulations regarding DDT use
- Review and update of legislation on the management of pesticides, particularly public health insecticide
- Review/formulation/harmonization of regulatory instruments with respect to public health insecticides
- Networking within the implementing districts
- Guidelines on environmentally sound management (ESM) of DDT containing waste, particularly containers and small unused amounts at the end of spray programmes
- Inter-sectoral collaboration
- Storage facilities at both national and sub-counties
- Need for institutional strengthening in management of IRS using DDT

The following will also be needed to directly enhance the quality of data collected:

- Suitable reporting forms
- Office equipment (computers) for data management.
- Communication equipment (two way communication radios, mobile phones, reliable internet access) to facilitate data transmission to and from remote areas

3. Needs for establishing a national mechanism for active collection and reporting on the use of DDT and its alternatives in disease vector control.

1. Train national and district malaria control officers in data collection and management in relation to geographical reconnaissance (GR) and IRS.
2. Strengthening of existing Highland Malaria Project data base in Kabale District for planning and disease monitoring purposes to facilitate documentation and replication of lessons on DDT-based IRS.
3. Strengthen information technology capacities within the malaria control programme to facilitate data management and reporting.
4. strengthen intersectoral arrangements for consultations and active involvement of all relevant stakeholders, including communities for planning and implementation of IRS activities.
5. Strengthen capacity for insecticide monitoring and management of vector resistance, to enable generation of relevant data and sound decision-making in the selection of insecticides. Substantial external technical and financial support will be required.

4. Estimation of the initial and recurrent cost of establishing and maintaining active information collection and reporting mechanisms.

Initial cost = US\$195,000 ,
Recurrent cost = US\$25,000)

Training needs:

- a. Train national and district malaria control officers in data collection and management in relation to geographical reconnaissance (GR) and IRS.

(US\$30,000)

- b. Train stores staff on inventory and stock management, as well as relevant staff for logistical management. **(US\$25,000)**
- d. Train national and district staff on mosquito sampling, insecticide resistance monitoring, bioassays and requirements for environmentally sound disposal wastes **(US\$40,000, recurrent cost US\$10,000)**
- e. Train Law Enforcement Officers on their role in enforcement of regulations regarding DDT use including strategies to prevent insecticide pilferage. **(US\$15,000)**

Data management:

- a. Procurement of hard- and software for implementing a data recording system for IRS and train staff for its management. **(US\$40,000, recurrent cost US\$5,000)**

Research:

- a. Strengthen capacity for insecticide susceptibility monitoring and bioassays **(US\$30,000, recurrent cost US\$10,000)**

IEC and BCC

- a. Conduct advocacy meeting at national and district level targeting the districts where IRS is to be conducted and related community awareness **(US\$15,000)**

Coordination:

- a. Strengthen intersectoral arrangements. **(US\$10,000)**

**ESTABLISHING NATIONAL MECHANISMS FOR ACTIVE INFORMATION
COLLECTION AND REPORTING ON THE USE OF DDT FOR DISEASE VECTOR
CONTROL**

*REPORT OF THE ASSESMENT IN
ZAMBIA & ZIMBABWE*

*PREPARED BY
VECTOR BIOLOGY AND CONTROL UNIT
DIVISION FOR HEALTHY ENVIRONMENT AND SUSTAINABLE DEVELOPMENT
WORLD HEALTH ORGANIZATION REGIONAL OFFICE FOR AFRICA
APRIL 2006*

ACRONYMS

COP	Conference of Parties
DDT	Dichloro diphenyl trichloroethane
EHT	Environmental health technician
GEF	Global Environmental Facility
IEC	Information education & communication
IRS	Indoor residual spraying
ITNS	Insecticide Treated Nets
IVM	Integrated Vector Management
KAP	knowledge attitude & practice
MOHCW	Ministry of health & child welfare
NMCP	National malaria control program
SAMC	Southern Africa malaria control
SSC	Stockholm Convention Secretariat
POPs	Persistent Organic Pollutants
WHO	World Health Organization

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1. BACKGROUND

Malaria constitutes a major threat to the health and well-being of a large proportion of the world's population. For Africa south of the Sahara, malaria remains the highest cause of morbidity and mortality especially in children under the age of five. With a total population of just over 10 million people, more than 3.5 million malaria cases and 50,000 deaths are reported annually in Zambia. Malaria transmission in Zimbabwe is largely unstable. Approximately 50% of the 13 million population live in malarious areas. While the overall malaria mortality may be low in Zimbabwe, this can rise markedly during epidemic outbreaks, as was the case in 1996 and 1997.

Vector control is a proven strategy for reducing disease transmission, and it is widely recognised that such control measures be suitably adapted to local circumstances. Until recently, the main strategy used for the control of malaria vectors in eastern and southern African countries has been the spraying of residual insecticides such as DDT and pyrethroid inside human habitations.

The Stockholm Convention on Persistent Organic Pollutants (POPs) aims to eliminate the production and use of 12 chemicals including DDT. However, the Convention allows the use of DDT for disease vector control in accordance with the recommendations and guidelines of WHO.

The Convention stipulates that each Party that uses DDT must provide information to the secretariat of the Convention and the WHO, on the amount of DDT used, the condition of such use and its relevance to that Party's disease management strategy. The Convention secretariat in cooperation with WHO, developed a reporting format that was adopted by the first Conference of Parties of the Convention (COP-1) in May 2005, in Paraguay.

Vector control programs in many of the countries in Africa south of the Sahara, are characterized by shortage of trained man power and financial resources, which limits the planning, implementation, monitoring and evaluation of effective disease control. Hence, it is recognized that the reporting obligations on the use of DDT and its alternatives, may overstretch the capacity of national vector control programmes.

In this regards, COP-1, in its decisions on DDT noted that *sufficient capacity at the national and sub-national levels is necessary for effective implementation, monitoring and impact evaluation of the use of DDT and its alternatives in disease vector control, and recommends that the financial mechanism of the Convention support activities to build and strengthen such capacity as well as measures to strengthen relevant public health systems.*

In response to the COP-1 Decision, the Convention Secretariat and WHO organized a consultation workshop in Addis Ababa, Ethiopia, in November 2005, for countries and Parties in Africa South of the Sahara, that are either using DDT for disease vector control or are preparing for its re-introduction. The workshop was aimed to:

- Clarify the reporting format and data requirement under the Convention.
- Review the processes currently used in each of the countries and Parties to handle DDT and how data is collected on the production/import, storage, use, disposal and other pertinent information pertaining to DDT use, as well as the use of alternatives.
- Review the opportunities for establishing the best possible national systems to collect and manage data on the use of DDT and its alternatives for disease vector control, in the light of the reporting requirements for Stockholm Convention regarding evaluations on DDT, and to identify the relevant capacity strengthening needs for establishing such systems.

The workshop noted in its recommendations:

- A need to improve the access of countries to guidelines relevant to the objectives of the Stockholm Convention on POPs.
- A need for capacity strengthening in countries for the effective regulation and control relating to the reintroduction of DDT use for disease vector control.
- The misuse/unrecommended use of DDT is an problem requiring urgent attention. Parties should therefore enhance public awareness and education efforts to address this.
- Urgent global efforts are needed on the development of alternative interventions, tools to facilitate the sustainable reduction of existing reliance on DDT.
- Intensify efforts at monitoring and management of vector resistance to enable sound decision-making in the selection of insecticides. Countries will require substantial external technical and financial support, in this regards.
- UNEP and WHO should work with counterpart agencies in countries to address existing misconceptions on the use of DDT with regards to the Provisions under the Stockholm Convention.
- Need to improve the sharing of lessons learned in the use of DDT and its alternatives in disease vector control. In particular, experiences on the effectiveness of the various interventions are needed to guide country decision making.
- The National Stockholm Convention focal Points should ensure adequate involvement of all relevant national stakeholders in deliberations relating to the Convention, to ensure comprehensive evaluation of issues by countries and promote balanced country submissions at COP and other forum under the Convention.
- The SSC and WHO should ensure that countries receive the reporting form early to facilitate timely reporting to the Convention.

The present study therefore builds on these observations and should enable the elaboration of realistic country mechanisms.

1.1. OBJECTIVES OF THE STUDY:

The specific objectives of the study were to:

1. assess the current mechanisms being employed to collect information on the use of DDT and its alternatives for disease vector control
2. identify the gaps in the information that is currently collected, compared to what parties are required to report on (ref. questionnaire adopted under the Stockholm Convention on POPs for reporting by Parties that use DDT to the Secretariat and WHO every three years)
3. identify barriers/ inadequacies that prevent the effective collection and management of relevant information
4. recommend a possible mechanism for the efficient collection and management of such information
5. estimate the initial and re-current cost implications of establishing and maintaining such country mechanisms

2. METHODOLOGY

Studies were undertaken in two countries (Zambia and Zimbabwe) that have resumed indoor residual house spraying (IRS) of DDT for malaria control. Data was collected through interviewing personnel within the national malaria control programs and in the Ministry of Environments: In Zambia, with the

national malaria control center (NMCC) and Environmental Council of Zambia (ECZ), and in Zimbabwe, with the national malaria control programme, Ministry of Health and Child Welfare, as well as relevant staff of the Zimbabwe officer of the WHO.

The interviews referenced the format and questionnaire for reporting by parties that use DDT, which was adopted by the first conference of Parties in May 2005.

The assessment was carried out March- April, 2006.

3. DESCRIPTION OF VECTOR CONTROL SERVICES

3.1 Zambia

In Zambia, the national malaria control center (NMCC) of the Ministry of Health, is responsible for malaria control. The NMCC at the national level is staffed with focal points for IVM, specialist responsible for IRS operations and ITN specialist. The provincial Environmental Health Officer (EHO) is responsible for monitoring and supervision at the districts level.

The overall role of the NMCC is to formulate policies and strategies, set of standards, prepare guidelines for effective implementation of vector control activities, including malaria control; capacity building in manpower, logistics and finance; Monitor, evaluate and follow up of implementation of national malaria control strategies and guidelines; organize and conduct training of trainers; Provide technical assistance for epidemic control to provinces.

The capacity development target of the MoH is to have 2 doctoral level staff, which target is yet to be achieved.

The district directorate is staffed by a vector control manager, a coordinator for IRS activity (EHT), 2-5 supervisors (EHT), 5-15 spray teams, each consisting of 1 team coordinator and 5-8 spray men. The staff development capacity for the coming year is to have a field entomologist in each district.

The districts are the main implementers of vector control activities: responsibilities at that level include local planning and resource allocation for vector control activities, supervision and evaluation of control vector control, information and education of local communities, and training of spray men.

The following indoor residual house spraying indicators are employed:

- Average coverage of targeted households
- Percentage coverage of at risk population
- Percentage coverage of targeted population
- Average application rate
- Average number of structures sprayed per year
- Average number of households sprayed per year
- Cost of indoor residual house spraying

3.2 Zimbabwe

Zimbabwe is divided into 10 administrative provinces with a total of 59 districts. Out of the 59 rural districts, 42 are classified as having malaria transmission and 24 are classified as heavy burden

districts. The district is the basic planning level, and is supported by the government through direct budget support.

The provincial program is responsible for planning, implementation, monitoring and evaluation of malaria vector activities. Specifically, the Provinces coordinate malaria control activities, conduct in-service training courses for health staff, Devise procedures on information flow between all health institutions and malaria control; analyze data, identify problems and provide timely feedback to the districts, and mobilize manpower and logistic during epidemic outbreaks.

Various data formats and supervisory checklists are used to monitor and evaluate malaria control activities at the districts level. The data sheets are compiled by the district health team, and then passed on to the provincial health department. The provincial department aggregates and sends a summary report to the central level. The data received from all provinces are aggregated by the central level in the form of a national report.

The following list of data are used in compiling data for supervision, monitoring and evaluation of the NMCP at district level.

- district spraying coverage
- larviciding reporting form
- insecticide treated nets distribution form
- vector surveillance reporting sheet
- bioassay reporting form
- insecticide expenditure form

4. INFORMATION GAPS FOR REPORTING BY PARTIES USING THE DDT REPORTING FORMAT

4.1 Zambia

End use information

DDT is used to control susceptible *An. gambiae*, *An. arabiensis* and *An. Funestus* vector of malaria. The NMCC, in collaboration with Kankola Copper Mines (KCM), introduced indoor residual spraying (IRS) for malaria vector control in 2000 in two mining towns, Chingola and Chililabombwe. Malaria prevalence in KCM has been reduced from 74% to <1%, and zero mortality was recorded between 2001-2002. Spraying started in 5 districts in 2003 and expanded to 8 districts in 2004, using 7,725 Kg and 13,266 Kg of DDT (WP 75%), respectively. The coverage of targeted districts range from 87% to 100 %. The spraying coverage was expanded, in 2005, to include 15 districts, with a corresponding increase to 34,170 Kg of DDT used.

DDT spraying is limited to houses that are not plastered. The criteria for using DDT is cost effectiveness and the level of malaria incidence in the selected districts. DDT spraying commences at the beginning of the transmission period and takes about 75 days to cover the target districts.

Regulation

Environmental Council of Zambia (ECZ) is responsible for regulating the importation of DDT. It is also involved in supervisory visit, training of field staff and public awareness campaigns. The Pesticide and Toxic Substance Regulation of 1994, regulates the importation, distribution, use and disposal of chemicals in Zambia.

The information exchange between municipalities and the mining companies on the use of DDT and conditions of stock, is limited. The NMCC and other stakeholders need to work together to develop a mechanism for the disposal of DDT sachets that are stored in the various warehouses. The following are required for effective management on the use of DDT for vector control purposes.

- Appropriate policy framework on intersectoral collaboration, which mandates accountability and promotes joint planning and evaluation.
- Formal intersectoral collaboration between NMCC, Municipalities, ECZ and mining companies, to facilitate the identification and resolution vector control problems, and promote efficient information sharing and dissemination
- The development of legislation and policies covering production, distribution, safe use, quality assurance and disposal of pesticides for agricultural and public health use in collaboration with relevant sectors.
- Strengthening enforcement of regulation on the use of DDT

DDT disposal

The amount of DDT imported by Zambia is based on forecasting on expected consumption needs. DDT stocks are stored in warehouses in the 15 districts where spraying is conducted. The stocks are managed by the Municipalities and MoH. It is likely that storage facilities may not meet the standards of ECZ.

There is no obsolete DDT in the country. The MoH is directly responsible for disposal of DDT. There is agreement with the supplying company to collect and dispose the empty sachets of DDT.

Resistance monitoring

The bioassay test and susceptibility tests for DDT is conducted according to the WHO standard tests and no resistance to DDT has been reported for *Anopheles gambiae*, *An. arabiensis* and *An. funestus*. Resistance monitoring and bioassay test procedures are conducted with the support of the Tropical Disease Research Laboratory.

While the National program in collaboration with the TDRL undertake resistance monitoring and bioassay procedures, the following shortfalls were observed during the assessment:

- Lack of systematic data collection and management on insecticide resistance monitoring and bioassay tests.
- Need of an entomological facility to support operational research in the country.

DDT Alternatives use

Zambia uses Deltamethrine, lambda-cyhalothrin and alphacypermethrin as alternative insecticides for IRS, while ITNs are also used as alternative strategies for the control of malaria although coverage still remain low, especially among the poor populations. ITNs and ICON are purchased from South Africa. IRS is supplemented with other vector control measures, including larviciding and environmental management.

There is no operational research into alternative strategies of malaria control, and there is no systematic collection of information on alternative strategies in use.

Human and environment exposure

The Environmental Council of Zambia is, in principle, responsible for monitoring risks associated with pesticide use, although there are no systems in place for monitoring human exposure and tracking cases of environmental spillage. No incidents of intoxication or major spillage into the environment have been reported, but this may be partly due to the afore-mentioned limitations.

System strengthening

Although the country has recently revived the vector control component of the health services, there is a need to building trained manpower. This could preferably be done through a combination of in-service training and postgraduate studies. A good career development structure is needed to attract and retain experienced staff.

4.2 Zimbabwe

DDT production and import

DDT is imported from AVIMA in South Africa. The importation of DDT is controlled through the Hazardous Substance Act that prevents the use and importation of DDT. Permission of the Registration Authority in the Ministry of Agriculture is required for importation of DDT. Currently, only the Ministry of Health is allowed to import DDT. The amount of DDT that is consumed and imported annually, is thus, centrally regulated.

End user information

DDT was reintroduced for malaria control in 2003. An estimated population of 895,000 people were protected by spraying DDT in 2004-2005. 14 districts were covered with a target population of 1.3 million and 530,452 rooms sprayed. The percentage coverage was 67 %. The total amount of DDT imported in 2004 and 2005 were 10 tons and 140 tons, respectively. Information on the structures sprayed and target population protected for 2005/6 is still being compiled.

The DDT spraying period is determined by the NMCP, the number of spraying cycles are determined by the length of the transmission season and residual effect of DDT. The refusal rate of DDT spraying is low and the cost of spraying per house is difficult to estimate, since part of the fund mobilized is shared between the central and provincial programs.

Although data on the amount of DDT used is adequately collected and compiled at the central level, the information may not reach to central level as speedily as required. Inadequate numbers of staff who are trained on data collection methods and the limited number of computers available at the central and provincial levels are major limitations.

Regulation:

The hazardous substance act was revised in 1996 regulates the importation and use of DDT .

Stock information:

DDT is not packaged or reformulated in Zimbabwe. Stocks of DDT are stored in 8 warehouses at provincial level. The amount of DDT stock currently stored is not available. This is mainly due to shortage of trained personnel.

Obsolete DDT

The amount of DDT imported to the country is based on the remaining quantities of DDT from the previous season and estimated quantities required to cover the selected districts. There is no obsolete DDT in the country and the MoH is directly responsible for disposal of DDT.

Resistance monitoring

Both Blair and DEBEERS laboratories are involved as research laboratories. The bioassay test and susceptibility tests for DDT is conducted according to the WHO standard tests and no resistance has been reported for *Anopheles arabiensis* - the main vector of malaria. The National Institute for Health Research supports bioassay tests in 10 districts where DDT is sprayed.

Although the process of data collection was adequate at the national level, the information on the resistance status of malaria vectors, entomological surveillance data from malarious districts, bioassay results of DDT and alternative insecticides spraying and operational research to explore the availability of alternative strategies need further strengthening to enable a more precise and complete assessment of the country situation.

DDT alternatives

Lambdacyalothrin WP 10% is used for IRS in areas where tobacco is grown and additionally ITNs are used as alternative strategies for the control of malaria in Zimbabwe. 13 tons of ICON was used during the 2004-05 transmission season. The acceptability rate among the population is good. ITNs and ICON are purchased from a local company while long lasting nets are imported from A to Z company in Tanzania. Delatmethrine and cypermethrine have been used in the past to control malaria and no resistance has been observed in the mosquito vectors to these insecticides.

Larviciding is one of the least most commonly used vector control interventions. Decision to use larvicides is normally based on a clear understanding of the most preferred vector breeding sites. According to the national malaria control policy, larviciding is only indicated or advocated in selected settings.

Disease management strategy:

There is a vector control policy and IVM is at its early stage. However, there is no research to develop alternatives vector control methods. This is mainly attributed inadequate technical capacities for entomological evaluations and vector control research.

General human and environment safety:

No incidents of intoxication by human or major spillage into the environment were reported. However, the monitoring system has to be strengthened to track such incidents.

It is imperative that the monitoring system on human exposure and environmental contamination be strengthened. In addition, intersectoral coordination between various players should be consolidated to adequately address DDT and insecticides exposure.

System strengthening:

A good career development structure is needed to attract and retain experienced staff. As is the case for Zambia, a combination of in-service training and post graduate studies should be urgently explored to build the requisite trained manpower needed.

5. IDENTIFICATION OF BARRIERS OR CONSTRAINTS FOR EFFECTIVE COLLECTION AND MANAGEMENT OF DATA

Trained man power:

While both countries have made some headway in revived vector control program successfully through limited system strengthening and staff recruitment, some basic routine functions of control programs such as systematic collection and analysis of entomological information need to be urgently consolidated. Except for the occasional provision of in-service training to the vector control staff, there is very limited opportunity for university or postgraduate training within the two countries.

A strengthening of in-service training, training materials and guidelines on vector control are extremely important. The National Malaria Control Program should avail itself of opportunities for increasing collaboration with WHO in this regards.

The following were identified for strengthening capacities of the vector control programs for efficient collection of data on the use of DDT

- Need for skilled manpower, particularly entomologists, entomology technicians and epidemiologists at the different levels of programme administration.
- Need for establishing strong links with national Universities to organize specialized courses in vector control.
- Need for organizing training on the safe handling and management of insecticides.

Operational research

Operational research on vector control should be an integral component of the national vector borne disease control programme. It should be conducted regularly in order to influence vector control policy including the choice of insecticides and alternative vector control interventions.

Operational research both at the central and provincial level is limited because there are limited opportunities for postgraduate training or higher level training outside the country. The non-availability of funds for training in Regional and international schools remains a set back to develop the capacity of the vector control program in the long run. The capacity to retain trained personnel, like in most African countries, is also a major challenge.

The research laboratories in both countries support the malaria control program in monitoring vector bionomics and insecticide resistance. These laboratories are currently not functioning at full capacity because of the shortage of equipments such as PCR machines, electrophoresis and reagents that are required to conduct the tests.

Technical strengthening needs:

- Need for training on insecticide resistance detection, monitoring and management
- Need for building local capacity to undertake operational and basic research in vector borne diseases and their control.
- Need to undertake operational research on different vector control measures in (chemical and non chemical) in order to reduce reliance on DDT.

Laboratory and communication equipment:

For effective planning, monitoring and evaluation of program activities, surveillance should be conducted on a regular basis. At present epidemiological studies are conducted infrequently in various provinces and districts. Priority needs are:

- Training on vector control data management
- Equipments for data processing and communication
- Furnishing laboratories with basic equipments for entomological surveillance and resistance tests.

Strengthen intersectoral coordination and collaboration

To prevent or minimize environment pollution, the following need are identified:

- Creation of conducive policy framework that mandates intersectoral collaboration, and promotes accountability, joint planning and evaluation.
- Strengthened intersectoral collaboration for effective and efficient information dissemination system.
- Community empowerment and participation on vector control.
- Involvement of municipalities in vector-borne diseases control, including malaria.

6. PROPOSED DATA MANAGEMENT MECHANISMS FOR EFFECTIVE REPORTING TO THE CONVENTION

The quality of data generated is critical to the validity of reports submitted by Zambia and Zimbabwe. Noting the previously described constraints of trained manpower, it is important that the countries are supported to achieve the critical mass of technical skills to assure quality reporting to the COP.

Coordination

In order to compile data representative of the situation, surveillance on disease incidence and burden, entomological and resistance tests need to be conducted regularly. The process of data collection and management proposed requires well defined structure and the designation of focal points for the collection and management of data at the various levels of the program.

The system proposed for compiling and analysing data for the DDT reporting format is described in the following sections:

District level

At the district level, the principal EHT should be responsible for logistics, coordination and compilation of relevant data. It is anticipated that the EHTs will have to be trained in order to undertake the activities described below. The situation where a trainee is assigned regular operations of the control program and may not be available for the compilation of the relevant data during the

reporting period should be avoided. It is proposed that 2 EHT trainees in each of the malarious districts with DDT-based IRS programmes, be made available for each of the 3 sub-activities of the DDT reporting format:

EHT 1 - they will be responsible for recording and compiling data on disease incidence, prevalence and burden; DDT and alternative strategies use including the amount used, structures sprayed, coverage and target population protected,

EHT2 - they will be responsible for collecting data on vector surveillance, insecticide resistance detection, monitoring, management and bioassay results for DDT and alternatives

EHT3 - they will be responsible for data collection on DDT stocks inventories, disposal and compliance of communities on the regulation as well as human and environment exposure

Provincial

One principal EHT will be identified and designated to undertake relevant activities at this level. S/he will coordinate, collect, compile and analyse data that is collected from the districts on disease burden, stocks, resistance and bioassay.

Central

A designated official from the NMCP should be responsible for collecting, reviewing, and compiling the data sent by the provincial NMCPs on the reporting format.

7. INITIAL AND RE CURRENT COST ESTIMATES FOR CAPACITY BUILDING AND MAINTENANCE

7.1 ZAMBIA

Estimated for 15 districts that are currently covered by DDT spraying. This represents also a core group of trainees available to do field work for other areas (as described under section 6).

INITIAL COST

Gaps identified	Task	Activities	Number required	Cost estimated	Total
Strengthening capacity need for data collection and management	Training	Trainers of trainers on safe use of DDT	15	100/ person	15,000
		Training on DDT inventories and management of DDT stocks	30 EHTs	500/ person	15,000
		Training on insecticide resistance, monitoring, detection and bioassay	30 EHTs	3,000/ person	90,000
		Designating focal person and training on data collection and management	30 EHTs	500/person	15,000
		Postgraduate training of central level staff on planning, monitoring and evaluation of vector control (IVM)	4	3,000/ person	12,000
	Guideline	Developing a guideline on safe use and disposal of DDT	1	5,000	5,000
	Infrastructures	Computers and printers for provinces and central level	15	15,000	22,500
		Internet services for provinces and central level	15	5,000	75,000
Laboratory equipments		Entomological identification machine	1	10,000	10,000
		Resistance assay machine	1	10,000	10,000
		Reagents for PCR assay and electrophoresis	1	6,000	6,000
Strengthening intersectoral coordination, and awareness raising	Establishing the steering committee of IVM	Identify main partners and Organize a meeting		5,000	5,000
		National consensus workshop on		10,000	10,000
	Community awareness and participation	Developing IEC materials, radio-events etc		8,000	8,000
	Total				

Recurrent cost estimate

Task	Activity	Cost estimated	Responsible institution
Laboratory support	Reagents for PCR assay and electrophoresis	6,000	MoH
	Bioassay and susceptibility test kits	2000	"
	Per diem for data collection	500	"
	Per diem for data analysis	500	"
	Cost for running and maintenance of insectary and laboratory	5000	"
	Operational research for alternatives	10,000	"
Total		24,000	"

INITIAL AND RE CURRENT COST ESTIMATES FOR CAPACITY BUILDING AND MAINTENANCE

Zimbabwe

Estimated for 14 districts that are currently covered by DDT spraying.

Initial cost

Gaps identified	Task	Activities	Number required	Cost estimated	Total
Strengthening capacity need for data collection and management	Training	Trainers of trainers on safe use of DDT	12	100/ person	12,000
		Training on DDT inventories and management of DDT stocks	28 EHT	500/ person	14,000
		Training on insecticide resistance, monitoring, detection and bioassay	28 EHTs	3,000/ person	84,000
		Designating focal person and training on data collection and management	28 EHTs	500/person	14,000
		Postgraduate training of central level staff on planning, monitoring and evaluation of vector control (IVM)	8 provincial 2 Central	3,000/ person	30,000
	Guideline	Developing a guideline on safe use and disposal of DDT	1	5,000	5,000
	Infrastructures	Computers and printers for provinces and central level	10	1,500	15,000
		Internet services for provinces and central level	10	500	5,000
	Laboratory equipments	Entomological identificaiton machine	2	10,000	20,000
		Resistance assay machine	2	10,000	20,000
		Reagents for PCR assay and electrophoresis	2	3,000	6,000
Strengthening intersectoral coordination, and awareness raising	Establishing the steering committee of IVM	Identify main partners and Organize a meeting		5,000	5,000
	National consensus workshop	Conduct a stakeholders workshop meeting		10,000	10,000
	Community awareness and participation	Developing IEC materials, radio-events etc		8,000	8,000
	Total				248,000

Recurrent cost estimate

Task	Activities	Cost estimated	Responsible Institution
Laboratory reagents	Reagents for carrying out resistance assays	6,000	MoH
	Bioassay and susceptibility test kits	2000	'
	Per diem for data collection	500	'
	Per diem for data analysis	500	'
	Per diem for data analysis	500	'
	Cost for running and maintenance of insectary and laboratory	5000	'
	Operational research for alternatives	10,000	'
Total		24,000	'

Annex 1

PARTICIPANTS FROM ZAMBIA

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