

REPORT OF THE FIFTH MEETING OF THE
GLOBAL COLLABORATION FOR
DEVELOPMENT OF PESTICIDES
FOR PUBLIC HEALTH

GCDPP

WHO/HQ, GENEVA
25–26 SEPTEMBER 2006



**World Health
Organization**

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Department of Control of Neglected Tropical Diseases
WHO Pesticide Evaluation Scheme (WHOPES)

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1 Introduction

The fifth meeting of the Global Collaboration for Development of Pesticides for Public Health (GCDPP) was held at the World Health Organization (WHO) headquarters in Geneva, Switzerland, on 25–26 September 2006.

Dr David Heymann, Acting Assistant Director-General of WHO Communicable Diseases (CDS) and Representative of the Director-General for Polio Eradication, opened the meeting, noting the role of GCDPP as a consultative group to the WHO Pesticide Evaluation Scheme (WHOPES) that gives advice, *inter alia*, on matters related to the development of insecticides and their safe and effective use in the field of public health. He welcomed the wide representation at the meeting of different institutions, especially industry.

The use of insecticides worldwide has increased significantly in recent years and rates of pesticide poisoning, either accidental or deliberate, are high, especially in developing countries. Given the growing interest in food safety and the recent discussions on the use of DDT in malaria vector control, the meeting at WHO was timely.

One of the major challenges facing the developing world is the lack of effective national regulatory frameworks and human and financial capacity to regulate the availability, sale and use of pesticides. This poor regulatory environment fosters the excessive and unsafe use of pesticides, leading to pollutants in food, drinking-water and the environment. Pesticide management has been identified as a priority activity for WHO, which is seeking ways to further strengthen its collaboration with the Food and Agriculture Organization of the United Nations (FAO) and the United Nations Environment Programme (UNEP) to better support Member States in this important issue.

Dr Heymann invited the meeting to provide its advice to WHOPES on key strategies and activities to support Member States in the sound management of public health pesticides, as

well as providing their recommendations on international tools, resources and opportunities that can be used for this purpose.

Dr Lorenzo Savioli, Director of the WHO Department of Neglected Tropical Diseases (NTD), informed the meeting of the changes within CDS since the previous GCDPP meeting and of the establishment of a separate unit, Vector Ecology and Management (VEM), reflecting the priority that the Organization has given to this cross-cutting programme.

The meeting was convened in plenary sessions (see Annex 1) and was attended by 10 representatives of industry, four representatives of national and government-supported agencies, one representative from the Bill & Melinda Gates Foundation, six representatives of regional and international organizations, six representatives of universities and research institutions, eight temporary advisers, as well as members of the WHO Secretariat (see Annex 2). Dr Mir Mulla was appointed as Chairman, Dr A. Adalla as Vice-Chair, and Dr Michael Macdonald and Mr Gamini Manuweera as rapporteurs.

2 Secretariat report on developments since the previous GCDPP meeting

Dr Morteza Zaim, Scientist in charge of WHOPES and Secretary of the GCDPP, provided a brief report on activities carried out by the programme since the previous meeting of the GCDPP in June 2004, in as far as they relate to the two main objectives of WHOPES. These are: (i) to facilitate the search for alternative pesticides and application technologies that are safe and cost-effective; and (ii) to develop and promote policies, strategies and guidelines for the safe and effective use of pesticides in public health, and assist and monitor their implementation by Member States.

WHOPES, a programme established by WHO in 1960, functions in close collaboration with national disease control programmes, registration authorities, industry and research institutions, as well as other WHO programmes, notably the Programme on Chemical Safety (PCS) and the Global Malaria Programme (GMP). WHOPES is a four-phase testing and

evaluation programme that assesses the safety, efficacy and operational acceptability of pesticide products for use in public health. It is supported by two panels of experts and advisory committees: the WHOPES Working Group, which meets once a year to review the result of efficacy trials, and the FAO/WHO Joint Meeting on Pesticide Specifications (JMPS), which also meets once a year, in June, to develop pesticide specifications.

Since the previous GCDPP meeting, WHOPES has completed the testing and evaluation of six pesticide products: four mosquito larvicides and two products for space spraying. The reports of the WHOPES Working Group Meetings have been widely distributed among registration authorities and national disease control programmes, as well as industry. These reports contain a critical review of the existing literature as well as studies carried out by WHOPES, providing justification for WHO recommendations and facilitating the registration and use of such products by national authorities.

WHO has given high priority in the past couple of years to the development of alternative products and technologies. In collaboration with the GMP, WHOPES has held numerous meetings with industry on development of new compounds, optimization of existing tools and creation of new application technologies. The result of this effort is that WHOPES is busier than ever, and the total number of products in the pipeline includes eight long-lasting insecticidal mosquito nets (LNs), two insecticide kits for long-lasting treatment of mosquito nets, five products for mosquito larviciding, one product for space spraying and two products for indoor residual spraying. It is therefore urgent that the Scheme expands its network of collaborating centres for the field testing and evaluation of pesticide products, and GCDPP guidance is sought on this matter.

Since 2002, WHO and FAO have established a joint panel of experts and have harmonized their procedures and requirements for development of pesticide specifications, the details of which are published in the *Manual on development*

and use of FAO and WHO specifications for pesticides.¹ During 2004–2006, the JMPS has reviewed 29 public health pesticide compounds and their formulations, from 16 manufacturers; about half of the submissions were from members of CropLife International.²

Major steps have been taken towards harmonizing the requirements, procedures and criteria for evaluating public health pesticides, including the publication of guidelines on testing LNs,³ mosquito larvicides,⁴ and mosquito adulticides for use in indoor residual spraying and treatment of mosquito nets.⁵ These guidelines have been well received by national registration authorities, control programmes and research institutions, as well as industry. Plans are under way to develop detailed guidelines for testing and evaluation of mosquito repellents, space spray products and household insecticide products.

The development of guidelines for management of public health pesticides⁶ is a major milestone in WHOPES activities. The

¹ *Manual on development and use of FAO and WHO specifications for pesticides* (only available on the Internet at http://whqlibdoc.who.int/publications/2006/9251048576_eng_update2.pdf; accessed 20 October 2006).

² *Programme for development of FAO and WHO specifications for pesticides* (available at http://www.who.int/whopes/quality/en/Programme_work.pdf; accessed 20 October 2006).

³ *Guidelines for laboratory and field testing of long-lasting insecticidal mosquito nets*. Geneva, World Health Organization, 2005 (WHO/CDS/WHOPES/GCDPP/2005.11; available at http://whqlibdoc.who.int/hq/2005/WHO_CDS_WHOPES_GCDPP_2005.11.pdf; accessed 20 October 2006).

⁴ *Guidelines for laboratory and field testing of mosquito larvicides*. Geneva, World Health Organization, 2005 (WHO/CDS/WHOPES/GCDPP/2005.13; available at http://whqlibdoc.who.int/hq/2005/WHO_CDS_WHOPES_GCDPP_2005.13.pdf; accessed 20 October 2006).

⁵ *Guidelines for testing mosquito adulticides for indoor residual spraying and treatment of mosquito nets*. Geneva, World Health Organization, 2006 (WHO/CDS/NTD/WHOPES/GCDPP/2006.3; available at http://whqlibdoc.who.int/hq/2006/WHO_CDS_NTD_WHOPES_GCDPP_2006.3_eng.pdf; accessed 20 October 2006).

⁶ *Draft guidelines on the management of public health pesticides. Report of the WHO Interregional Consultation, Chiang Mai, Thailand, 25–28 February*

guidelines were developed in order to assist Member States in the implementation of the International Code of Conduct on the Distribution and Use of Pesticides¹ and published as a draft to ensure broader review by national authorities before finalization. Since the previous GCDPP meeting, WHOPES, in collaboration with GMP, UNEP and FAO, has been promoting their implementation by Member States and has participated in various international and regional meetings for this purpose, namely:

- Joint UNEP/WHO subregional meeting on reduction, elimination and management of pesticides in the context of the Stockholm Convention, Bangkok, May 2004;
- FAO expert meeting on pesticide management, FAO/HQ, Rome, October 2004;
- FAO regional workshop for the implementation of the International Code of Conduct on the Distribution and Use of Pesticides, Damascus, December 2004;
- FAO regional meeting on International Code of Conduct on the Distribution and Use of Pesticides: implementation, monitoring and observance, Bangkok, June 2005;
- WHO/UNEP regional induction workshop on reporting and data requirements for countries that use or potentially will use DDT for disease vector control, Bangkok, November 2005;

2003. Geneva, World Health Organization, 2003 (WHO/CDS/WHOPES/2003.7; available at http://whqlibdoc.who.int/hq/2003/WHO_CDS_WHOPES_2003.7.pdf; accessed 20 October 2006).

¹ *International code of conduct on the distribution and use of pesticides (revised version)*; available at <http://www.fao.org/waicent/faoinfo/agricult/agp/agpp/pesticid/>; accessed 20 October 2006).

- Launch of the Chinese version of the Manual on Development and Use of FAO and WHO Specifications for Pesticides, ICAMA, Beijing, December 2005;
- First regional committee meeting of the WHO Eastern Mediterranean Region and Global Environmental Facility project on alternatives to DDT, Muscat, March 2006.

The response to the guidelines has been very positive, and it is now time to review and finalize them.

In collaboration with UNEP and FAO, WHOPEs has also published, in English and French, guidelines for situation analysis for public health pesticide management¹ to assist Member States in development of evidence-based and realistic national implementation plans for sound management of pesticides.

Furthermore, WHOPEs has been a strong advocate for judicious use of pesticides and pesticide management. Since the previous GCDPP meeting, it has organized two workshops for training of trainers on judicious use of insecticides, nominated by countries from the WHO African, Eastern Mediterranean, Western Pacific and South-East Asia regions, using the training document on the subject, now available in English² and French.¹The support and assistance of GCDPP

¹ *Guidelines on situation analysis for public health pesticide management*. Geneva, World Health Organization, 2005 (WHO/CDS/WHOPEs/GCDPP/2005.12; available at http://whqlibdoc.who.int/hq/2005/WHO_CDS_WHOPEs_GCDPP_2005.12.pdf; accessed 20 October 2006).

² *Decision-making for the judicious use of insecticides: facilitator's guide*. Geneva, World Health Organization, 2004 (WHO/CDS/WHOPEs/2004.9b; available at http://whqlibdoc.who.int/hq/2004/WHO_CDS_WHOPEs_2004.9b.pdf and *Decision-making for the judicious use of insecticides: participant's guide*. Geneva, World Health Organization, 2004 (WHO/CDS/WHOPEs/2004.9a; available at http://whqlibdoc.who.int/hq/2004/WHO_CDS_WHOPEs_2004.9a.pdf; accessed 20 October 2006).

members is sought to provide more training and capacity strengthening on this priority subject.

Quality control of pesticides constitutes an important element in management of pesticides. In collaboration with the Collaborative International Pesticide Analytical Council and FAO, WHOPES has published the guidelines for national laboratories on quality control of pesticides,² and is seeking financial resources to assist priority countries in capacity strengthening on such a priority area.

WHOPES has developed a resource tool on sound management of pesticides and diagnosis and treatment of pesticide poisoning in collaboration with GMP, PCS and UNEP in order to assist national authorities and other stakeholders in development of training materials for different target groups. Participants were invited to provide their comments and suggestions on how to improve the tool to better respond to the needs of Member States.

Pesticide management requires close monitoring of pesticide use. At global level, WHOPES has been closely monitoring such uses and has been publishing the analysis of the data that are collected in close collaboration with WHO regional offices. WHOPES is also keen to collaborate similarly with FAO to better understand pesticide use at the global level, especially where such practices may have direct influence on management of insecticide resistance in public health.

WHO has published the sixth edition of *Pesticides and their application for the control of vectors and pests of public health importance*.³ Professor C.F. Curtis of the London School of

¹ http://whqlibdoc.who.int/hq/2004/WHO_CDS_WHOPES_2004.9a_fre.pdf and http://whqlibdoc.who.int/hq/2004/WHO_CDS_WHOPES_2004.b_fre.pdf; accessed 20 October 2006.

² *Quality control of pesticide products: guidelines for national laboratories* (WHO/CDS/WHOPES/GCDPP/2005.15; available at http://whqlibdoc.who.int/hq/2005/WHO_CDS_WHOPES_GCDPP_2005.15.pdf; accessed 20 October 2006).

³ *Pesticides and their application for the control of vectors and pests of public health importance*. Geneva, World Health Organization, 2006

Hygiene and Tropical Medicine was acknowledged for drafting the revised document.

Any discussion on safe and effective use of pesticides is incomplete without due attention being given to issues related to application and equipment. The meeting was informed of the close collaboration between the International Pesticide Application Research Centre and industry in development of specification guidelines for major equipment for vector control. A consultation has been organized by WHOPES, to be held in WHO/HQ, on 27–29 September 2006, to review and finalize the guidelines.

Dr Zaim concluded his report by remarking that the strength of WHOPES is represented by the strength of its collaborating partners, many of whom were represented at the meeting and who were thanked for their continued support and interest in the work of WHO.

3 The International Code of Conduct on the Distribution and Use of Pesticides – A framework for management of pesticides and future challenges

Dr Gero Vaagt, FAO Senior Officer in the Plant Protection Service, reviewed the challenges related to management of pesticides in light of globalization and regionalization, increases in international regulations and consumer awareness.

Pesticides are one of the most important groups of chemicals, although their worldwide trade amounts to approximately 3% only of the overall trade of chemicals. According to the Organisation for Economic Co-operation and Development, global trade in chemicals amounted to around US\$ 1 500 billion in 1998. Their relevance has to be seen in the light of their input into agricultural production and their use for public health and

(WHO/CDS/NTD/WHOPES/GCDPP/2006.1; available at http://whqlibdoc.who.int/hq/2006/WHO_CDS_NTD_WHOPES_GCDPP_2006.1_eng.pdf; accessed 20 October 2006).

other purposes. Public awareness and a general sensitivity related to the use and presence of pesticides have to be considered as they are emitted intentionally into the environment, generally to control plant and animal pests or diseases, weeds, or vectors of human and animal diseases.

The total sale of pesticides amounted to around US\$ 48 billion in 2005, of which 15 billion was spent on non-crop uses (including public health) purposes. Multinational research and development companies account for about 80–85% of the world market; generic pesticide companies cover the remaining 15–20%. In this context, it is very important to note the recent growth of generic products. In Europe today, more than 70% of pesticides sold are generic; by 2011, it is expected that 96% of all pesticides sold in Europe will be of a generic nature.

The management of pesticides today is guided and regulated nationally as well as internationally. Nearly all countries possess pesticide legislation. However, there are many challenges in order to appropriately address, manage and control pesticides, in particular for developing countries. International agreements and conventions, such as the Sanitary and Phytosanitary Agreement of the World Trade Organization, the Rotterdam Convention and the Stockholm Convention, are imposing further demands and challenges to authorities responsible for pesticide management at the national level. Coordination and collaboration among the three important sectors (agriculture, environment and health) have become increasingly important at the national and international levels.

The International code of conduct on the distribution and use of pesticides (the Code of Conduct) is the worldwide guidance document on pesticide management for all public and private entities. It serves as an exemplary document for management of chemicals as it has been adopted by governments, pesticide industry associations and nongovernmental organizations. Reference to the Code of Conduct is made by other United Nations organizations, the food industry, financial institutions and others. It also strengthens adherence to relevant conventions and international standards. The Code of Conduct

focuses on risk reduction, and protection of human and environmental health, hence supporting sustainable development.

3.1 Discussion

The participants recognized that the Code of Conduct intends to provide the framework for the management of all pesticides (agriculture and public health). However, it has to be further strengthened as it relates to the specific requirements for the management of public health pesticides.

The regulation of public health pesticides and pest control operators is especially weak in many countries and requires careful consideration. The need for close collaboration of health, agriculture and environment sectors for successful implementation and observance of the Code of Conduct was reiterated. The meeting recommended that the Code of Conduct should be brought to the attention of the World Health Assembly for its support and collaboration with Member States. Further advocacy within the health sector should also be planned and carried out.

CropLife International has adherence to the Code of Conduct as a condition of membership, and several associations of generic manufacturers also adhere to it or are in the process of doing so.

The participants also recognized that judicious use of pesticides and an integrated approach to pest and vector management are the key strategies promoted by the Code of Conduct. Prevention and management of insecticide resistance are also one of the provisions of the Code of Conduct. Effective management of insecticide resistance in major vectors and pests of public health importance requires close collaboration of health and agriculture sectors. The need for capacity strengthening and closer collaboration of existing regional networks for monitoring and management of insecticide resistance in disease vectors was also stressed.

The meeting agreed that the increasing use of pesticides highlights the important and leading role that ministries of health should play in assessment of the safety of pesticides. This issue, as well as the urgent need for management of public health pesticides, requires capacity strengthening for sound management of pesticides, through strengthened legislative frameworks, and provision of human and financial resources for improved and effective enforcement.

Many developing countries lack resources, especially in the health sector, for quality control of pesticides. The meeting stressed the need for capacity strengthening in such an important area of pesticide management, and noted the importance of close collaboration between health and agriculture sectors to ensure optimized use of limited resources.

4 International initiatives on chemicals, and opportunities for creating synergies and coherence among sectors concerned with the sound management of pesticides

Dr Agneta Sundén-Byléhn, Senior Scientific Affairs Officer, UNEP Chemicals, presented a review of international initiatives on chemicals and the opportunities for creating synergies among different sectors concerned with the management of pesticides.

A number of multilateral environmental agreements related to chemicals have been concluded under the auspices of UNEP during the past two decades, including the Basel Convention on transboundary movements of hazardous waste, the Montreal Protocol regarding ozone depleting substances, the Rotterdam Convention concerning international trade of banned and severely restricted chemicals, and the Stockholm Convention on persistent organic pollutants. Most recently, the Strategic Approach to International Chemicals Management (SAICM) was adopted through a high-level agreement and subsequently endorsed by the UNEP Governing Council at its special session held in February 2006. UNEP works closely with other intergovernmental organizations on a number of technical

issues related to these multilateral environmental agreements, and in particular with regard to the Stockholm Convention.

Starting with a list of 12 chemicals, the Stockholm Convention, which entered into force in May 2004, aims to protect human health and the environment from persistent organic pollutants (POPs). These are chemicals that stay in the environment for years, bio-accumulate in body tissues and bio-magnify through the food chain, causing global pollution through long-range environmental transport. Short- and long-term exposures to POPs have been associated with a range of adverse effects on human health and the environment, including endocrine disruption and reproductive impairment, developmental effects, increased risk for cancer and depressed immune systems.

The objective of the Stockholm Convention is to reduce and where possible eliminate releases of POPs. Major issues encountered by countries in relation to POP pesticides include the use of POPs against termites and in particular the use of DDT in malaria control. Time-limited exemptions may therefore be requested by Parties for termiticide use of chlordane, heptachlor and mirex. DDT can be used by Parties for disease vector control in accordance with WHO recommendations and guidelines. However, the Conference of Parties will regularly (at least every three years) evaluate, in consultation with WHO, the continued need for DDT for disease vector control.

UNEP has worked closely with WHO since the beginning of the treaty negotiations on issues related to DDT, including development of guidance materials on alternative approaches to DDT, regional demonstration projects for reducing reliance on DDT, and questionnaires for Party reporting on the use and management of DDT as well as alternative insecticides. Most recently, a joint WHO/UNEP resource tool was developed on the “sound management of pesticides and diagnosis and treatment of pesticide poisoning”. The tool is to be used for developing training materials for various stakeholder groups involved with the sound management of pesticides (both POPs and others) in public health and other sectors.

The collaboration with FAO has so far mainly concerned issues related to POP termiticides. An international (global) termite expert group was established in 2000 that, inter alia, has developed guidance materials on alternatives to POP termiticides. Stakeholders are also here confronted with issues concerning sound management of both POPs and alternative insecticides.

SAICM aims to assist countries in achieving the 2020 goal of the Johannesburg Plan of Implementation to use and produce chemicals in ways that lead to the minimization of significant adverse effects on human health and the environment and to address the increasing gap in capacities of countries to manage chemical risks, in particular in relation to the development process. SAICM, which builds upon previous international initiatives on chemical safety and promotes multi- and cross-sectoral approaches, was agreed to through a high-level declaration (the Dubai declaration) adopting an overarching policy strategy and recommending the use of a global plan of action. The overarching policy strategy identifies objectives for different programme areas, while the plan of action identifies particular activities needed to achieve these and other commitments together with main players from the public and private sectors.

Both the Stockholm Convention and in particular SAICM demonstrate the need for coherent and cross-sectoral approaches towards the sound management of chemicals – at national as well as international level. The UNEP Governing Council has requested UNEP, as a matter of priority, to support developing countries and countries with economies in transition in implementing SAICM, taking into account the Bali Strategic Plan¹ for Technology Support and Capacity Building. UNEP's

¹ The Bali Strategic Plan, developed in response to the UNEP Governing Council Decision SS.VII/1 (2002) concerning the strengthening of international environmental governance, is intended as an intergovernmentally agreed approach to strengthen technology support and capacity-building in developing countries and countries with economies in transition, by reinforcing the role of UNEP for this purpose, building on areas where it has demonstrated comparative advantage and expertise.

approach for implementing this request includes the creation of partnerships and, with regard to the sound management of pesticides, seeks to create further synergies and collaborative efforts with other organizations by building on the existing cooperation with WHO and FAO.

4.1 Discussion

Much of the discussions focused on the recent WHO press release on DDT.¹ Dr Pierre Guillet, GMP Acting Coordinator, Vector Control and Prevention, informed the meeting of GMP's primary objective to scale up the use of three effective malaria interventions, namely artemisinin-based combination therapies for case management, long-lasting insecticidal nets (LLINs) and indoor residual spraying (IRS) for vector control. LLINs and IRS are core interventions that will be supplemented where and when appropriate by secondary interventions such as larviciding and environmental management within the context of integrated vector management (IVM).

In high-transmission areas, neither IRS nor LLINs alone will be enough –both have to be used and optimally combined. Once coverage is achieved and transmission under control, the respective role of ITNs and IRS will be optimized in the context of IVM, based on the assessment of the local situation. IRS will be deployed in a range of epidemiological settings, including high-transmission areas, using WHO-recommended insecticides, including DDT where appropriate. DDT will be used in the context of the Stockholm Convention until a viable alternative is available.

The GMP approach calls for several important conditions: (i) situational analysis at the country level; (ii) availability of decision-making processes for programme managers; (iii) availability of vector control services with adequate human and logistic resources; (iv) monitoring and evaluation tools, and

¹ *WHO gives indoor use of DDT a clean bill of health for controlling malaria.* WHO press release, 15 September 2006 (available at <http://www.who.int/mediacentre/news/releases/2006/pr50/en/index.html>; accessed 20 October 2006).

capacity building; (v) adoption and enforcement of good pesticide management practices for effective and safe use within the context of IVM; (vi) improved formulations of existing insecticides and application technologies; and (vii) selection of new insecticide alternatives to DDT and pyrethroids.

Dr Guillet reiterated the need for strengthened and more proactive collaboration among stakeholders and allocation of significant resources to effectively strengthen capacity in the areas of medical entomology, vector control and pesticide management, especially in Africa.

The meeting noted the inadequate capacity in many malaria-endemic countries, especially in Africa, for proper pesticide management, and effective monitoring and evaluation of pesticide applications. There is a pressing need to ensure that minimum capacity is available in the aid-receiving countries for sound insecticide management; where the use of DDT is indicated, the health and environmental impact of any such use should be strictly monitored. The meeting also highlighted the importance of inclusion of such capacity building in projects supported by aid agencies, and requested WHO to address this issue with United Nations specialized agencies, funds and programmes, other intergovernmental organizations and donor agencies.

5 Country perspectives on management of public health pesticides

Brazil

Dr Ima Aparecida Braga, Brazilian Ministry of Health, informed the meeting of public health pesticide management in her country.

In 2005, Brazil registered 603 072 cases of malaria (incidence of 255/100 000), 248 189 cases of dengue (incidence of 134 75/100 000), 3469 cases of visceral leishmaniasis (incidence of 1.88/100 000) and 89 606 cases of schistosomiasis. Transmission of Chagas disease has been interrupted throughout most of Brazil. To combat this, Brazil

spends an average of US\$ 6 million each year on the purchase of insecticides.

Pesticide registration and use are regulated by the ministries of health, agriculture and the environment. Within the health ministry, the National Agency for Sanitary Surveillance (Agencia Nacional de Vigilância Sanitária – ANVISA) is responsible for pesticide registration and use and monitors for residues in food.

Vector control programmes have been decentralized in Brazil since 1999. There are three levels of government in the Brazilian health system (Sistema Unico de Saúde), with specific responsibilities at each level. The National Secretariat of Health Surveillance (Secretaria de Vigilância em Saúde – SVS) is responsible for the evaluation, recommendation, procurement, quality control and distribution of pesticides used in public health. The application of pesticides is the responsibility of health personnel from municipalities and states, and SVS supervises this application. Pesticides are purchased through and with the assistance of the Pan American Health Organization (PAHO) using the 40th Term of Cooperation (signed in December 2004). The SVS responsibilities are defined by the government decree Portaria 1.172, of June 2004.

All pesticides and formulations used in public health in Brazil by the Ministry of Health are registered, certified and regulated by ANVISA and have WHO specifications which are used for the quality control evaluation prior to use. The purchase of insecticides through PAHO ensures adherence to WHOPES guidelines for the purchase of public health pesticides regarding selection, tendering, labelling, packaging and quality control recommendations.

Pesticides and formulations are selected after laboratory and field evaluations conducted by the SVS and selected universities.

All pesticides are received in the SVS central warehouse in Rio de Janeiro, where they are held until the result of quality control and their compliance with WHO specifications is available. The

pesticides are distributed to state health authorities who store and distribute them to the municipalities. The guidelines on storehouses, storage and distribution of insecticides are regulated by SVS (Projetos de Unidades de armazenagem, distribuição e processamento de praguicidas – Diretrizes, 2003). The SVS has published in 2000 guidelines for the standards and use of personal protection equipment for vector control personnel (Manual de procedimentos de segurança em controle de vetores). This and other publications on the control of vector-borne diseases are freely available on the SVS web site.

The national stock of pesticides available for vector-borne disease control is controlled by a computerized information system (SIES) operated at the federal, state and municipal levels in order to assure that adequate stockpiles of insecticides are available for routine control programmes and in emergencies. Expiration dates are monitored to ensure that products are used prior to expiration. All organochlorine and expired insecticides are incinerated.

The SVS conducts training courses for all technical personnel who will be using or handling insecticides in the vector control programmes, and guidelines have been developed and published on the Internet (Manual de Controle de Vetores – Procedimentos de Segurança, 2001). A certification programme for pesticide applicators and supervisors is being planned in collaboration with PAHO. Personnel at the intermediate levels are trained by the state health secretariat and municipalities. The states and municipalities have the responsibility for monitoring personnel for pesticide exposure.

Monitoring for insecticide resistance of *Aedes aegypti* has been conducted since 1999 by the Ministry of Health through a national programme for monitoring insecticide resistance and a network of collaborating laboratories. Other vector control programmes are in the process of developing a resistance monitoring programme.

Decentralization has increased the number of municipalities with vector control programmes. One challenge Brazil faces with regards to pesticide management is the need to increase the number of qualified personnel to support, assist and supervise activities at the state and municipal levels. A national plan to train vector control personnel is being developed. New guidelines for vector control, resistance monitoring and management of pesticides are being prepared or revised.

Indonesia

Dr Ferdinand Laihad, Indonesian Ministry of Health, provided an overview of public health management in his country.

The use of pesticides is an important component in the integrated approach to control vectors and pests of public health importance. Vector-borne diseases continue to be a major public health problem in Indonesia. Approximately 107 million people (49%) are living in malaria-endemic areas, with 2 million clinical cases reported annually; epidemics are common. About 180 million people (80%) are at risk of dengue/dengue haemorrhagic fever, mainly in the city, and 150 million people are at risk of lymphatic filariasis. Japanese encephalitis is endemic in some provinces.

Malaria control programmes currently mainly use IRS and ITNs for controlling malaria. The response to epidemics of dengue/dengue haemorrhagic fever depends largely upon space spraying, while source reduction and larviciding (using temephos) are the methods of choice during inter-epidemic periods. Vector control measures against Japanese encephalitis rely mainly on case management. Control of lymphatic filariasis depends mostly on mass treatment. The major vector for *Wuchereria bancrofti* is *Culex quinquefasciatus*. However, anopheline species are main vectors of *Brugia malayi* and *Brugia timori*. Vector control for lymphatic filariasis through the application of larvicides and environmental management has been practised. Also integrated vector control for filariasis and malaria will be introduced in some areas.

To date, malaria control has used wettable powder formulations for IRS. The insecticides used are carbamates (bendiocarb) for eastern Indonesia and pyrethroids (lambda-cyhalothrine, alpha-cypermethrin, bifenthrin and etofenprox) for the other areas of Indonesia. Pyriproxyfen has been used for mosquito larviciding and deltamethrin and permethrin in making LNs, Permanet[®] and Olyset[®], respectively. Deltamethrin tablets and permethrin EC used for re-treatment net were feasible.

For dengue control, malathion for space spraying and temephos for larviciding are used. Malathion, used mainly in Jawa Bali and pyrethroid (cypermethrin), used in outer Java-Bali, will be rotated every three years to prevent vector resistance.

The legal instruments for public health pesticide management are Minister of Health decree number 1350/Menkes/SK/XII/2001: "Management of Public Health Pesticides" consists of public health pesticide classification, safety, production, storage and transport, distribution, waste management, licensing, control of labelling, control of professional pest control operator and the Minister of Agriculture decree number 434.1/Kpts/TP.270/7/2001 – "Condition and procedure for pesticide registration" consists of pesticide registration, importation, formulation and repackaging.

The Pesticide Commission is available under the Minister of Agriculture. Monitoring the efficacy of vectors to insecticides is mainly done by the entomology division in the Ministry of Health. Public health pesticide testing for procurement is done by the National Institute for Health Research and Development, the Bogor Institute for Agriculture, the university or the entomology division in the Ministry of Health. Testing of pesticides for active ingredients is done by Sucofindo. Registration of public health pesticides should have a WHOPES recommendation.

Pest control operations are carried out mainly by trained district personnel at community level or by NGOs. Waste disposal and storage are treated according to the guidelines produced at national level. Indonesia has an organization for household

pesticide (“MP2RT”) and a pest control association (“IPPAMI”). In the field of agriculture, there is CropLife, the association of multinational pesticide companies, and a national pesticide industry association (“HMPN”).

Dr Laihad identified the following challenges for public health pesticide management in Indonesia: (i) impact of decentralization on procurement of insecticides; (ii) increased use of pesticides in agriculture that will induce resistance in vectors and pests of public health importance; (iii) inadequate monitoring of insecticide resistance in vectors; (iv) insufficient rules and regulations. The following actions were proposed: (i) establish public health pesticide networking; (ii) standardize public health pesticide monitoring; (iii) training on management of public health pesticides; (iv) further strengthen legal instruments for public health pesticide management.

Philippines

Dr Candida B. Adalla, Dean of the College of Agriculture, University of the Philippines Los Baños, Laguna, briefed the meeting on vector control and management of public health pesticides in her country.

Agriculture and public health are actually already interlinked by pesticides. There is parallelism in the evolution of vector control strategies in the public health and agriculture sectors, from indigenous methods (sanitation and vector/pest habitat modification) to the more sophisticated and capital-intensive pesticide-based pest/vector management strategies.

Concerns towards the massive use of pesticides in both agriculture and public health arose as an offshoot of the observed tolerance of *Anopheles flavirostris* (malaria vector) to alphacypermethrin and deltamethrin insecticides in Isabela and Agusan del Sur. This observation was made even more significant by the reality that the current vector management strategy of the Department of Health (DOH) depends largely on the use of synthetic pyrethroid insecticides, particularly alphacypermethrin and deltamethrin.

Dr Adalla summarized the current vector control strategy of the DOH and presented preliminary data on the nationwide susceptibility monitoring efforts of the agency in aid of developing sustained control and effective management of vectors of malaria and dengue. It will also attempt to look into the agriculture and public health continuum, specifically the aspect of insecticide use, in the hope of developing harmonized and complementary policy guidelines on pesticide use and pest/vector management strategies. A judicious use of these chemicals will also address the need for proper labelling and usage at the household and farm levels.

Sri Lanka

Mr Gamini Manuweera, Office of the Sri Lankan Registrar of Pesticides, provided a brief review of public health pesticide management in his country.

The Control of Pesticides Act No. 33 of 1980 is the main framework of legal instrument that provides required provisions for the management of public health pesticides including all other types of pesticides in the country. The Act regulates import, formulation, re-packing, labelling, storage, transport, sale, and use of pesticides.

The Registrar of Pesticides (ROP) is the licensing authority. The Technical Advisory Committee established under the above Act advises the ROP on all related activities pertaining to efficient management of pesticides in the country, while formulating necessary policy guidelines. The office of the ROP is functioning under the Department of Agriculture of the Ministry of Agriculture. The advisory committee comprises heads of all national authorities of major disciplines related to pesticides, such as health, environment, occupational safety, etc.

Chemical and physical properties, toxicology, environmental fate and bio-efficacy are evaluated for registration. Duration of registering a product varies depending on the type of registration, product, its intended uses, associated adverse effects, availability of alternatives, etc. A molecule not registered previously in the country usually takes about three

years. It is a prerequisite that local bio-efficacy trials are conducted by research institutes or other relevant agencies mandated for the subject and that necessary recommendations are made. Products meant for public health vector control purposes are given priority in registration evaluation. Malaria, dengue, filariasis and Japanese encephalitis are the major vector-borne diseases in the country. There are two separate agencies under the Ministry of Health, for the management of malaria and filariasis, which make necessary recommendations for registration.

The Anti Malaria Campaign (AMC), which is responsible for malaria control, acts as the national body that plans, implements, monitors and evaluates the management activities related to malaria control. Policy formulation, procurement and distribution of vector control pesticides and monitoring of the trends, at national level, of the disease are carried out by the AMC. Regional/district level planning is carried out by medical officers. The activities are implemented through regional officers who are largely medical officers, except for a few scientific officers working in the AMC. The majority of officers concerned have bachelor's degrees in medicine/surgery or, in the case of scientific officers, bachelor's degrees in science, with specialized training in vector control. At divisional level, a medical officer of health is responsible for implementation and monitoring of the programme.

The standard practice adopted in regulation of pesticides under the Control of Pesticides Act on quality assurance of pesticides products is also applicable to public health pesticides. However, evaluation of pesticides originating from different sources is a challenge due to variations in impurity profile and formulants. Specially, assessment of the presence of impurities, toxicological significance of varying levels of impurities present, differences in the impurity profile, verification of reliability and accuracy of toxicological reports can often be a difficult task. Improvements in acceptable standards and accreditation status of testing laboratories could be useful to overcome the situation to a certain extent. Reliability of the source itself and assessment of manufacturing standards for the maintenance of

product quality between different batches are some of the other issues in effective management of pesticides.

In the case of malaria vector control, AMC centrally procures all products through the Tender Division of the Ministry of Healthcare by open tenders. All purchases of selected products should conform to WHO specifications. Pre-shipment quality control is ensured through the selection of independent analytical laboratories conforming to ISO or similar standards in the country of origin to carry out sampling and analysis of the consignment before shipment, for conformity to WHO specifications. Post-shipment analysis is carried out after the consignment of goods arrives at the port in Sri Lanka.

Decisions on use and procurement of malaria vector control products are based on reports obtained from districts regarding disease transmission status, susceptibility status of vectors and weather forecasts, which may be conducive to disease transmission. One of the limitations in purchases is the longer time period necessary to go through the procedures for finalizing purchases and the physical receipt of the products in the country, which could take between 9–12 months.

The AMC, which is the main purchaser of insecticides in the Ministry of Healthcare, has its own pesticide storage facilities strategically located in the regions. Storage capacity is adequate for the AMC's annual requirements and storage conditions are satisfactory.

All new stocks are recorded both at the directorate and at the stores complex, and issues are made only on written instructions from the directorate. Stock books are maintained and physical stock-taking is carried out at least every two months by directorate staff. Stocks issued to the provinces are monitored through the monitoring of insecticide usage in the districts, carried out monthly. Purchases of insecticides are planned according to consumption patterns and new stocks are purchased only when previous stocks are finishing.

Improper planning in ordering pesticides for vector-borne disease control contributes to the stockpile of obsolete pesticides. There are no pesticide disposal facilities available in the island, and hence proper and safe disposal of them locally is not possible.

In conclusion, Mr Manuweera noted that illegal use of public health pesticides in agriculture is a major field problem that could lead to possible vector resistance.

United Republic of Tanzania

Mr Jonathan Akhabuhaya, Chief Research Scientist of the Tropical Pesticide Research Institute, Arusha, United Republic of Tanzania, briefed the meeting on public health pesticide management practices in his country.

He informed the meeting of the registration process as well as the number of pesticide products registered in the country (430), 18% of which are for use in public health; and of relevant acts and legislation for registration and control of pesticides. There is inadequate capacity for pesticide management at all levels, particularly the enforcement of regulations for sale, pesticide formulators, quality control of pesticides and waste management.

Furthermore, there is a lack of national guidelines for storage and transportation of pesticides, and inadequate capacity for proper management of pesticide stocks. Mr Akhabuhaya shared with the participants different pictures from pesticide production sites in the country and his concern over occupational exposure of workers.

Thailand

Mr Somchai Preechathaveekid of the Bureau of Cosmetic and Hazardous Substance Control, Food and Drug Administration, Thailand, briefed the meeting on public health pesticide management practices in his country.

There are two major governmental agencies responsible for public health pesticide management in Thailand: the Food and

Drug Administration and the Department of Disease Control. The Food and Drug Administration plays an important role in chemical safety and regulatory control of public health and household pesticides. In the area of public health pesticide use, it regulates the production, import, export, having possession, disposal and use of public health and household pesticides. On the other hand, the Department of Disease Control is the policy-making body for the control programmes for vector-borne diseases.

The Food and Drug Administration and the Department of Disease Control function in collaboration to control and supervise use of public health pesticides. Representatives from both agencies are present in the national committee to develop a national master plan for chemical management and in the standing committees established by legislation to regulate the use of public health and household pesticides. The standing committees relating to public health pesticide regulations include sub-committees on standards and registration of hazardous substances for public health and household use and on standards of commercial pest control services. The other agencies and stakeholders involved in public health pesticide management include the Department of Health, Department of Medical Sciences, Department of Medical Services, Department of Forestry, Federation of Thai Industry, Thailand Pest Management Association and experts in related areas.

There are several legal instruments established to control the use of public health pesticides and reduce their risks to human health and the environment. Among these laws and regulations, the Hazardous Substance Act B.E. 2535 (1992) is the major act for managing chemicals, including public health pesticides. The Hazardous Substance Act confers relevant authority on seven governmental agencies for executing the act; each in the area relating to its authority, including agriculture, industry, public health and household use. Under this act, the Food and Drug Administration is authorized to regulate use of pesticides in the field of public health, including vector control pesticides, household insecticides and professional pest management pesticides.

Registration of public health pesticides and agricultural pesticides are carried out by different authorities. All pesticides used in the public health programme are subject to registration at the Food and Drug Administration, while those used in agriculture are registered at the Department of Agriculture.

In the registration process, intrinsic properties of pesticides on health and environments, physico-chemical properties of formulated products, data on product efficacy, manufacturing process, packaging, storage and handling, and disposal management are reviewed and assessed by the authority and the experts in related areas. This mandatory process is to assure safety for use and efficacy of the products. The process is approved by the subcommittees on standards and registration of hazardous substances for public health and household use.

Any activities relating to registered pesticides must be notified to the authority. These activities include production, import, export and having possession of pesticides. These pesticides are listed in the act. Licenses are issued after the product has been approved for registration. In spite of these restrictions, public health pesticides intended for use by the governmental agencies and certain international organizations are exempt from the notification, permission and registration processes. This exemption is to facilitate delivery of essential pesticide products to national, regional, and local public health and vector control agencies, especially in the urgent cases.

It is noted that the Hazardous Substance Act is being revised. Some changes may affect the regulations of pesticides in public health use. These include expiration of registration certificate. A registration certificate valid for five years or less will be granted instead of lifelong validity.

The quality, efficacy and safety of pesticide products are continuously monitored as part of the post-registration activities. Not only licensed sites but also unlicensed sites and distribution premises are inspected on a regular basis, without notice. Post-marketing control activities also include the programmes on

monitoring consumer complaints, control of pesticide advertisements and toxicity surveillance of pesticide products. Evaluation results of these activities are taken into account to determine the rules and regulations for controlling suspected products.

The important vector-borne diseases in Thailand that are major causes of morbidity and mortality are dengue and malaria. In 2005, reported cases of dengue fever and dengue hemorrhagic fever in Thailand accounted for 22.5% of the total reported cases in South-east Asia.¹ This resulted in the increasing use of pesticides by individuals and communities for personal protection and vector control. Deltamethrin is the first-line pesticide for controlling malaria, specifically in the high-risk areas, while both temephos and deltamethrin are primarily used for dengue control. In accordance with the Stockholm Convention, the use of DDT for malarial control was finally ended in 2002.

The Department of Disease Control develops the national policy and provides technical support to vector-borne disease control programmes. It serves as the responsible authority in promoting and coordinating the safe handling and use, efficacy, cost-effective application of pesticide products for public health use. Such recommendations take into consideration the local resources and requirements as well as WHO recommendations on use of public health pesticides.

As health systems in Thailand are moving towards decentralization, activities in regard to vector-borne disease control, such as pesticide procurement and application, are being transferred to and will finally be carried out at regional or local levels. The transfer is expected to be complete in 2015. Concerning the shortcomings of decentralized health systems, guidelines and procedures for the major aspects of such

¹ *Situation of dengue/dengue haemorrhagic fever in the South-East Asia Region*. New Delhi, WHO Regional Office for South-East Asia; last update 27 April 2006 [cited 2 September 2006]. Available from http://w3.whosea.org/en/Section10/Section332_1098.htm

activities are being developed in order to help the local public health and vector control agencies to achieve effective management.

The challenges of public health pesticide management in Thailand are associated with the management not only at the pre-registration steps but also the post-registration steps, especially the monitoring of use and quality control of pesticides. Thailand is in the process of improving its national policy, regulations and national guidelines for public health pesticide use. Intra- and intersectoral collaborations as well as assistance from international organizations are necessary for improvement in regulation and management of pesticide use.

5.1 Discussion

Much of the discussion following the country presentations focused on capacity strengthening for public health pesticide management.

The meeting recognized the inadequacy of regulatory frameworks in many developing countries for sound management of public health pesticides and the general lack of human and financial resources to regulate availability, sale and use of pesticides and the acute shortage of resources to enforce regulations. It also recognized the general lack of regulations and guidelines on proper storage, handling, rational use and disposal of waste pesticides and empty containers. There are challenges associated with management of public health pesticides under decentralized services. There is a general lack of guidelines and preventive measures to avoid stocks of obsolete pesticides.

Insufficient priority is given to quality control of pesticide application equipment and there is acute shortage of national and/or regional centres for quality control of application equipment.

In many developing countries, there are inadequate resources for better selection and targeting of insecticides, high rates of

substandard pesticide products on the market and insufficient quality control. WHO was requested to address these priority issues.

The important role of different academic institutions and associations represented in GCDPP was recognized, e.g. the American Mosquito Control Association, Center for Medical, Agricultural and Veterinary Entomology of the United States Department of Agriculture, the International Centre of Insect Physiology and Ecology in Kenya, for assisting WHOPES in development of guidelines, tools (including training materials) for sound management of pesticides and in promoting safe, effective and judicious use of these chemicals.

The meeting reiterated, once again, the need for close collaboration of the health and agriculture sectors for effective management of pesticides. The need for such collaboration was especially noted as it relates to insecticide resistance prevention and management as well as integrated pest and vector management.

Capacity building goes far beyond training and that the proper structure and framework for the vector control functions has to be recognized, established and supported at different levels. In addition, training activities should be tailored to the specific needs of the control programmes and ensure proper structure, career opportunities and funding for effective work of the trainees.

In many countries, the taxes and tariffs levied on public health pesticides and those used in agriculture are different. This practice may promote the unauthorized use of one in the other sector.

6 Stewardship and public health pesticides – Priority actions to support Member States on sound management of public health pesticides

Dr Richard Brown, CropLife International Stewardship and Sustainability Committee, Brussels, addressed the meeting on stewardship and public health pesticides.

Product stewardship has been variously defined, but the most relevant and useful definition to their industry is that given in the Code of Conduct. This is, “the responsible and ethical management of a pesticidal product from its discovery through to its ultimate use and beyond”. Looking more deeply into this, the key words are “responsible” and “ethical”. Responsible means “answerable or accountable for something within one’s power, control or management”. In many instances, pesticide companies are held accountable by statutory bodies; but in the developing world, enforcement of local or international laws is sometimes incomplete.

Within CropLife, the view is taken that, as a minimum, they comply with all relevant regulations, regardless of enforcement and that, where appropriate, they will go beyond these to ensure that the company is behaving ethically. The issue is then to determine what is “ethical”. Philosophers and ethicists have had to deal with a subtle but fundamental duality in the meaning of “ethical” that dates back to the word’s Greek definition. It can mean either “to be in accordance with absolute standards within society” or “to be in accordance with norms of behaviour within society or a group”. Though subtly different, the outcomes of these two definitions can be substantially different. In order for there to be one standard, a condition of membership of CropLife is to sign up to adhere to the Code of Conduct, and this is the cornerstone of their stewardship approach.

CropLife International converted the Code of Conduct stewardship requirements into practice by addressing them under seven different areas: research, manufacturing, storage, transport and distribution, integrated pest/vector management,

safe use initiative, container management and disposal of obsolete stocks. In 2005, stakeholders from all aspects of the industry such as national government, NGOs, academia, farmers and international bodies, were invited to discuss and agree targets and key performance indicators for CropLife International companies. Based on this analysis, some of the key issues were presented along with critical issues for public health pesticides.

This analysis concluded that ultimately, the resolutions to all the critical issues involve three key activities. These are: (i) stakeholder engagement with representatives of all concerned parties; (ii) building regulatory and enforcement capabilities; and (iii) public–private partnerships.

Dr Brown concluded by emphasizing the need for understanding, recognition of the value that each party brings to the table and ownership of a common agenda.

6.1 Discussion

The meeting recognized the limited capacity for sound management of public health pesticides in the majority of developing countries and the urgent need for strengthening the regulatory frameworks for registration and control of pesticides; as well as strengthening the post-registration monitoring, evaluation and control of pesticides, based on a critical situation analysis and needs assessment.

It reiterated the urgent need for development of alternative insecticide products, notably mosquito adulticides for malaria and dengue vector control. Capacity strengthening for insecticide resistance monitoring and management was also recognized as a priority activity.

The need for optimized and harmonized registration systems was strongly emphasized. The need for training and certification of managers of vector control and pesticide applicators, as well as the establishment/strengthening of the central vector control

team/unit to oversee and guide the vector control activities at lower levels of health system, were also recognized.

There is an important need to develop guidelines to assist Member States in efficacy and risk assessment of public health pesticides, as well as in safe handling, storage, transportation and disposal of waste and containers.

Industry has a crucial role and responsibility in the management of pesticides. However, there is no common platform and association for the public health pesticide industry. The representative from CropLife was asked to address this priority issue.

The meeting also recognized the importance of manufacturers' after-sale stewardship activities and recommended the inclusion of such requirements in tenders for purchase of public health pesticides and a requirement for registration of pesticides by national authorities.

The meeting also reiterated the use of quality and well-maintained pesticide application equipment for vector control, to ensure their safe and effective application. The meeting, however, raised great concern over the general lack of capacity for quality control of pesticide application equipment.

7 Status report on current initiatives in developing alternative insecticides for public health use

Bill & Melinda Gates Foundation

Dr Kate Aultman, Senior Program Officer, Infectious Diseases, Bill & Melinda Gates Foundation, provided a brief overview of the foundation's strategies and priorities as they relate to vector control.

The core values of the foundation are: (i) "from those to whom much has been given, much is expected"; and (ii) "all lives - no matter where they are being led – have equal value".

The foundation's three main subdivisions of work are currently (i) global development – seeking solutions to poverty and hunger and including issues related to water, agriculture, microfinance and libraries; (ii) global health – encouraging the development of lifesaving medical advances and to help to ensure they reach the people who are disproportionately affected, ensuring equitable access to opportunities for America's most vulnerable people.

Dr Aultman informed the meeting of the following major strategies and activities relating to vector control and provided a brief summary of initiatives under each: (i) new tools for vector control, including the Global Malaria Project (2002), Grand Challenges in Global Health (2005), Innovative Vector Control Consortium (2005); (ii) easier deployment of new tools, including proposed activities with WHOPES on facilitation of regulatory processes and capacity strengthening on sound management of public health pesticides, involving end users in product design from the outset and in late stage product development; (iii) better access to tools in development, including working with industry to facilitate access; (iv) better access to existing tools, including issues and activities relating to manufacturing capacity, quality control, distribution and transport, counterfeits and generics; (v) better application of vector control for disease control, through demonstration projects, modelling, improvement monitoring and evaluation, strengthening regulatory framework in collaboration with WHOPES, and prevention and management of insecticide resistance; and (vi) better stewardship of vector control tools and the environment, through improved capacity for judicious use of insecticides and better targeting of pesticide applications as well as ecological/environmental health approaches.

Innovative Vector Control Consortium

The Innovative Vector Control Consortium (IVCC), established in 2005 and funded by the Bill & Melinda Gates Foundation, is a public–private partnership led by the Liverpool School of Tropical Medicine and includes Colorado State University, University of California, London School of Hygiene and Tropical Medicine and South African Medical Research Council, to

improve the tools and technologies available for vector control. Although the priority will be given to malaria and dengue vector control, the tools developed under this project are intended to be used for all indoor transmitted vector-borne diseases.

The IVCC has two main complementary objectives: (i) to produce improved insecticides and formulations; and (ii) to provide improved tools for a decision support system to be used at the community level for malaria and dengue prevention and control.

It is advised by two external scientific advisory committees that evaluate all potential projects against four major indicators: (i) products that will fit into current control activities; (ii) acceptability by disease endemic countries; (iii) existence of a credible regulatory pathway for the product; and (iv) whether the product can be sensibly produced that facilitates global access to the technology. A portfolio approach to produce a vibrant pipeline of potential products will be used to rectify the market failure to produce new products.

United States Armed Forces Pest Management Board

Dr Stanton E. Cope of the United States Armed Forces Pest Management Board briefed the meeting on the development by the Board of new and improved materials and methods for vector control and personal protection.

The Board is pursuing an initiative to discover, develop and validate novel pesticide applications against medically important arthropods, with emphasis on reducing vector-borne disease risks for deployed military personnel. This research programme, entitled Deployed War-Fighter Protection (DWFP), began in 2004 with a recurrent annual budget of US\$ 5 million awarded through two funding channels: competitive grants for original research and development proposals and with the USDA/ARS.

During the first three cycles of DWFP competitive awards, a total of 21 grants have been implemented (PIs from academia 9, industry 4, military medical entomologists 8), targeting mosquitoes (4), phlebotomines (4), other flies (2) and general

vectors (11), already yielding some products going for patenting, regulatory approval and manufacturing. Among the promising new tools are some for dengue vector control, deployable spraying systems, comparative risk analyses, novel insecticides and formulations. It is envisaged that products developed by the DWFP initiative will be suitable for wider applications against pests and vectors of public health importance.

Public Health Insecticide Consortium

Dr Graham B. White of the University of Florida in Gainesville briefed the meeting on the activities of the Public Health Insecticide Consortium (PHIC), which was established in 2005.

The Consortium has been formed between professional organizations (the American Mosquito Control Association, National Pest Management Association and Responsible Industry for the Sound Environment), researchers, industry and relevant United States Federal Agencies (Centers for Disease Prevention and Control, Department of Defence, National Institutes of Health, United States Agency for International Development and United States Department of Agriculture) to sustain and replenish the range of effective insecticides available for controlling pests and vectors of public health importance in the USA and other countries.

The preliminary orientation with regulators at the United States Environmental Protection Agency (EPA) led to the Armed Forces Pest Management Board taking responsibility for launching the Consortium and developing its mission to encourage insecticide discovery and development, registration, production, marketing and use for public health purposes. The Consortium members are committed to assure the availability of effective tools for public health pest and vector control by (i) promoting initiatives to develop and register new public health insecticide materials and application methods, (ii) reviewing and sustaining the registered status for appropriate uses of existing public health insecticides, and (iii) raising public knowledge and appreciation of pesticide uses for public health protection.

Nationally in the USA, the Consortium has many similar purposes to the GCDPP internationally. Strategically, the Consortium provides a forum of stakeholders for ensuring safe and necessary uses of public health insecticides while maintaining and expanding the inventory of products available. Practically, the expertise of the Consortium members identifies needs, appropriate solutions and implementation plans. Organizationally, the Consortium promotes effective PHI applications through public agencies and private companies, with representative members serving for liaison.

Some priority projects already adopted by the Consortium include: (i) developing a plan with EPA to implement the PHI components of the Food Quality Protection Act in the USA, including the incorporation of benefits of public health insecticides into risk models, and development of risk models more accurately reflecting public health insecticide use and application patterns; (ii) ensuring sufficient research evaluating the relative risks and benefits of public health insecticides applied (a) to reduce disease transmission by vectors, and (b) to suppress the densities of public health pests to levels acceptable to the community; (iii) developing a plan to implement an applied programme to (a) monitor/identify the priority needs for public health insecticides required for pest and vector control; (b) to solicit candidate products from innovators and industry; (c) to produce adequate data for registration/re-registration of public health insecticides; (d) to facilitate the timely phase-out of obsolete products based on operational needs assessment.

7.1 Discussion

The meeting noted with great interest the investment made by the above-mentioned institutions and the initiatives taken for developing new public health pesticide products and application technologies, and wished to see ways for strengthened and closer collaboration among different partners and stakeholders to ensure the optimized use of limited resources and timely development and delivery of alternative tools and application technologies for public health use.

There are currently five new products under review by the Innovative Vector Control Consortium: two are new formulations of existing molecules; two are agricultural products that may be adapted for vector control; and one is a new active ingredient. To solicit projects, the Consortium has met with major manufacturers of pesticides. The decision for inclusion of new molecules for further testing and development by the Consortium, as to how far back in the pipeline of development to go, has not been made.

Loss of chemistries due to deregistration, development cost of new chemistries and formulations and the relative small size of the public health pesticide market, as well as negative public perception of pesticides due to poor risk–benefit analysis and pesticide misinformation, were considered threats to vector management.

8. Conclusions and recommendations

Recognizing that:

- The worldwide use of pesticides is increasing at record rates, and that an estimated 3 million tonnes of pesticide active ingredient are used every year, with about 85% in agriculture, with an increasing trend in the public health sector;
- Pesticide consumption in developing countries is increasing rapidly, causing great concern. Pesticide poisoning, either accidental or deliberate, is a major public health problem in the developing world, accounting for the vast majority of global reported cases.
- One of the major challenges facing the developing world is the lack of effective implementation of national regulatory frameworks and human and financial capacity to regulate availability, sale and use of pesticides. This poor capacity to enforce the regulatory environment enables the excessive and unsafe use of pesticides,

leading to pollutants in food, drinking-water and the environment;

- In addition, FAO and WHO estimate that approximately 30% of pesticides marketed in developing countries are substandard and do not meet internationally accepted standards of quality. When the quality of labelling and packaging is also taken into account, the proportion of poor-quality pesticide products in developing countries is even higher;
- There is also a lack of regulation and understandable information on the proper storage, handling and rational use of pesticides and the disposal of waste pesticides and empty containers; and inadequate management and storage of obsolete stocks and used packaging materials and lack of facilities for proper waste management;
- Vector control, mainly through the use of pesticides, has a vital role in prevention of major vector-borne diseases, including malaria and dengue. However, the dwindling arsenal of safe and cost-effective pesticides and the increasing challenges faced with their management under decentralized health systems, as well as the increasing use of pesticides by individuals and communities for personal protection and vector control, require capacity strengthening for planning, implementation and evaluation of vector control programmes and management of public health pesticides;
- The International Code of Conduct on the Distribution and Use of Pesticides, adopted by the FAO Member States, has established voluntary standards of conduct for all public and private entities engaged in, or associated with, the distribution and use of pesticides. The Code of Conduct includes the life-cycle concept of pesticide management and focuses on risk reduction and the protection of human health and the environment.

It intends to cover management of all pesticide products, but lacks details covering public health pesticide management;

- Effective implementation of the Code of Conduct and monitoring its observance require close collaboration of agriculture, environment and public health sectors at national and international levels. WHO is seeking ways to further strengthen its collaboration with FAO and UNEP for better supporting Member States in this important issue;

the Meeting made the following recommendations to WHO:

1. to develop a joint programme with FAO and UNEP on pesticide management to ensure complementary, harmonized and coordinated guidance and support to responsible bodies at the national level and to all stakeholders, as well as to monitor observance of the Code of Conduct;
2. to request active participation and support of the health sector in observance of the Code of Conduct, by submitting the Code of Conduct to the World Health Assembly. Ensure that the next revision of the Code of Conduct addresses the specific needs of public health pesticide management;
3. to support Member States in establishment of national regulatory frameworks as well as capacity strengthening on sound management of pesticides based on a critical needs assessment;
4. to develop risk assessment and pesticide management guidelines, building on existing guidelines, addressing the life-cycle approach, and support Member States in pesticide risk reduction measures, including scientifically-based and efficient registration systems and post-registration systems;

5. to enhance regional and cross-sectoral collaboration and cooperation on sound management of pesticides and promote the role of all stakeholders, including the pesticide industry, nongovernmental organizations and other civil society groups, in sound pesticide management;
6. to invite United Nations specialized agencies, funds and programmes, other intergovernmental organizations and donor agencies to include capacity-building for the sound management of pesticides within their activities, as appropriate;
7. to promote development of new active ingredients, formulations and application technologies for vector control, and promote targeted and judicious application of insecticides, integrated vector management, and resistance management strategies;
8. to develop and disseminate, in collaboration with industry, FAO, UNEP and other agencies, educational materials of all types to pesticide users;
9. to explore the use of health networks in rural areas for promoting the judicious use of pesticides and prevention of pesticide poisoning, in collaboration with agricultural networks;
10. to support and strengthen the capacity at national and regional levels to recognize and eliminate supply of substandard pesticide products;
11. to ensure wide distribution of knowledge and information on pesticides and pesticide management adequate and appropriate to the needs of all stakeholders;
12. to develop model training packages and certification schemes for the managers of vector control programmes, as well as pesticide applicators, to ensure safe and effective application of public health pesticides;

13. to support Member States using DDT to ensure that there is capacity for proper management of the insecticide, that WHO guidelines and the provisions of the Stockholm Convention are adhered to, and that the potential health and environmental impact of DDT is carefully monitored;
14. to support Member States through the opportunities presented by SAICM, so that the ministries of health take full advantage to establish or strengthen intersectoral collaboration mechanisms with ministries of the environment, agriculture and other relevant ministries in the area of chemical management.

Annex 1 Agenda

Monday, 25 September 2006

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| 09:00–09:10 | Welcome address
Dr David Heymann, Acting Assistant
Director-General, Communicable Diseases
and Representative of the Director-General
for Polio Eradication |
| 09:10–09:30 | Opening remarks, introduction of
participants, and appointment of
Chairman and rapporteurs
Dr L. Savioli, Director, Department of
Control of Neglected Tropical Diseases |
| 09:30–10:00 | Secretariat report on developments
since the last GCDPP meeting
Dr M. Zaim, WHO Pesticide Evaluation
Scheme (WHOPES) |
| 10:00–10:30 | Coffee |
| 10:30–11:00 | The International Code of Conduct on
the Distribution and Use of Pesticides –
A framework for management of
pesticides and future challenges
Dr G. Vaagt, Senior Officer, Pesticide
Management Group, FAO, Rome |
| 11:00–11:30 | Discussion |

11:30–12:00	Stockholm Convention – An opportunity to promote integrated vector management and sound management of public health pesticides Dr A. Sunden-Bylehn, Senior Scientific Affairs Officer, UNEP Chemicals, Geneva
12:00–12:30	Discussion
12:30–14:00	Lunch
14:00–15:30	Country perspectives on management of public health pesticides – Brazil – Indonesia – Philippines Discussion
15:30–16:00	Coffee
16:00–17:30	Country perspectives (continued) – Sri Lanka – United Republic of Tanzania – Thailand
17:30–18:00	Discussion

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08:30–09:00	Stewardship and public health pesticides – Priority actions to support Member States on sound management of public health pesticides Dr Richard Brown, CropLife International
09:00–10:00	Discussion
10:00–10:30	Coffee
10:30–12:30	Discussion (continued)
12:30–14:00	Lunch
14:00–15:00	Status report on current initiatives in developing alternative insecticides for public health use Dr K. Aultman, Bill & Melinda Gates Foundation <ul style="list-style-type: none">• Professor Janet Hemingway, Dean, Liverpool School of Tropical Medicine, UK• Dr Stan E. Cope, US Armed Forces Pest Management Board• Dr G.B. White, University of Florida, Gainesville, USA
15:00–15:30	Discussion
15:30–16:00	Coffee
16:00–17:30	Conclusions and recommendations
17:30–17:40	Closure of meeting

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