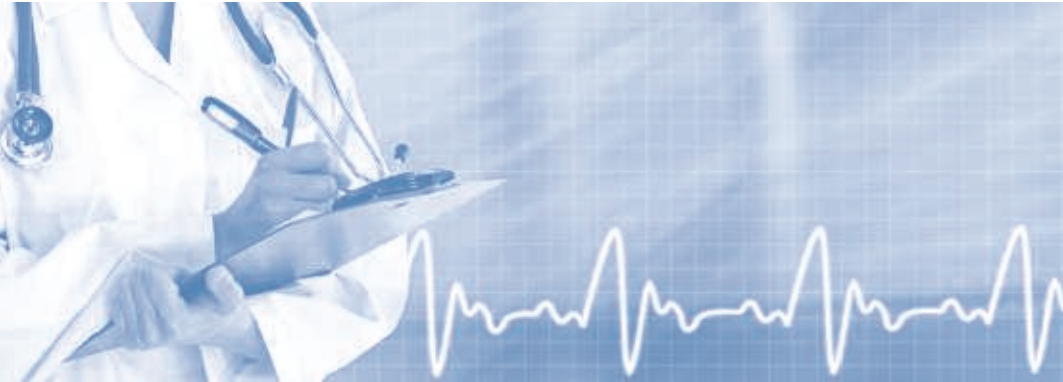




Health-sector involvement in chemicals management at the national level:

**review
of current
practice**



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ABSTRACT

The Strategy for Strengthening the Engagement of the Health Sector in the Implementation of the Strategic Approach to International Chemicals Management (SAICM) was adopted at the third session of the International Conference on Chemicals Management held in Nairobi, Kenya, on 17–21 September 2012. This paper presents practical examples of health-sector involvement in chemicals management in selected countries, including legislative arrangements, research projects, the collection and dissemination of information, awareness-raising practices, and approaches to the education and training of medical professionals. This information can be used by professionals in the health and other sectors in connection with planning action for the implementation of the SAICM Strategy.

Keywords

Chemical safety
Environment and public health
Environmental exposure
Health care sector
Policy

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EXECUTIVE SUMMARY

The chemical industry is one of the world's largest economic sectors, producing organic and inorganic chemicals, plastics, synthetic fibers, pharmaceuticals and medicines, synthetic rubber, soaps, paints and coatings, pesticides, fertilizers and other agricultural chemicals. All these chemicals, if managed improperly, pose risks to human health and the environment. According to WHO estimates, in 2004, 4.9 million deaths (8.3% of the total) and 86 million disability-adjusted life years (5.7% of the total) were attributable to environmental and occupational exposures resulting from the unsound management of selected chemicals.

The Strategic Approach to International Chemicals Management (SAICM) was developed as a policy framework to achieve the sound management of chemicals throughout their life-cycle so that, by 2020, chemicals will be produced and used in ways that minimize significant adverse impacts on environment and human health. The Strategy for Strengthening the Engagement of the Health Sector in the Implementation of SAICM was approved at the third session of the International Conference on Chemicals Management held in Nairobi, Kenya, on 17–21 September 2012. It was emphasized that, given the position of trust held by doctors, nurses and other community health workers, the health-sector workforce is central to credible communication with the public. There are a number of World Health Assembly resolutions that require the health sector to build capacity and implement measures necessary to prevent the negative health impact of hazardous chemicals.

The current situation vis-à-vis health-sector involvement in, and the implementation of, chemicals management varies significantly among countries around the world. Current information collected from different sources demonstrates that the role and responsibilities of the health sector should be defined in national legislation. This would enable the

identification of overlapping mandates and gaps in regulations and enhance coordination among national agencies. There should be significant health-sector involvement in the development of interagency policies, plans and programmes for national chemicals management so that it can perform its important role in risk assessment, health-impact assessment, monitoring, control and surveillance.

The development and implementation of a sound chemicals-management system would significantly improve the collection and dissemination of information, including that on the health effects and other health-related aspects of chemical safety. There is a substantial body of evidence in many countries to show that the health sector plays a significant part in the collection and dissemination of information on chemicals management.

Current initiatives to involve the health sector in chemicals management as a user of chemicals (green health care) will bring about a better understanding of the profits and opportunities of proper chemicals management and strengthen health-sector involvement in this area in general.

Financial support at the national and international levels plays an important role in facilitating health-sector participation in chemicals management. There are a number of fund-raising possibilities for the health sector, including national and international resources, such as national budgets and research projects and programmes. In order that health-sector input into national chemicals management may be effective, action must be taken in six principle areas, namely: (1) awareness raising; (2) risk assessment; (3) capacity building and resilience; (4) information collection and dissemination; (5) intersectoral communication and collaboration and effective working; and (6) international leadership and coordination.



INTRODUCTION

Global burden of disease attributed to chemicals

The chemical industry is one of the world's largest economic sectors, producing organic and inorganic chemicals, plastics, synthetic fibers, pharmaceuticals and medicines, synthetic rubber, soaps, paints and coatings, pesticides, fertilizers and other agricultural chemicals. Worldwide sales of chemicals in 2010 were valued at €2353 billion (1). As of 1 May 2012, the Chemical Abstracts Service (CAS) of the American Chemical Society had issued CAS Registry Numbers to 66 515 886 distinct organic and inorganic substances (2). The CAS Online Chemical Catalogues File contained listings of more than 19 000 000 commercially available chemicals and their worldwide suppliers. In 2007, 4637 chemicals were classified as high production volume (HPV) chemicals (3). It is estimated that, by 2020, there will be a greater production of chemicals in transition countries than in developed countries (4). If not properly managed, chemicals pose hazards to human health and the environment.

According to WHO estimates, in 2004, 4.9 million deaths (8.3% of the total) and 86 million disability-adjusted life years (5.7 % of the total) were attributable to environmental and occupational exposures resulting from the unsound management of selected chemicals. Unintentional poisonings kill an estimated 35 000 people each year and, in developing countries where two thirds of those deaths occur, such poisonings are associated with excessive exposure to, and the inappropriate use of, toxic chemicals, including pesticides. These figures relate to chemicals for which data are available and which, therefore, are more likely to be an underestimation of the actual burden. Since chemicals with known health effects, such as dioxins, cadmium and mercury, or chronic exposure to pesticides, could not be included in the study due to incomplete data and information, the actual level of disease and injury is probably higher (5).

In 2013, WHO, in cooperation with the United Nations Environment Programme (UNEP), published a systematic review of endocrine-disrupting chemicals. It was recognized that the involvement of the health sector in chemicals management would benefit the collection of information on, and the prevention of, health effects. The report notes that potential disease risks could be reduced and public health expenses substantially lowered by carrying out more comprehensive assessments and using better testing methods (6).

SAICM

SAICM is a policy framework the overall objective of which is to achieve the sound management of chemicals throughout their life-cycle so that by 2020 chemicals are produced and used in ways that minimize their significant adverse impacts on human health and the environment. SAICM was adopted at the International Conference on Chemicals Management held in Dubai, United Arab Emirates, on 4–6 February 2006. The Dubai Declaration on International Chemicals Management expresses high-level political commitment to SAICM and its Overarching Policy Strategy, which sets out SAICM's scope, needs, objectives, financial considerations, underlying principles and approaches, as well as the process of implementation and review. The SAICM Global Plan of Action, a working tool and guidance document for the implementation of SAICM and other relevant international instruments and initiatives, was also supported (7).

The Quick Start Programme and Trust Fund were developed to assist countries in the implementation of SAICM (8). WHO supports countries in the development and implementation of the Programme's projects on the development of health-sector capacities.

Strategy for Strengthening the Engagement of the Health Sector in the Implementation of SAICM

The SAICM Strategy was approved at the third session of the International Conference on Chemicals Management held in Nairobi, Kenya, on 17–21 September 2012 (9). The representatives of the international and national organizations all recognized the important contribution that could be made by the health sector at both the national and international levels.

Para.14 of the Strategy states that:

...there is room for the sector to play a stronger role in advocating action on chemicals and safer alternatives, including through implementation of and compliance with legal instruments, standards and policies. In many countries, the effect of chemicals on health is a priority environmental concern for the general public. Given the position of trust held by doctors, nurses and other community health workers, the health-sector workforce is central to credible communications with the public (10).

The six specific objectives of the Strategy are:

- to foster a deeper interest in and awareness of sound chemicals management among stakeholders in the health sector and to build their capacity to undertake preventive action, especially by increasing the amount, quality and relevance of information disseminated to the sector on the human health aspects of chemicals management;
- to involve actively the health sector in increasing the amount and improving the quality and relevance of information available on the impacts of chemicals on human health, including through risk assessment;
- to strengthen the health sector's capacity to fulfill its roles and responsibilities in chemicals management;
- to improve consultation, communication and coordination with other sectors and increase

the number of joint actions at the national, regional and international levels;

- to ensure the effective use of existing resources, including organizations and funds, and to leverage additional resources where needed;
- to strengthen coordination, leadership and coherent action by international agencies, including United Nations agencies, relevant convention secretariats, multilateral funding agencies and regional development banks, with regard to the implementation by the health sector of the Strategic Approach (10).

The Strategy states the key roles and responsibilities of the health sector as:

- preventing and managing chemical emergencies, including by providing medical treatment for those affected;
- gathering clinical and research evidence about chemical risks and informing decision makers and the public;
- working with other sectors to advocate action on chemicals and safer alternatives;
- raising awareness of chemicals safety with special emphasis on protecting vulnerable populations;
- assessing the impact of chemicals management policies through monitoring and evaluation, including bio-monitoring and health surveillance;
- sharing knowledge and participating in international mechanisms to solve chemicals-related problems (10).

Thus, the contribution that the health sector could make to chemicals management, both now and in the future, is recognized.

This paper has been developed to provide information about the experiences and practices of selected countries in relation to health-sector involvement in chemicals management, as well as a general overview of health-sector activity in the area of chemical safety at the international level.



METHODOLOGY

A number of resources were used to gather the information, such as the websites of the Inter-Organization Programme for the Sound Management of Chemicals (IOMC), SAICM, UNEP, the United Nations Industrial Development Organization (UNIDO), the United Nations Institute for Training and Research (UNITAR), WHO and other international organizations, and national authorities in selected countries.

Scientific reviews and articles were also used as a source of information. The information found was usually in the form of a general overview of the chemicals-management system involved with limited reference to capacity building and information-sharing, and a detailed overview of the legal arrangements. Very few scientific articles analysing practices of health-sector involvement at the national and international levels were found despite the use of a wide range of key words or phrases, such as “SAICM”, “health sector”, “health authorities and chemical safety”, “health and chemicals management”, “national chemicals management and health”, “registration, evaluation, authorization and restriction of chemicals (REACH)”, “UNEP”, “sustainable development, burden of disease and globally harmonized system of classification and labelling of chemicals”, “chemical emergencies preparedness and response” and “risk assessment”.

However, a significant amount of literature was found relating to the strategic management of chemicals and the environment on the websites of international organizations. There is a substantial body of evidence published on the websites of governments and national agencies in many countries to the effect that the health

sector plays a significant part in national chemicals management and, in some countries, is the leading agency in implementing it. References were sought using the aforementioned terms and there is some evidence that, in developing countries, policy initiatives are developed in silos and that collaborative initiatives, such as SAICM, are extremely difficult to develop (11).

The main source of information on infrastructure for national chemicals management comprises the national profiles on the UNITAR website (12). The profiles of countries (Australia, Egypt, Finland, Jordan, Kenya, Mongolia, Suriname, Sweden, Thailand, the United Republic of Tanzania, the United States of America and Uzbekistan) were analysed with particular emphasis on legislation, structure, the responsibilities of governmental agencies, the collection and dissemination of information, and education. Information provided at the request of the WHO Regional Office for Europe by experts in the Russian Federation and Slovenia was also included in the analysis.

The role of nongovernmental organizations (NGOs), such as medical-professional societies and private health-sector organizations, are recognized as being very important. This paper, however, concentrates on the involvement of governmental health-sector organizations in national chemicals management. Selected examples of country experiences related to health-sector involvement in chemicals management, as well as international practices in this area, are described below.



INTERNATIONAL AND NATIONAL PRACTICES OF HEALTH-SECTOR INVOLVEMENT IN CHEMICALS MANAGEMENT

Health-sector participation in the development of legally binding/voluntary instruments and policy

Global level

WHO is the directing and coordinating authority for health within the United Nations system, its objective being the attainment of the highest possible level of health for all people. Efforts to promote a healthier environment, intensify primary prevention, and influence public policies in all sectors to address the root causes of environmental threats to health are a key part of its Twelfth General Programme of Work (13). The International Forum on Chemicals Safety was created by the International Conference on Chemical Safety held in Stockholm in April 1994 to facilitate open, multisectoral discussion on the most important and emerging issues relating to chemical safety with the main focus on human health, particularly the protection of vulnerable populations.

WHO participated actively in the development of SAICM and contributed staff resources to the SAICM secretariat, in accordance with the provisions of paragraph 29 of the SAICM Overarching Policy Strategy, and Resolution I/1 of the International Conference on Chemicals Management, Dubai, United Arab Emirates, 4–6 February 2006 (7).

Health-protection aspects are covered by WHO during discussions of chemical conventions aimed at the protection of human health and the environment. The main role of WHO in the development of policy on chemicals management is to ensure that all health-protection aspects are properly addressed.

One of WHO's main legal instruments for regulating the prevention of acute chemical impact are the International Health Regulations (IHR) (14). These require all countries to have systems in place for coordinating the management of events that may constitute a public health emergency of international concern, thus improving their capacity to detect,

assess, notify and respond to public health threats, including chemical threats. In addition, a number of World Health Assembly resolutions require the health sector to build capacity and implement every measure necessary to prevent the negative health impact of hazardous chemicals and wastes (15).

Regional level

All WHO regions have environmental health policies that identify the main environmental determinants of and threats to health, as well as action to address them.

The WHO Regional Office for Europe has more than 20 years' experience in the promotion of environmental health through the close cooperation of the sectors for environment and health. At the Fifth Ministerial Conference on Environment and Health in Parma, Italy, in March 2010, priority tasks in the area of chemical safety were set up to contribute to the development and implementation of SAICM and other international agreements, to prevent the exposure of children to harmful substances and preparations, and to identify exposure to carcinogens, mutagens and reproductive toxicants, as well as endocrine disruptors (16).

Ministers of health and the environment in Africa adopted the Libreville Declaration on Health and Environment in Africa on 29 August 2008 on the occasion of the First Inter-Ministerial Conference on Health and Environment in Africa, which took place in Libreville, Gabon, on 26–29 August 2008. The Declaration commits governments to take measures to stimulate the necessary policy, institutional and investment changes necessary to optimize synergies between the health, environment and other relevant sectors, and urges Member States, among other things, to:

- update their national, subregional and regional frameworks in order to address more effectively the interlinkages between health and the environment through the integration of these links in policies, strategies and national development plans;
- ensure the integration of agreed objectives in

- the areas of health and environment in national poverty-reduction strategies;
- implement, at all levels, priority intersectoral programmes on health and environment aimed at accelerating the achievement of the Millennium Development Goals;
 - build national and regional capacities to address the linkages between environment and health through the establishment and strengthening of health and environment institutions (11).

In accordance with its mandate, WHO is involved in chemicals management at the global and regional levels, is an important contributor to global legal and voluntary regulatory mechanisms and policy development, and plays a unique role in advocating the protection of human health from the impact of harmful chemicals.

Legal and policy requirements for health-sector involvement in chemicals management at the national level

The experiences of selected countries in which the health sector is the leading agency for, or

plays a meaningful role in, chemicals management were analysed and it was found that the existing legislative and regulatory mechanisms of health-sector involvement differ significantly from country to country. There are many reasons for this, including the differences in the mandates of the various ministries and agencies and the cultural and historical characteristics of the countries (12).

The health sector is responsible for the management of pharmaceuticals and disinfectants in practically all of the countries in question. In many of them, the health sector is also deeply involved in the management of cosmetic consumer products and pesticides. The biggest diversity was observed in connection with the legal arrangements relating to health-sector involvement in the management of industrial chemicals. Some examples are given below.

In *Australia*, national legislation regulates the management of four groups of chemicals (agricultural chemicals, industrial chemicals, pharmaceuticals and food additives), and clearly defines the health-sector's role in regulating them during their life-cycle (Box 1).

Box 1

Case study. Responsibilities of the Australian health sector in chemicals management

The potential of a chemical to impact the environment or public health adversely is one of the topics of the core assessment of both pesticides and industrial chemicals. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS), which is the Australian Government's regulatory body for industrial chemicals, relies on Environment Australia (a registered training organization) to assess the potential impact of a chemical on Australia's environment (taking unique flora and fauna in account), and the Government's Department of Health and Aged Care to assess its potential impact on public health. A division of functions and responsibilities is included in the legislation for all groups of chemicals for their whole life-cycle.

NICNAS was established in 1990 and is administered by the National Occupational Health and Safety Commission. The process of assessing new chemicals begins with a primary toxicological evaluation conducted by NICNAS staff and an environmental assessment conducted by Environment Australia for NICNAS. These assessments form the basis for further assessments relating to occupational health and safety, public health (conducted by the Department of Human Services and Health) and the environment.

Other health-sector responsibilities include the development of air and water standards, the monitoring of urban air and waste, and the implementation of specific chemicals-related programmes (e.g. on lead strategy or scheduled waste) (12).

In *Egypt*, environmental law requires the competent ministries, in cooperation with the Egyptian Environmental Affairs Agency and the Ministry of Health, to develop and promulgate a list of hazardous substances, which should be controlled and revised periodically.

In *Finland*, the Chemical Act defines responsibilities within chemical safety as follows: for health effects – the Ministry of Social Affairs and Health and the National Product Control Agency for Welfare and Health; for occupational safety and health – provincial governments and municipal authorities; and for environmental effects – the Ministry of the Environment, the Finnish Environment Institute, regional environment centres, municipal authorities and import customs authorities.

In *Kenya*, the various aspects of risk in the life-cycles of chemicals are largely guided by the relevant ministries but policy is executed by specialized institutions with the mandate to do so, such as the Government Chemist Department. Similarly, the Pest Control Product Board, the Water Resources Management Authority, the National Environment Management Authority, the Occupational Health and Safety Department, the Kenya Medical Research Institute and the Kenya Plant Health Inspectorate Service, have sector specialization and provide forensic and general analytical services, surveillance and a means of enforcing risk-reduction measures.

In *Sweden*, the National Chemicals Inspectorate (a general directorate under the Ministry of the Environment) is responsible for the entire approval procedure, covering both health-related and environmental aspects, as well as agricultural and non-agricultural pesticides (plant-protection products and biocides). According to the legislation, the Ministry of Health is not strongly involved in industrial and agricultural chemicals management.

In the *United Republic of Tanzania*, the Industrial and Consumer Chemicals (Management and

Control) Act of 2004 delegated mandates to manage chemicals to ministries and other bodies; national environmental and sectoral policies stipulate the governance of chemicals management.

In the *European Union (EU)*, a central agency – the European Chemicals Agency – registers and evaluates industrial chemicals and biocides through the EU REACH programme. However, there is a wide diversity in the national agencies responsible for REACH implementation as a result of their national legislation. Thus, in Bulgaria, Hungary, Ireland, Italy, Latvia, Liechtenstein, Luxembourg, Romania, Slovakia, Slovenia and Spain, the national public health authorities are responsible for and involved in the implementation of national REACH programmes, in cooperation with other official national government institutions. It should be noted that REACH does not cover the whole chemicals life-cycle. It registers substances rather than products. Other stages of chemicals management in EU are covered by relevant environmental regulations. Health-sector responsibilities and duties are not usually identified or recognized in legislation pertaining to other sectors (including that for the environment). To ensure recognition of the health sector's role in managing chemicals at all stages of their life-cycle, its responsibilities and functions should be clearly defined in legislation related to chemical safety.

In some countries, for example the *Russian Federation*, *Thailand* and *Uzbekistan*, requirements for chemicals management are included in a national public health or other relevant act, as well as in the legislation of environmental and other agencies. Moreover, in *Thailand*, the Hazardous Substances Act confers the authority for chemicals management on seven government agencies. In the *Russian Federation*, separate government decisions establish the responsibilities of the health sector in the area of environmental health, including the regulation of chemicals (Box 2).

Box 2

Case study. Health-sector duties in biological and chemical safety in the Russian Federation

The Order of the Government of the Russian Federation on the responsibilities of the governmental bodies in the area of biological and chemical safety provides for:

- the chemical safety of the population and the organization of cooperation among governmental bodies with responsibilities in the area of chemical safety;
- the organization of work for the development of governmental policy on the provision of chemical safety for the public;
- regulations for sanitary and epidemiological well-being with the aim of protecting the public from the negative health impact of harmful chemicals;
- participation in the development of laws and presidential and governmental (cabinet) orders on technical regulations in the area of chemical safety;
- the development and implementation of federal and agency programmes aimed at providing chemical safety;
- cooperation among governmental and international bodies in the area of chemical safety;
- the development of health-care institutions and organizations to respond to chemical threats;
- the implementation of educational and training programmes for medical and public health professionals, including post-graduate training in chemical safety;
- the coordination of the Police Force in connection with the protection of the public from chemical threats;
- scientific research into chemical safety;
- the implementation of protective measures to prevent chemically induced diseases;
- the monitoring of chemical content in products and the environment, and chemically induced diseases;
- the organization of governmental response to chemical threats;
- investigation into work-related diseases and mass chemical poisonings;
- the education of different population groups and non-medical professionals in chemical safety;
- resources for and research into the diagnosis and treatment of chemical poisonings and chemically induced chronic diseases;
- the organization of chemical–toxicological emergency response teams;
- the dissemination of information to the public in chemical emergencies (12).

The information included in the countries' national profiles demonstrates that the role and responsibilities of the health sector in chemical safety should be defined in national legislation (a separate chemical act regulating the different aspects of chemical safety) for all types of chemicals and at all stages of their life-cycle. It is important to create coherence between the mandates of the ministries with respect to their specific responsibilities in the subsequent

stages of the chemical life-cycle. This would facilitate capacity building and the development of scientific research in the health sector, encourage fund-raising for the successful implementation of legislation, and increase health-sector involvement in chemicals management. It would also facilitate the identification of overlapping mandates and gaps in the regulations, and enhance interagency coordination.

Intersectoral coordination and structural and organizational arrangements

Global level

United Nations agencies working in the area of chemical safety cooperate closely within the framework of IOMC in which the following nine organizations participate: the Food and Agriculture Organization (FAO); the International Labor Organization (ILO); the Organization for Economic Cooperation and Development (OECD); the United Nations Development Programme (UNDP); UNEP; UNIDO; UNITAR; WHO; and the World Bank. The objective of IOMC is to strengthen international cooperation in the field of chemicals and to increase the effectiveness of the organization's international chemicals programmes. IOMC promotes the coordination of policies and activities, pursued jointly or separately by its participating organizations, to achieve the sound management of chemicals in relation to human health and the environment. The United Nations agencies head IOMC meetings on a rotational basis.

There are many other examples of the close cooperation of the United Nations agencies, for example, in connection with the development of the joint ILO/WHO International Chemical Safety Cards project, and the preparation of the publication, *State of the science of endocrine disrupting chemicals – 2012*, a joint UNEP/WHO undertaking (6).

The Global Health Security Initiative is an informal partnership of health officials from the G7 countries (Canada, France, Germany, Italy, Japan, the United Kingdom and the United States), Mexico and the European Commission,

in which WHO participates as an observer. The Initiative provides a platform for strengthening global health preparedness and response to threats of chemical, biological, radiological and nuclear (CBRN) terrorism and pandemic influenza.¹

All WHO activities in the area of chemical safety are organized and coordinated by the chemical-safety team that is part of the Public Health and Environment Directorate of the Organization. WHO works to establish a scientific basis for the sound management of chemicals and to strengthen national capabilities and capacities for chemical safety through its International Programme on Chemical Safety (IPCS).

Regional level

There are also many examples of close cooperation between the environment and health sectors at the regional level. The European Environment and Health Task Force, comprising representatives of the environment and health sectors, is the leading international body for the implementation and monitoring of the European Environment and Health process.² The WHO European Centre for Environment and Health chairs the Joint Task Force on Health Aspects of Air Pollution under the United Nations Economic Commission for Europe Convention on Long-Range Transboundary Air pollution.³

Since the WHO regional offices have responsibilities in the area of chemical safety, they represent the health sector, including relevant NGOs, in interagency discussions on the strategic management of chemicals at the global and regional levels.

¹ Information on the Global Health Security Initiative available at: <http://www.ghsi.ca/english/index.asp>, accessed 19 January 2014.

² Information on the European Environment and Health Process available at: <http://www.euro.who.int/en/what-we-do/event/fifth-ministerial-conference-on-environment-and-health/documentation/the-european-environment-and-health-process-2010-2016-institutional-framework>, accessed 25 September 2013.

³ Information on activities of the Joint Task Force on Health Aspects of Air Pollution available at: <http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/air-quality/activities/health-aspects-of-long-range-transboundary-air-pollution>, accessed 6 October 2013.

Health-sector participation in interagency cooperation and institutional arrangements at the national level

Interagency cooperation

The implementation of the interagency-cooperation mechanism is one of the basic pillars for the successful implementation of SAICM. According to the overall analysis contained in the first progress report on implementation of the Strategic Approach: 2009–2010 (17), this mechanism has been established by 76% of the responding stakeholders, and 89% have committed to implementing the approach.

According to a survey conducted by the WHO Regional Office for Europe in 2012 to assess the current capacity in the WHO European Member States for addressing issues of chemical safety, identify gaps and set priorities for the implementation of the Parma Declaration on Environment and Health (2010), interagency cooperation is ongoing in 95% of the responding countries and in 97% the health sector is participating in this mechanism.

Comparable information is found in the national profiles. It is essential that all of the problems relating to chemical safety be dealt with through the coordination mechanism but, in many countries, interministerial activity includes only the regulation of pesticides and the management of emergency situations. Examples of successful interministerial cooperation in Slovenia and Thailand follow.

In *Slovenia*, an intersectoral coordinating mechanism has been in operation since 1996 for issues relating to chemical safety. Through this mechanism, the responsible ministries pursue the implementation of national policies, programmes and measures based on the Chemicals Act and other regulations relating to chemicals, and the comprehensive and coherent development of chemical safety at the national level. For example, the National Chemical Safety Programme (2006–2010) was coordinated using

this mechanism. After the Fifth Ministerial Conference on Environment and Health, “Protecting children’s health in a changing environment”, Parma, Italy, 10–12 March 2010, the Slovenian Government established the Intersectoral Working Group on Implementation of the Commitments of the Parma Declaration. Members of the Group include the state secretaries of 11 ministries and governmental agencies, who share responsibilities in the broad area of environmental health. Health professionals from national and regional institutes of public health and the National Poisons Control Centre were indirectly involved in the activities of the Intersectoral Committee for Chemical Safety (ICCS) (18).

In *Thailand*, two mechanisms are being used to achieve cooperation among various agencies and organizations in executing tasks or carrying out activities within the scope of chemicals management: the National Coordinating Committee on Chemical Safety appointed by the Cabinet to undertake policy formulation, monitoring, evaluation, and decision-making with respect to certain chemicals, and standing committees established by legal acts to regulate and manage chemicals throughout their life-cycle. These committees include the National Environment Board, the Pollution Control Committee, and the Committees on Drugs, Food, Cosmetics, and Hazardous Substances. A special coordinating mechanism has been demonstrated in Thailand – the research platform – which offers increasing opportunities for involved organizations and interested individuals to interact and share their ideas and experiences with the aim of creating knowledge and generating the application of their findings. The National Coordinating Committee on Chemical Safety has several subcommittees: the Subcommittee on Policy and Planning, the Subcommittee on the Chemical Safety Information Network, the Subcommittee on Research and Development, and the Subcommittee on the Poison Centre Network.

Thus, the health sector should play a significant role in the development of interagency policies, plans and programmes on the national

management of chemicals. The structure and terms of reference, as well as the organization of work, are very important for constructive discussion on and full coverage of national priority issues pertaining to chemicals management. Rotation among the sectors might be recommended to provide them all with the same possibility of drawing attention to their main problems and priorities.

Structural organization

In some countries the health sector is responsible for and provides leadership in chemicals management at the national level (usually through the Ministry of Health). This is the case, for example, in *Canada, Poland, Slovenia* (Box 3), and the *United Republic of Tanzania* (12). The most common approach involves the intersectoral collaboration of government departments and agencies in accordance with the mandates of the sectors. For the most part, the environment department/agency takes the lead role though the health/public health department/agency does so in some cases.

To provide adequate health-professional expertise, *Egypt, Jordan, the Russian Federation, the United Kingdom* and the *United States* have established separate organizations, government

departments, and staff units in their health sectors as follows.

In *Egypt*, the Ministry of Health and Population established a unit for chemical safety in 1995 to ensure the safe use of chemicals, protect the public from poisons and the chronic effects of chemical exposure, monitor chemical incidents, and develop public awareness in this area. The infrastructure for response to chemical emergencies exists in the Directorate for Emergency Medicine. The National Committee for Pharmaceutical and Medication Programming regulates the household use of chemical products.

In *Jordan*, more than one department of the Ministry of Health is involved in the control of chemicals and their various impacts on health and/or the environment: the Chemical Safety Section of the Environmental Health Directorate; the Occupational Health Directorate; and Medicinal Control Directorate. All of them have specific activities in the area of chemical safety, including the provision of support to scientific research, monitoring, control, licensing and other related activities (19).

In the *Russian Federation*, environmental health units have been established in the Ministry of Health and the Federal Service on Customers' Rights Protection and Human Well-Being

Box 3

Case study. The Chemical Office of the Republic of Slovenia (CORS)

CORS was established in the Ministry of Health in 1999 with the mission to provide chemical safety in Slovenia, its basic task being to render the risks connected to the production, transport, use and disposal of chemicals acceptable to the population in as far as their health and the environment are concerned. This is achieved by:

- integrating and coordinating the views of the relevant national authorities, professional institutions and the public to create a balanced policy on chemical safety;
- raising awareness at all levels through public and educational systems, and through the work of the highly qualified CORS staff.

CORS is responsible for carrying out its professional and administrative roles, as well as inspection-related duties, in accordance with the legislation (12).

Surveillance. A number of research centers carry out investigations and provide expertise in the area of chemicals safety, such as the Russian Register of Potentially Hazardous Chemical and Biological Substances and the A.N. Sysin Research Institute of Human Ecology and Environmental Health (19).

In the *United Kingdom*, the National Health Service and many health agencies have been reorganized (2013) to create Public Health England, a new body through which the public health sector will contribute to SAICM. This will be achieved on the basis of advice received from the Centre for Radiation, Chemicals and Environmental Hazards (CRCE). In addition, the role of Chief Medical Officer in the delivery of health and advice on public health issues

extends beyond the Department of Health to include all other governmental departments. CRCE provides the public with advice on how to protect themselves from hazards resulting from exposure to chemicals, poisons, and radiation (ionizing, non-ionizing, ultrasound and infrasound), and with related services; it also carries out research in this area. CRCE commissions the National Poisons Information Service (NPIS), which provides advice 24/7 on treatments and poisonings, as well as laboratory and technical services and training courses,⁴ expert information and advice to government and other bodies, as appropriate. In the *United States*, several public health institutions are responsible for activity in the area of chemicals safety (Box 4).

Box 4

Case study. Public health institutions in the United States (selected information)

The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal public health agency of the United States Department of Health and Human Services. ATSDR serves the public by using the latest science, taking responsive public health action, and providing trusted health information to prevent harmful exposure to toxic substances and diseases related to such exposure. So that ATSDR may fulfil its statutory responsibilities, it is housed jointly with the National Center for Environmental Health. It is responsible for the following programme areas: public health assessment; toxicological profiling; emergency response; exposure and disease registration; research on health effects; health education; and special initiatives in environmental health.^a

The Centers for Disease Control and Prevention (CDC) collaborate to create the expertise, information and tools needed to help protect the health of communities and individuals. This is done through activities related to health promotion, the prevention of disease, injury and disability, and preparedness for new health threats. CDC have specific topic areas in environmental health and chemical safety, including: air pollution and respiratory health; bio-monitoring; the prevention of childhood lead poisoning; exposure of the community to hazardous substances; human exposure to environmental chemicals; smoking and tobacco use; and toxic substances.^a

The National Institute of Environmental Health Sciences (NIEHS) is home to the National Toxicology Program, an interagency programme dedicated to testing and evaluating substances in the environment. The National Toxicology Program Division oversees and carries out the activities of the National Toxicology Program towards its goals, including: the provision of toxicological evaluations on substances of public health concern; the development and validation of improved (more sensitive, more specific, and faster) toxicological methods; the development of approaches and the generation of data for strengthening the science base for risk assessments; and the communication of results to all stakeholders (19).

^a Information on environmental health topics available at CDC website: <http://www.cdc.gov/environmental/>, accessed 14 January 2014.

⁴ Information on the chemical incident emergency toolkit available at: <http://www.hpa.org.uk/cietoolkit>, accessed 20 January 2014.

In many of the health-sector departments, the chemicals-related function may consist mainly of the poisons information service (if it exists) responsible for clinicians treating exposed persons. The strategic chemical-management function may not even be mentioned in the business planning of the department. It is in this connection that failure of the health sector to contribute to national strategic management and to provide systems to enable compliance with IHR will be felt most acutely.

To enable the health sector to perform its important role in national chemical management, i.e., risk assessment, health-impact assessment, monitoring, control and surveillance, the proper infrastructure must be in place.

Experience in the collection, dissemination and communication of information by health-sector institutions

Global level

WHO organizes the collection of information on specific topics, such as persistent organic pollutants, heavy metals and other priority pollutants and their influence on health, and disseminates it via its website.

INCHEM, the website of the International Programme on Chemical Safety (IPCS), provides rapid access to international peer-reviewed information on chemicals or combinations of chemicals commonly used throughout the world, which may also occur as contaminants in the environment and in food. It consolidates information from a number of intergovernmental organizations whose goal is to assist in the sound management of chemicals (20). On the IPCS website, concise international chemical assessment documents (CICADs) provide internationally accepted

reviews on the effects of chemicals or combinations of chemicals on human health and the environment. They aim to characterize the hazard and dose response of exposure to chemicals and to provide examples of exposure estimation and risk characterization for application at the national or local levels. They summarize the information considered critical for risk characterization in sufficient enough detail to allow independent assessment (21).

In cooperation with ILO, WHO has developed International Chemical Safety Cards that are now available on the Internet in 26 languages. These provide essential health and safety information on chemicals to promote their safe use. They are used by workers at shop-floor level and by those responsible for health and safety in factories, agricultural and construction settings and other workplaces, and they often form part of education and training activities.⁵

National level

The following examples from the *United Kingdom* and the *United States* illustrate ways in which the health sector collects information about chemicals and health at the national level and communicates it to other stakeholders and the public. The ability to be able to carry out this function is vital for the health sector to be able to contribute to the national management of chemicals.

In the *United Kingdom* in 2005, the newly formed Health Protection Agency published *Health protection in the 21st Century. Understanding the burden of disease; preparing for the future*, establishing its future priorities. The report was based on sound evidence, drawn from a wide variety of information to give an overview of the burden of diseases before addressing the specific topics of infectious diseases, non-infectious diseases associated with radiation, chemical incidents,

⁵ Information on International Chemical Safety Cards available at: <http://www.who.int/ipcs/publications/icsc/en/>, accessed 20 January 2014.

poisons and environmental pollution, as well as other areas of concern, such as injuries and asthma. Two cross-cutting themes were also included: children and inequalities. It is recognized that, although it includes a considerable amount of data and information, this report is not fully comprehensive and there are areas, which still need to be addressed. It is intended "as a useful framework to help underpin the strategies of other organisations involved with health outcomes and to raise awareness". It is "the first step in what will be a continuing process in collaboration with the many stakeholders and partners of the Health Protection Agency" (22).

TOXBASE, a database commissioned by Public Health England and produced by the National Health Service (NHS), provides information about the routine diagnosis, treatment and management of patients suffering from exposure to a wide range of pharmaceuticals and chemicals (agricultural, household and industrial), toxic plants and animals. It includes information on about 14 000 products and on poisoning in pregnancy, chemical incidents, antidotes and educational activities. TOXBASE is available free of charge to NHS-registered users (normally departments or surgeries rather than individuals). There are around 5000 active users, mainly in the United Kingdom and Northern Ireland, the main ones being hospitals, NHS Direct and NHS 24 contact centres.⁶

In the *United States*, CDC's Division of Laboratory Sciences coordinates the National Biomonitoring Program (NBP), which currently measures more than 450 environmental chemicals and nutritional indicators in people. All of the methods used by NBP have been published in peer-reviewed journals so that other laboratories can use them. NBP also shares its methods with many state public health laboratories and provides training in how to use them (23).

Each year, NBP works with many different groups, including state health departments, to provide information on exposure for public health investigations or emergencies, as well as



⁶ Information on National Poisons Information Service and TOXBASE available at: <http://www.npis.org/toxbase.html>, accessed 19 January 2014.

for up to 70 exposure studies. Health officials need biomonitoring information to help them make decisions that will benefit the health of the American people. CDC scientists also collaborate with United States government agencies, state and local health departments, universities, community organizations and international organizations on national studies of general population exposure and specific exposed population groups, such as children. The information collected is tabulated and communicated through:

- environmental chemical publications;
- NBP;
- NBP biomonitoring summaries (24);
- *National report on human exposure to environmental chemicals* (25);
- NBP chemical fact sheets (26).

Since 1986, the Agency for Toxic Substances and Disease Registry (ATSDR) has been required by law to conduct public health assessments at the sites included in the national priorities list of the United States Environmental Protection Agency. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. ATSDR also conducts public health assessments when petitioned by concerned individuals. The assessments are carried out by environment and health scientists working at ATSDR and in states with which ATSDR has cooperative agreements. The reports on the assessments are a valuable source of information on exposure, its health effects and community engagement. They are made available through an interactive map of the states (27).

So there is a substantial body of evidence published on the websites of many governments and national agencies to the effect that the health sector plays a significant role in the collection and dissemination of information on chemicals management. The main problem is the collection of information in developing countries and countries with economies in transition because of a lack of monitoring

systems and technical and human resources. The development and implementation of sound chemicals-management systems, including the collection of information on the health effects and other health-related aspects of chemical safety, would improve information collection and dissemination significantly.

Awareness raising and capacity building (education) at the international and national levels

International level

In 2010–2011, WHO carried out several capacity-building activities to strengthen the public health management of chemical incidents and chemical risk assessment, including the regional and national workshops and training events for the health sector held in Côte d'Ivoire (in 2010 and 2011), Jamaica (2010), Thailand (in 2010 and 2011), Armenia (2011) and Jordan (2011). In addition, WHO contributed to training workshops on the same topics in Ghana (2010) and Chile (2011) (28).

The opportunity was taken at these events to raise awareness about IHR and to introduce, promote and disseminate the publications, WHO *Manual for the public health management of chemical incidents* (29) and *WHO human health risk assessment toolkit: chemical hazards* (30).

The EU project, European Training for Health Professionals on the Rapid Response to Health Threats (ETHREAT), was launched in May 2005. Its aim is to plan and develop an educational package containing all the information and the training material necessary to empower European health professionals, including the health personnel of the armed forces, to rapidly recognize and adequately respond to new public health threats, such as attacks with biological, chemical and radiological agents.⁷ In Thailand, the Chulabhorn Research Institute, Bangkok, which is part of the Center of Excellence on Environmental Health, Toxicology

⁷ ETHREAT website available at: <http://euprojects.org/ethreat.info/index.htm>, accessed 20 January 2014.

and Management of Chemicals, provides graduate courses on environmental toxicology, occupational and environmental medicine, environment and health risk assessment, and management of toxic chemicals. It also offers an electronic distance-learning tool on risk assessment and risk management for medical doctors, environmental specialists, chemists, biologists and others involved in risk assessment and management. This activity is supported by WHO.

The WHO Collaborating Centre for the Public Health Management of Chemical Incidents has established an international training centre as part of Cardiff Metropolitan University's International Training Centre. It is the result of collaboration between the WHO Collaborating Centre, Public Health England, the G7 countries (Canada, France, Germany, Italy, Japan, the United Kingdom and the United States) and Mexico, Cardiff University, Cardiff Metropolitan

University and Public Health Wales. The training centre provides e-training in the emergency management of public health incidents (31).

At the international level, efforts are being made by WHO and its collaborating partner to develop training materials to train the trainers and to assist countries in the development of their national education and training programmes.

National level

According to existing information, many countries run education courses in the area of chemical safety for public health and other relevant professionals.

In the *Russian Federation*, a system of continuing education and post-graduate training has been implemented (Box 5).

Box 5

Case study. Postdoctoral education system in the Russian Federation

In the Russian Federation, medical physicians, hygienists, epidemiologists and experts in preventive toxicology alike are considering the human-health and environmental problems caused by exposure to chemicals.

After studying for six years in higher medical-education establishments, young specialists receive post-graduate internships, which provide a one-year course to improve their knowledge about: actual issues of chemical safety; the regulation of chemicals and chemical products; occupational hygiene (in connection with which special attention is paid to exposure to industrial carcinogens, reproductive toxicants and endocrine disruptors at the workplace); risk assessment; monitoring of environmental pollution and environmental health; and other topics related to chemicals management. On completion of the internship, physicians repeat the certification programme every five years. The certification courses are offered by higher medical educational establishments and institutes of post-graduate education.

Physicians with medical and prophylaxis profiles obtain their knowledge through certification courses in the same areas as the medical interns do, but their courses are more in-depth and take the physicians' specialties into account. Higher post-graduate courses are also provided, for example, that run by the Moscow State Medical Academy of Post-graduate Education, "Risk assessment of environmental factors on population's health and societal and hygiene monitoring", during which all stages of risk analysis and the major aspects of chemical safety are examined in detail.

In the *United Republic of Tanzania*, chemical-safety issues are included in the curricula of higher-education institutions. For example, the Muhimbili School of Hygiene offers courses on chemical safety, and the Department of Chemical and Process Engineering at the University of Dar es Salaam runs a course on work environment and chemical safety, as well as continuing education courses on the same subject.⁸

In the *United States*, NIEHS fosters scientific learning and provides opportunities for students of all ages. Post-doctoral research fellowships at NIEHS are funded for up to five years. Funding opportunities depend on the fellow's research area of interest, citizenship, experience and previous training. In addition to scientific training, postdoctoral fellows at NIEHS have the opportunity to participate in a wide variety of professional- and career-development activities. The Fellowships in Environmental Medicine for Medical Students is a one-year programme that allows medical students to participate in laboratory, epidemiological or

clinical research related to environmental health issues. The NIEHS Summer Internship Program provides research internships during the summer period for outstanding high-school and college students interested in pursuing higher education and careers in the biomedical and biological sciences. NIEHS Trainees Assembly comprises all NIEHS fellows in training, regardless of their education or career levels. The Assembly has a steering committee, which serves as a liaison between the NIEHS fellows and NIEHS leadership/management. The Office of Fellows' Career Development provides NIEHS intramural pre-doctoral and postdoctoral fellows with information and professional skills to help them obtain training positions and excel in their scientific careers (32).

CDC recently launched CDC Learning Connection to help the public health community locate learning products developed by CDC and their partners. Relying on a multifaceted approach, CDC Learning Connection focuses on quality e-learning and "spotlights" based on public health topics. Also featured is the CDC



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⁸ Information on training courses available at: <http://soh.ac.tz/index.php/what-we-do/training>, accessed 20 January 2014.

TRAIN,⁹ a learning resource available anywhere, anytime to all public health professionals working both within and outside CDC (33).

Thus, the education and training of medical professionals are critical to capacity-building in the health sector and to the fulfilment of its role. In the main, public health professionals are educated in chemical safety, an issue rarely included in education and training programmes for health-care professionals (endocrinologists, oncologists, gynaecologists). Very few countries include environmental health and chemical safety in licensing programmes. It is hoped that intensive awareness-raising exercises will change the attitude of professionals with regard to the effects of chemicals on human health and change their approach from treatment of these effects to prevention of them.

Awareness raising

Awareness raising in the context of health-sector involvement in chemicals management should be discussed from different angles: awareness raising among politicians and decision-makers with a view to policy development and the implementation of protective measures; awareness raising among public health and health-care professionals; and awareness raising in different population groups regarding the safe use of chemicals.

A few examples of how medical professionals have influenced the development of policy and legislation through awareness raising campaigns are provided below.

In 2008, United States Congress passed the Consumer Product Safety Improvement Act permitting the Consumer Product Safety Commission (CPSC) to regulate phthalates. As a result of many scientific and epidemiological

studies conducted by medical professionals, CPSC chose to regulate six phthalates, five of which had previously been determined safe at current levels. Information regarding CPSC's choice was delivered to decision-makers (34).

EPA developed the Endocrine Disruptor Screening Program in response to the statutory mandate in the Federal Food, Drug, and Cosmetic Act (FFDCA) to "...develop a screening program...to determine whether certain substances may have an effect in humans that is similar to an effect produced by a naturally occurring estrogen, or such other endocrine effects as the Administrator may designate", and as a result of the efforts of health-care professionals to raise the awareness of politicians about the effects of endocrine-disrupting chemicals.¹⁰

There are many examples at the global level of measures taken as a result of health-care professionals' awareness-raising campaigns, such as the prohibition of the use of asbestos and persistent organic pollutants, and restriction of the use of mercury and other heavy metals.

So the awareness-raising role of health and public health professionals is important in advocating the protection of human health from the impact of chemicals. To be able to achieve this, the collection of information through different scientific research projects, and health-risk and health-impact assessments at the national and international levels, is of the essence. Thus, it is essential that the national framework for health-sector involvement include all of the elements necessary for the successful involvement of the health sector in the implementation of SAICM.

Raising the awareness of and educating the public and different population groups (for example, workers) is another important role of health-sector professionals.

⁹ CDC TRAIN is an external learning management system — a learning resource for public health professionals and an affiliate of the Public Health Foundation TrainingFinder Real-time Affiliate Integrated Network (TRAIN).

¹⁰Website of the Endocrine Disruptor Screening Program available at: <http://www.epa.gov/endo/>, accessed 20 January 2014.

UNEP, in cooperation with the WHO Regional Office for Europe and the National Poison Centre of the Science University Malaysia, has produced a teaching compact disc (CD) for children called, "Toxicology in the classroom".

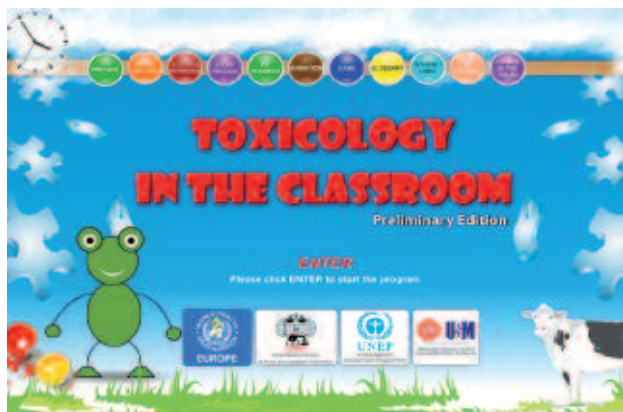
The CD will help create a basic understanding of toxicology and an awareness of the need for protective and precautionary measures to avoid the adverse effects of exposure to toxic chemicals on human beings and the environment.¹¹

NIEHS provides resources for classroom activities for students, including material on exposure, poisons, hazardous chemicals and other topics (32). NIEHS Kids' Pages on the Internet provide activities, songs, stories, jokes, and other resources designed to introduce children in a fun way to the concept of how they interact with their environment and how the environment may affect their health. Children and parents are encouraged to access and enjoy the site together.

Training courses on chemical safety, developed with the active participation of health-sector professionals, are held in the majority of countries for workers, farmers and other professional groups.

Green health care

Hospitals and other health-care organizations influence the environment by: generating waste that may include hazardous chemicals (cleaning products, disinfectants, pharmaceuticals, insecticides); using medical devices, equipment, light bulbs containing mercury and other materials and devices that may have toxic effects (polyvinyl chloride (PVC), Di(2-ethylhexyl) phthalate (DEHP), heavy metals (electronics, batteries); consuming large amounts of energy (buildings, car fleets); and generating significant



greenhouse gas emissions. This is another side of health-sector involvement in chemicals management – the user side – which should be taken into consideration in health-sector organization with a view to creating a safe environment for patients and workers, developing a chemicals-management system and preventing environmental impact by implementing sustainable energy consumption and waste management.

WHO activities in this area include: developing technical guidance materials on assessing the quantities and types of waste produced in different facilities; creating national action plans; developing national health-care waste-management guidelines, and building capacity at the national level to enhance the way in which health-care waste is dealt with in low-income countries.¹²

There are many examples of green health-care initiatives taken by medical workers' associations. For example, in the United States in 2007, the California Department of Public Health established the Medical Waste Management Program in its Environmental Management Branch to protect the public and the environment from potentially infectious-disease-causing agents. It regulates the generation, handling, storage, treatment, and

¹¹ Information on Toxicology in the Classroom available in English at: <http://www.unep.org/hazardoussubstances/UNEPsWork/Pesticides/ToxicologyintheClassroom/tabid/104445/Default.aspx>, accessed 20 January 2014.

¹² Further information on WHO activities in health-care management available at: http://www.who.int/water_sanitation_health/healthcare_waste/en/, accessed 7 October 2013.

disposal of medical waste by providing an oversight of action being taken to implement the Medical Waste Management Act, which permits the inspection of all offsite medical-waste treatment facilities and medical-waste transfer stations. In addition to the treatment methods specified in the Act, there are more than a dozen alternative medical-waste treatment technologies approved for use in California.¹³

The Green Hospital Pilot Project

In 2006, the Pennsylvania Department of Environmental Protection received a grant from EPA for the Green Hospital Pilot Project, the aim of which is to reduce the use of toxic chemicals and increase sustainable practices in hospitals in south-eastern Pennsylvania. The Department partnered with the Women's Health and

Environmental Network (WHEN) and the Health Care Improvement Foundation in producing a number of case studies and a compendium of best practices that are available to all hospitals. The case studies feature waste reduction, environmentally preferable purchasing, and a pharmaceuticals management programme. The compendium of best practices covers green teams, environmental purchasing guidelines, food-service sustainability, waste minimization, leadership in energy and environmental design (LEED) gold certification, reduction of regulated medical waste, and effective waste management.¹⁴

The involvement of the health sector as a user in chemicals management will facilitate a better understanding of the requirements for sound chemicals management in general, and influence awareness raising and capacity building among medical workers in particular.



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¹³ Further information on the Medical Waste Management Program available at: <http://www.cdph.ca.gov/certlic/medicalwaste/Pages/default.aspx>, accessed 7 October 2013.

¹⁴ United States Environmental Protection Agency webpage on sustainable healthcare: <http://www.epa.gov/Region3/green/healthcare.html>, accessed 7 October 2013.

Financial considerations

Financial support for health-sector involvement in chemicals management is very important. According to the results of the survey conducted by the WHO Regional Office in 2012 to assess the current capacity in the WHO European Member States for addressing issues of chemical safety and identify gaps and set priorities for the implementation of the Parma Declaration on Environment and Health (2010), only 20% of the countries' health sectors had dedicated financial resources for the implementation of international chemical agreements and, in most of them, these resources were for IHR implementation (22). Nevertheless, there are some good examples of national experiences in this area, for example in Thailand and the United States.

The Thailand Research Fund finances chemical safety projects that are considered a priority by the National Chemical Committee and applied by all interested stakeholders, including health-sector institutions.¹⁵

The United States Congress funds NIEHS through annual appropriations. The Office of Policy, Planning and Evaluation (OPPE) supports NIEHS in defining and interpreting its programmes and research so that they are comprehensible to Congress, the scientific and public health communities and the public. OPPE also serves as a liaison to help ensure the accessibility and responsiveness of NIEHS to Congress and various government, health and scientific agencies and organizations, as well as to the public (35).

In many countries, public and environmental health units in ministries and national public health scientific institutions receive financial support from government budgets. This means that if chemical safety was recognized at the national level as a priority for public health activity, some degree of financial support would be available.

International resources, such as the SAICM Quick Start Programme Trust Fund, have been used to support health-sector activities at the national level. A number of projects have been implemented on: strengthening capacities for SAICM implementation in Albania; country support to Gabon and Kenya for the implementation of the Libreville Declaration on Health and Environment in Africa; management of priority industrial carcinogens in Indonesia, Sri Lanka and Thailand; recycling and disposal of long-lasting insecticide-treated bed nets in Madagascar; management of public health pesticides in Morocco; a national pollutant release and transfer register in Panama; strengthening chemicals management in Peru, the Philippines and Uruguay; and on the feasibility of a subregional poisons centre in the East Africa subregion (28).

In the majority of the countries, the environmental sector leads projects on the implementation of international chemicals-related agreements funded from international resources (Global Environment Facility, World Bank) and involves the health sector (as well as other stakeholders) in the development of the national implementation plan.

Thus, a number of possibilities exist for raising funds for health-sector involvement in chemicals management, including national and international resources (national budgets, international research projects and programmes). The role of the health sector in chemicals management is very broad and, therefore, health-care and public-health professionals, as well as policy-makers in the health sector, should be invited to share their expertise by participating in relevant projects. Accordingly, all chemical-safety projects being implemented at the national and international levels, including the necessary health expertise, should receive sufficient financial support.



¹⁵ Information on the Thailand Research Fund available at: http://www.trf.or.th/index.php?option=com_content&view=article&id=47&Itemid=122, accessed 17 January 2014.

DISCUSSION

In the context of this document, the health sector refers to general practitioners, emergency physicians and clinicians, toxicologists, public health professionals, and paramedical and nursing staff. This discussion relates to the fundamentally important role of health-care professionals in the various stages of the chemical life-cycle, i.e., synthesis, manufacture, storage, transportation, marketing and waste disposal, as all of these may result in the contamination of air, water, soil and food and, subsequently, in human exposure and potential health effects. The role of the health sector is to assess the health risks posed by potential exposure to such chemicals during each of these phases and by occupational exposure, permitted industrial releases and discharges, waste disposal and the aftermath of acute chemical incidents and events (both accidental and deliberate). Having identified the hazards and assessed the risks, health-care professionals have an important role to play in helping to mitigate or prevent the risks of exposure, thereby protecting public health. Their findings need to be disseminated in a timely, open and transparent manner. They form the basis for translating science into policy.

This process provides health-sector input into preventative measures, such as environmental planning and environmental permissions, policy development and implementation, legislation development and regulation, waste management and emergency planning and preparedness. Thus, the health sector needs to assess the health risks associated with societal need for, and utilization and disposal of, chemicals and to protect health through subsequent risk mitigation and communication measures. For the health sector to be effective, action is required in six principal areas: (1) awareness raising; (2) risk assessment; (3) capacity building and resilience; (4) information collection and dissemination; (5) intersectoral communication and collaboration and effective action; and (6) international leadership and coordination (10).

Awareness raising

Industry produces large quantities of chemicals to address societal need. Some of these chemicals are recognized as being toxic to the environment and/or human health. They include high production volume (HPV) and toxic industrial chemicals (TICs) produced for and utilized by the agricultural, pharmaceutical, industrial, domestic, food and water and sanitation sectors. The inappropriate handling, storage and disposal of such chemicals, together with chemical incidents and events, may result in occupational and widespread community exposure with consequent significant acute and chronic health effects. An awareness of the presence, type and quantity of chemicals in a given geographical locality, together with an appreciation of the likely health impact of exposure to these chemicals, enhances the understanding of chemical hazards and contributes to risk mitigation and health protection.

Awareness raising has three major components: (1) establishing and maintaining robust and resilient channels of communication between the health sector and industry; (2) ensuring that the health sector can recognize and manage health effects that are (or may be) due to environmental chemical hazards; and (3) communicating the risks to the community.

Role of the health sector

The role of the health sector in raising awareness about the health implications of chemical environmental hazards can be summarized as follows:

- hazard identification through the establishment of close working relationships with the chemical industry and major users of environmental chemicals, such as the agricultural and water industries;
- risk characterization through the evaluation data resulting from animal, occupational, epidemiological and environmental studies;

- risk communication with communities and the general public;
 - risk management through collaborative, integrated and holistic planning, preparedness and response activities, education and training, and contribution to occupational and environmental control measures, including the development of policy, regulations and legislation;
 - research and development to address key gaps in the field;
 - publication and dissemination of findings.
- duration of exposure, and number of people exposed;
 - risk characterization based on the conclusion of community risk resulting from the aforementioned steps (through a clear, robust and well-defined process);
 - risk prioritization to optimize health-sector input to the safe management of chemicals;
 - risk mitigation and, thereby, reduction of health risk;
 - community engagement and risk communication.

Risk assessment

The assessment of the health risks associated with environmental chemicals is a cornerstone of the sustainable and safe management of chemicals and one of the health sector's key roles. It is the end product of assessments of the sources of chemical release, exposure, and contamination of the environmental media of water, soil, air, and food, as well as a toxicological evaluation. It requires collective expertise in environmental chemistry, environmental science, environmental toxicology, clinical toxicology, analytical chemistry/biochemistry, environmental epidemiology and public health. It is a prerequisite for risk prioritization, risk mitigation and risk communication to protect public health.

Role of the health sector

The health sector has a pivotal role to play in identifying hazards and characterizing risks during every stage of the chemical life-cycle. The principal components are:

- development of harmonized methods of risk assessment;
- hazard identification in conjunction with the chemical, manufacturing and service industries and utilities;
- dose-response assessment following an evaluation of data on animal, occupational, epidemiological and environmental studies;
- assessment of magnitude, frequency and

Building capacity and resilience

The large number of chemicals within the "universe of chemicals", together with the recognized health burden associated with environmental exposure to such chemicals, poses a significant challenge to the health sector. The health sector needs to contribute proactively at the local, regional, national and international levels to the development of preventive, legislative and regulatory measures for the safe management of chemicals. This requires a health-sector workforce that is robust, resilient and knowledgeable about all phases of the chemical life-cycle.

The health sector needs to be able to respond to a myriad of challenges pertaining to environmental contamination associated with societal dependence on chemicals. It must be able to contribute to the safe management of chemicals through multiagency and multidisciplinary measures of protection, planning, preparedness, policy development, policy implementation, legislation and regulation, as well as to respond in a timely, scalable, flexible, efficient and effective manner to environmental chemical exposure. To this end, the health sector needs to assure sufficient capacity and resilience by:

- clearly defining its roles and responsibilities in this field;
- creating an awareness of the respective roles and responsibilities of other agencies, organizations, sectors and disciplines;
- developing curricula;

- tailoring training, including vocational training;
- establishing collaboration with the academic sector on the provision of accredited education and requirements for the attainment of recognized qualifications;
- establishing programmes for continuing professional development;
- developing sufficient 24/7/365 capacity;
- developing audit programmes as part of ongoing governance;
- establishing translational research and development programmes to address key gaps;
- publishing and disseminating key findings;
- engaging with other key stakeholders and the public.

The safe management of chemicals with the aim of protecting human health lies at the heart of SAICM. Accordingly, it is incumbent on the health sector that it be central to the policies and practices related to the synthesis, storage, utilization, manufacture, transportation and disposal of environmental chemicals. To this end, the health sector requires a workforce that

is familiar with hazardous chemicals and the environmental media they contaminate, and that understands their likely impact – both acute and chronic – on health. Therefore, training is required in several fields, including environmental chemistry and toxicology, analytical chemistry and biochemistry, epidemiology and public health. This is a considerable undertaking but would provide the basis for an integrated, holistic approach to environmental hazards of this type.

The revised IHR (2005) exemplify the recognition achieved of the importance of developing capacity and resilience for health. The Regulations require the reporting of all public health events of international concern, including those involving chemicals and radiation. They also require countries to develop capacities and resilience for managing incidents and events associated with environmental hazards and, thus, provide the legislative basis for enhancing public health management of exposure to chemical hazards during all phases of the life-cycle of chemicals.



Collection and dissemination of information

As exposure to environmental chemicals may lead to both acute and chronic health effects, it is important to collect information on the sources, types, nature and magnitude of releases and subsequent environmental contamination. This information provides a basis for alerting and notifying the government in a timely manner, which in turn allows for timely intervention, as well as surveillance, environmental public health tracking, epidemiological investigation and research and development. The collection of information is a vital component of the health-sector's role in this field.

The ultimate role of the health sector then is to protect public health through liaison with other agencies, parties and disciplines to identify the locations of hazardous-waste and other waste-disposal sites, polluting industries, water-abstraction points, major chemical industries, chemical-storage sites, and transport routes. In addition, the health sector, together with key partners, needs to establish an inventory of potentially hazardous chemicals to which a given community could be exposed, and a system of monitoring air, water, soil and food so that background levels and exposure following an incident may be ascertained.

To be able to establish systems and structures for the identification, detection and timely notification of exposures, it is necessary to:

- establish robust channels of communication with relevant stakeholders to facilitate the reporting of, and response to, incidents and events in a timely, efficient and effective manner;
- establish biomonitoring capability and programmes to enable the estimation of background population exposure and uptake following an incident/event;
- collect health data relating to environmental insults;

- establish surveillance of chemical incidents and events to facilitate an understanding of the trends, patterns and potential health impact of environmental chemicals;
- undertake environmental epidemiological investigations;
- establish translational research programmes;
- establish environmental public health tracking systems to gain further knowledge about the potential health impact of exposure to chemical contaminants;
- integrate data relating to any acute or chronic incidents/events and point/nonpoint sources of pollution with exposure estimates and reported health effects in order to establish the burden of disease;
- establish complimentary epidemiological strategies;
- establish robust and resilient channels of communication with other key stakeholders to ensure that health advice is at the heart of policy, planning and permissions (for activities, placing chemicals on the market), as well as emergency planning, preparedness, response and recovery;
- establish robust and resilient channels of communication with the public (and/or their representatives) and the media so that information about risks from environmental chemicals may be disseminated in an open, transparent and timely manner during both the risk and crisis-communication phases.

Protecting the health of the public requires the development and implementation of risk-mitigating measures through a combination of actions to promote the safe handling of chemicals, and the reduction of the risk of environmental contamination and community exposure. Collecting information on the synthesis, storage, utilization, transportation, handling and disposal of chemicals provides a basis for implementing tailored preventive measures and assessing exposure and quantitative risk, as well as for delivering a multidisciplinary response in a timely, efficient and effective manner.

Intersectoral communication and collaboration

The safe management of chemicals requires an integrated and holistic approach and the input of many agencies, organizations and disciplines. These include the chemical and manufacturing industries and the sectors for agriculture, food, the environment, health, transport, and utilities.

The health sector needs to be placed at the core of this collaboration to ensure health protection.

The ultimate role of the health sector is to assess, manage and communicate risks associated with the societal use of chemicals. This can be achieved by:

- establishing robust and resilient channels of communication with other key stakeholders;
- creating understanding of and agreeing on key roles and responsibilities, underpinned as necessary by service-level agreements and memoranda of understanding;
- sharing expertise and information;
- assessing the principal hazards and risks (with multidisciplinary involvement);
- mapping the major sources of chemical hazards;
- developing integrated and holistic approaches to policy, legislation and regulation, as well as to key areas, such as environmental monitoring and modelling, surveillance, risk assessment and risk communication;
- integrating emergency management.

International leadership and coordination

WHO advocates the strengthening of health systems globally, particularly in relation to health inequalities. In some countries, shortages in this field lead to an inability to fully engage in the safe management of chemicals. As health risks posed by chemicals typically are faced by many countries, strengthening health systems in this area can be achieved by developing appropriate structures, capacity and resilience, reinforced by a suitable dissemination and exchange of information, practices and guidance among countries. Leadership from international agencies, relevant convention secretariats, multilateral funding agencies and regional development banks would further strengthen the sustainability and safety of chemicals management at the global level.

Many of the chemical threats faced by communities, such as indoor and outdoor air pollution, chemical accidents and terrorism, the contamination of land and water and the dangers of waste disposal, are of global concern. Accordingly, collaboration on, and the coordination of, activities in this area, as well as exchanges of information and expertise, may enhance the safe and sustainable management of chemicals.



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The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

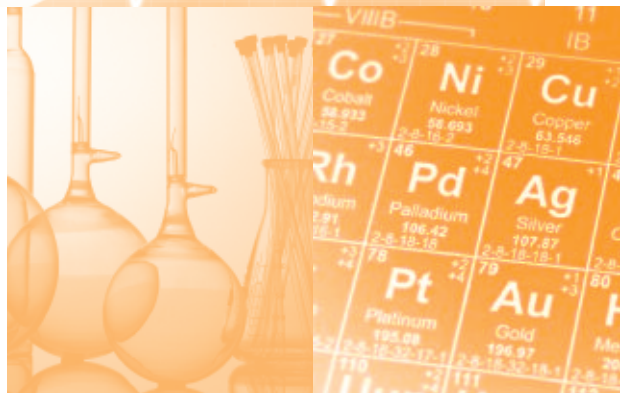
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Health-sector involvement in chemicals management at the national level: review of current practice



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