WHO-EM/CEH/150/E

Report on the

# Regional training workshop on tools and methods of environmental health and chemical risk assessment, management and communication

Amman, Jordan 18–21 September 2011



Regional Office for the Eastern Mediterranean

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#### WHO-EM/CEH/150/E

#### 1. INTRODUCTION

A regional training workshop on tools and methods of environmental health and chemical risk assessment, management and communication was organized by the WHO Regional Office for the Eastern Mediterranean on 18–21 September 2011 in Amman, Jordan. The workshop was attended by focal points for environmental health and chemical safety in countries of the Eastern Mediterranean Region. Its objectives were to:

- introduce concepts and tools for chemical and environmental risk assessment, management and communication;
- demonstrate the ability to conduct risk assessments and improve risk communication strategies; and
- review the status of chemical safety activities in the Region.

The workshop was opened by Dr Ahmad Basel Al-Yousfi, Acting WHO Representative for Jordan and Director, WHO Centre for Environmental Health Activities, who delivered a message from Dr Hussein A. Gezairy, WHO Regional Director for the Eastern Mediterranean. In his message, Dr Gezairy referred to a recent WHO global study on preventing disease through healthy environments which estimated that almost a quarter (24%) of the global burden of disease and one third of the burden in developing countries was caused by modifiable environmental risks. These environmental factors, which included air pollution, unsafe water and sanitation, improper solid and hazardous waste management, unhygienic food among others, contributed to major diseases such as respiratory illnesses, diarrhoea, malaria and unintentional injuries. Similarly, chemicals in the environmental health practitioners required professional expertise in environmental health risk assessment, management and communication.

Dr Bassam Al-Hijjawi, Director, Primary Health Care, Ministry of Health, Jordan, in his inaugural address drew attention to the strong commitment of the Ministry of Health to addressing environment-related diseases, noting that the Department of Environmental Health within the Ministry of Health was responsible for translating this strong commitment to environmental health. He closed by highlighting the importance of this subject.

Dr Haifa Madi, Director, Health Protection and Promotion, WHO Regional Office for the Eastern Mediterranean, reiterated that the training would provide an excellent opportunity for the focal points of environmental health and chemical safety in Member States and also help them to identify links between risk management and communication.

Dr Ahmad Al-Shatti (Kuwait), was elected as Chair for the first day; Dr Jamal Abdul Nasir (Pakistan) for the second day; and Mr Maher Shehadeh (Jordan) for the third day of the workshop. The agenda, programme and list of participants are attached as Annexes 1–3, respectively.

# 2. TECHNICAL PRESENTATIONS

# 2.1 Overview of the status of chemical safety activities in the Eastern Mediterranean Region

Dr Mohamed Elmi, WHO Regional Office for the Eastern Mediterranean

Human poisoning by pesticides is a major problem in developing countries. The data on pesticide poisoning are very limited. However, a network of various agencies has been identified for a global alert system for chemical incidents and outbreaks. This comprises United Nations organizations, nongovernmental organizations, academia, poison information centres and others. Globally, 400 new chemicals are formulated every day and about 100 000 are commercially available.

Chemical pesticides are the most important group of hazardous substances in the Region, but chemical safety data on the situation are quite scarce. Available information shows 130 000 toxic exposures and about 200 deaths per year in Jordan, while in Pakistan 4 million toxic exposures were reported and about 7000 deaths per year. Some countries in the Region have developed national chemical safety profiles, while others are still in the development process.

WHO is also assisting Member States to implement Regional Committee resolution EM/RC49/R.8 (2000) on health effects of environmental conditions. The main regional priorities for chemical safety are to enhance human resource development; develop and strengthen existing national and local chemical safety plans; and promote a multidisciplinary approach on chemical safety risk analysis.

# 2.2 Overview of environmental health risk assessment in the Region

Dr Amir E. Johri, WHO Centre for Environmental Health Activities

Environmental health risk assessment is defined as the probability, or chance that exposure to a hazardous substance, at a certain level over certain period of time will impact human health. The public has become increasingly aware of the presence of harmful contaminants in the environment, therefore environmental health risk assessment is designed as a scientific tool to address these concerns. In fact risk assessment helps scientists and regulators to identify serious health hazards and determine realistic goals for reducing exposures to toxic contaminants.

Risk assessment consists of four steps: 1) hazard identification; 2) exposure assessment; 3) dose–response assessment; and 4) risk characterization. The risk management framework addresses:

- a clearly articulated problem in its public health and ecological context;
- careful analysis of weight of scientific evidence that supports conclusions about a problem's potential risk to human health and the environment;
- options made after examining regulatory or non-regulatory risk management;
- making a decision based on best available scientific, economic and other technical information;
- taking actions effectively, expeditiously, flexibly and with the support of other stakeholders; and
- proper evaluation of the risk management decision.

Environmental health risk assessment was instrumental in prioritizing environmental health risk factors affecting children within the home environment and its immediate surroundings in Tunisia and Oman. In this project, they were able to develop monitoring tools for environmental health risk factors affecting children in these pilot countries. In the United Arab Emirates, 8 priority environmental health risks were identified using the deliberative process of risk ranking. It was also estimated in a study that the annual numbers of deaths potentially attributable to environmental contamination in the United Arab Emirates are about 600 (outdoor air); 250 (indoor air) and 40 (occupational exposures).

The main objectives of the regional environmental health risk assessment programme are to:

- Provide technical support to the countries to develop/adopt methodologies and tools in environmental health risk assessment for critical risk factors;
- Support countries to develop environmental health risk assessment and management practices including country assessments;
- Provide scientific information on possible health effects of emerging environmental health risks; and
- Establish a regional cooperative network.

#### 2.3 Definitions of terms used in risk analysis

Dr Mohamed Elmi, WHO Regional Office for the Eastern Mediterranean

Risk assessment is based on science and risk management on policies. Risk communication is the interactive exchange of information and opinions concerning risks. Hazard is defined as the inherent property of an agent or situation having the potential to cause adverse effects when an organism, system or population is exposed to that agent. Risk is defined as the probability of an adverse effect in an organism, system or population caused under specified circumstances by exposure to an agent.

Risk assessment is the scientific evaluation of known or potential adverse health effects resulting from human exposures to hazards. The four steps are: hazard identification; hazard characterization; exposure assessment; and risk characterization. Risk management is the process of weighing policy alternatives to accept, minimize or reduce assessed risks and to select and implement appropriate options. Risk communication is defined as an interactive process of exchange of information and opinion on risk among risk assessors, risk managers, and other interested parties including stakeholders and the public.

Variability is the property of nature, the diversity of things and cannot be reduced through further study or additional measurements. Uncertainty is our lack of knowledge. In many cases, it can be reduced through further studies or expert information.

#### **2.4 WHO Human health risk assessment toolkit for chemicals** *Dr Kersten Gutschmidt, WHO headquarters*

The production and use of chemicals continue to grow worldwide, with a tenfold increase in global production during past decades. At present, chemical production is expanding in countries in transition and developing countries. Chemical exposures result in the loss of 7.4 million years of

healthy life per year. Unintentional poisonings cause more than 350 000 deaths per year, out of which 94% occur in low- and medium-income countries.

The human health risks from chemicals generally depend on:

- The amount of a chemical present in an environmental media (e.g. soil, water, air, food) or a product (e.g. commercial, industrial);
- The amount of contact (exposure) a person has with the pollutant in the environmental media or product;
- The toxicity (hazardous properties) of the chemical; and
- Obtaining information to describe these three factors is the cornerstone or foundation of most human health risk assessments related to chemicals.

The newly developed WHO toolkit is intended to assist its users with the performance of human health risk assessments. This toolkit provides road maps for conducting human health risk assessment; identifies information that should be gathered to complete an assessment; lists references and provides case studies that illustrate how the toolkit can be used to address a health risk assessment question. There are several training projects using this toolkit.

# 2.5 Outline of the WHO/International Programme on Chemical Safety risk assessment toolkit case studies exercise

The objective of this fictitious case study is to demonstrate how the principles and road maps that comprise the toolkit can be used by a public health or related professional to evaluate potential risks of chemical contaminants in drinking-water as a result of emissions from a discrete or point source. While the aim of the case study is to demonstrate the thinking behind all stages of human health risk assessment, including hazard identification, hazard characterization/guidance or guideline value identification, exposure assessment and risk characterization, the user of the toolkit should be aware that measuring substances in drinking-water for which drinking water guidelines exist allows a quick and very first assessment of how big a problem there might be and whether there is a need to pursue this.

#### 2.6 Group work on case studies

The participants were divided into three groups (chlorine gas, benzene and endosulfan). After the group discussions and exchange of information, each group presented the four steps of risk assessment in their respective case study.

# 2.7 Environmental health risk communication

Mr Mazen Malkawi, WHO Centre for Environmental Health Activities

Environmental health risk communication is the third leg of the "risk tripod" (assessment, management and communication). The presentation focused on the need for including this programme within the work of environmental health departments. The presentation gave a definition of risk = hazard + outrage.

Communications strategies for environmental health risks concern four different groups of stakeholders. The first group comprises people with low outrage and low risk. The second group comprises people with high outrage and low risk. The third group is people with low outrage and high risk. The fourth group comprises people with high outrage and very high risk (emergencies).

Once the type of stakeholders is known, a suitable communication strategy is needed. One serious mistake is mismatching strategy with type of audience. The first group needs to be approached through normal health education and advocacy tools. For the second group, the communications strategy should aim at lowering outrage, while increasing the outrage should be the goal of communications strategy for the third group. A crisis communication strategy is needed for emergencies.

# 3. COUNTRY PRESENTATIONS

# 3.1 Afghanistan

More than three decades of continuous war has destroyed most of the infrastructure including health. In addition, war has also increased risk exposure to different kind of chemicals used in various weaponries and substandard fuels. At present the environmental health department of the Ministry of Public Health does not have a chemical safety programme or unit. However, other programmes such as food safety, water, sanitation and hygiene, radiation protection, environmental hygiene, urbanization and housing and occupational health are part of the current structure. There are no laws on chemical safety, no mechanisms for monitoring and surveillance and no chemical analysis laboratory. There is a lack of resources and institutional capacity in the Ministry of Public Health to address the chemical safety programme/unit, but requires resources and external assistance especially from WHO.

# 3.2 Bahrain

Many regulations, laws and decrees for the management of chemicals have been promulgated and concerned ministries have been given the mandate to implement this legislation. The description of the key approaches and procedures to control chemicals is summarized as following:

- Labelling of pesticides
- Registration of pesticides
- Licenses for pesticides
- Inspections
- Licenses for setting up or managing industrial establishments
- Registration and inspections of industrial establishments
- Permits for discharge and storage of wastes
- Production, handling and disposal of dangerous materials

Chemical safety programmes also provide information and raise awareness of the workers on prevention of chemical risks. A consumer product safety group was established in 2005 and its objectives are to secure the safety and high quality of cosmetic products, eliminate all unnecessary

adverse effects, develop guidelines for products and maintain and enhance the protection of public health.

#### 3.3 Jordan

Various governmental departments in Jordan are responsible for chemical safety and management. At the Ministry of Health there is more than one department with responsibility for chemicals and their various impacts on health or environment, under the public health law no.47 of 2008. The most important offices controlling the management of chemicals at the Ministry of Health are the environment health directorate and chemical safety department.

However, the main aim of the chemical safety department of the Ministry of Health is to oversee the safe handling of chemicals throughout the whole process, starting from import to waste disposal. Some of the functions of the department include: chemical input control; formulating legislation, strategies and policies; training and research; and information and knowledge sharing

There were 207 chemical poisoning cases in Jordan in 2010. There are several laws that deal with the proper handling of hazardous chemicals. The Royal Scientific Society and the Jordan Institution for Standardization and Metrology have accredited laboratories for chemical analysis.

#### 3.4 Kuwait

The chemical section of industrial environmental management/environment public authority was established in accordance with law no. 21 of 1995 as amended by law no. 56 of 1996. These functions were previously carried out by chemical materials division of the environmental protection department of the Ministry of Health. The law has been promulgated by the environment public authority environmental standards for the production of chemicals and safety, transport, storage, import and export to and from the customs passage through their territory. The government has signed several agreements related to chemicals and the establishment of a national committee to follow up the provisions and recommendations. The composition of the coordinating committee for the regulation of chemicals in accordance with ministerial decree 8/90, be renewed periodically. Now the chemical section inspectors conduct visits to the stores of pesticides and chemicals finding out irregularities concerning the sound management of chemicals in accordance with environmental requirements. They also help in controls regarding hazardous substances. Article 18 explains the establishment of storage for hazardous chemicals under the specific requirements laid down by the competent authority. The coordinating committee for the regulation of chemicals under the umbrella of the environment public authority has representative membership from among many stakeholders including the environment public authority, oil companies, Ministry of Health, public authority for industries, Kuwait Institute for Scientific Research and many others.

The coordinating committee works to: strengthen information exchange for chemicals; oversee the international conventions and international treaties and examine their impact and how they can have positive effect on their local scenario; train and raise awareness and education of citizens regarding the handling of chemicals; evaluate studies for environmental and health benefits and management of chemical projects, among others.

#### 3.5 Lebanon

The Ministries of Public Health, Agriculture, Environment and Labour are responsible and are in the process of strengthening their chemical safety inspection capabilities. The field of the prevention of major industrial accidents has not been developed and all activities in this regard are based on mitigating measures in the form of rapid response. There are laws and regulations to monitor pesticides, persistent organic pollutants (POPs) and various chemicals. Lebanon was among 12 countries chosen by the UNEP to prepare a national implementation plan for the POPs. The Lebanese plan was drafted in 2005. Industrial wastewater generation quantities are monitored regularly and environmental guidelines have been developed for 12 classified chemical industries. The government has also developed guidelines for hazardous waste management. Cosmetics are not regulated in Lebanon; however, imports are subject to visa from the Ministry of Public Health based on certificate of conformity to the Lebanese Mandatory Standards.

#### 3.6 Morocco

A wide variety of chemicals are imported and exported from the country. Petroleum products are mainly imported, while fertilizers and pesticides are exported. Responsibility for chemical safety is shared by different national authorities dealing with health, agriculture, labour, environment, transport etc. There are many commissions and committees which coordinate to undertake chemical safety work. Several chemical safety laws have been enacted. There is a comprehensive system of monitoring and surveillance of chemical exposures. There is an extensive network of laboratories with excellent capacities and capabilities, in terms of skills and equipment. However, there is lack of skills to manage problems related to storage and disposal of chemical waste, and there is a huge concern about dumping obsolete chemicals as it pollutes the soil extensively.

#### 3.7 Oman

A permanent committee for chemicals was established in 1996 and is responsible for overseeing chemical safety in the country. It is composed of various ministries and departments. Several laws have been enacted on chemical safety. There is a proper system of monitoring and surveillance of chemical exposures. The poison control centre is well established and provides information services to the public, including analytical toxicological services, chemical accident preparedness and response, and training and research. Around 8000 of poisoning cases per year were reported, out of which 3% were due to chemicals. The chemical laboratory provides its services to various departments and agencies relevant to chemical safety in the country.

#### 3.8 Pakistan

The Government of Pakistan has many departments which look after chemical management, including production, import, use, storage and disposal, but there is no central body to oversee the different aspects and coordinate efforts of various departments and organizations. Pakistan produces a number of chemicals domestically, e.g. fertilizers, pesticides, soda ash, acids, paints, varnishes etc. There are several policies and laws on the control of chemical production and use. The chemical industry in the country is responsible for most of the production of chemical waste.

From 2003 to 2009, the National Poison Control Centre at Jinnah Postgraduate Medical Centre in Karachi received 5036 patients with poisoning, of which organophosphate poisoning was most common. There are several poison control centres in the country that provide information and technical assistance on chemical safety issues. Well-established chemical testing laboratories are present in most of the provincial capital cities, in particular the Pakistan Council for Industrial and Scientific Research in Lahore, the National Institute of Health in Islamabad and others.

# 3.9 Palestine

There is no proper chemical safety programme in Palestine, but this responsibility has been given to the environmental health department. The chemical safety regulations encompass transfer of materials and hazardous waste storage, treatment and disposal. Circulation and use of pesticides for agriculture and public health are mentioned in the Palestinian public health law. Monitoring and surveillance of chemical exposures are undertaken by the inspectors of environmental health divisions in the governorates, and decisions are taken according to chemical safety regulations. The central public health laboratory was established by the Ministry of Health and is accredited by ISO standard 17025. The staff of the central laboratory analyse samples to identify the presence of a threat to public health, such as chemicals. Qualified staff are still needed for the laboratory. Due to lack of control at the borders, the Palestinian Authority cannot control movements of chemicals in and out of their territories. At present there is no strategy or action plan for chemical safety.

# 3.10 Saudi Arabia

The chemical safety programme in the Ministry of Health was introduced in 2000. The main goal of the programme is to reduce the health hazards related to the use of chemicals and the major objectives are as follows.

- Reduce the incidence of chemical and drug poisoning
- Reduce mortality rate due to chemical and drug poisoning
- Educate personnel handling chemicals and drugs
- Collaborate with all the concerned sectors
- Enhance the national system for surveillance and reporting

The policy on chemical safety includes compulsory notification of chemicals and drug poisoning; creating a registry for these cases; continuous training of personnel; reporting of all deaths due to chemical poisoning to the Ministry of Health; and strengthening the surveillance system and community education and awareness.

# 3.11 Somalia

At present there is no chemical safety programme in place. Chemical safety legislation is in draft format with the ministries of health and agriculture. However, all relevant ministries were sensitized on chemical risk assessment of pesticide exposures in a workshop conducted in Hargeisa. An inventory of available chemicals in the market was made in 2007. A list of chemical importers was registered in Hargeisa and a laboratory for chemical and food analysis was made available by

WHO. Awareness is lacking among the public on chemical risks along with limited technical, financial and human resources. There is poor coordination among all the relevant ministries.

# 3.12 Sudan

Sudan imports considerable amounts of chemicals, which include formulated medicines and pharmaceutical products, raw material for the local pharmaceutical industry, local manufacture of paints, manufacture and maintenance of lead acid batteries, metal degreasing and dry cleaning, as well as food additives.

According to a study carried out in 2004–2005, about 234 tonnes of obsolete POPs pesticides were stockpiled in more than 340 storage sites, most of which were inappropriate, throughout the country. Most of these obsolete POPs were in Northern Darfur, Kassala, River Nile and Al-Gezira states. The National Council for Pesticides and Pest Control Products was established under the chairmanship of the Principal of the Ministry of Agriculture and Forestry to undertake the following functions:

- establish a register for pesticides and pest control products;
- inspect pesticides and products for combating pests;
- develop a registry for pesticides and products for combating pests and renew or cancel such products in accordance with the regulations passed under the Act;
- license the production, preparation and trade in pesticides and pests control products and the cancellation of the same;
- license the importation and exportation of pesticides and pests control products;
- control and supervise the elimination of the extra stock of pesticides and pests control products;
- establish an organ for control, assessment and inspection of pesticides and pests control products.

The National Medicines and Poisons Board, headed by the Minister of Health, was established to perform functions which include: regulating import of drugs; laying down the standards and conditions for the license of pharmaceutical industries; registration of medicines, cosmetics and poisons; and preparation of a list of poisons. The Government of Sudan has adopted various legislative and institutional measures for the management of toxic chemicals, hazardous substances and waste. At the present time for the purpose of analysing chemicals and chemical products, there are many laboratories in different institutes with varying capabilities and infrastructures spread all over the country. Most of those laboratories use internationally accepted protocols for chemical and waste/pollutant testing. Different ministries, agencies and other governmental institutions are responsible for various aspects of chemical control activities.

#### 3.13 Syrian Arab Republic

The National Committee on Chemical Safety implements legislation concerning sound management of chemicals and encourages government to enact environmental protection legislation. It has also set up efficient mechanisms for establishing sound statistics on types and quantities of chemicals imported, exported, produced and consumed, as well as of chemical waste produced The Ministry of Environment has the main coordinating role with concerned ministries

and authorities in all environmental matters. The ministries of health, industry, agriculture, social and labour affairs, finance and Directorate of Customs are also involved. A national profile on chemicals was developed in 2003. There are many inter-ministerial committees for cooperation and coordination among various ministries and departments. There are many regulations and laws concerning measures to be taken to control the use of chemical products from their introduction into the market through imports or manufacture to final disposal of chemicals as waste. Several actions have been taken by the Syrian government to control the chemicals, e.g. an inventory of obsolete pesticides was carried out 2004; under the Basel Convention 600 tonnes of these pesticides were safely transferred to France in 2010; inventory of mercury products and emissions 2007; POPs inventories etc. There are several chemical analysis laboratories in different cities belonging to many different ministries and authorities; most are not yet formally accredited. It is government policy to strengthen all laboratory facilities in terms of equipment, skills and staff qualifications.

# 3.14 Tunisia

There are several laws on chemical safety in Tunisia. There is a technical committee working on chemical safety in the Ministry of Public Health. It is represented by various ministries and departments. The chemical control programme monitors the chemicals from import, manufacturing, storage, transport, sale, use and waste. They seize and destruct chemicals which are not licensed and provide information on treatment and disposal of chemical waste. The Government of Tunisia has signed many international conventions and agreements. There are a number of chemical analysis laboratories: central laboratory for analysis and testing; international environment technology centre; Ministry of Agriculture and Environment laboratories; National Laboratory Institute of Scientific Technical Research and and public health laboratories **RECOMMENDATIONS** 

# Member States

- 1. Establish or strengthen environmental health units in ministries of health to address the issues related to chemical safety and environmental health risk assessment.
- 2. Include a health component in the environmental impact assessment or promote environmental health impact assessment (EHIA).
- 3. Support operational research in the field of chemical safety and environmental health risk assessment.
- 4. Develop comprehensive academic programmes leading to graduate and postgraduate studies in chemical safety and environmental health risk assessment.
- 5. Complete or update national chemical safety profiles, with the assistance of WHO.
- 6. Review and update legislation on chemical safety according to local priorities and international conventions.
- 7. Create and maintain a chemical registry at national level according to international comparative standards.
- 8. Establish or strengthen poison control centres and chemical analysis laboratories in the Region.

# Member States and WHO

- 9. Establish a network of environmental health risk assessment and chemical safety experts at national, subregional and regional level.
- 10. Build capacity in the field of chemical safety in the Region, and involve petrochemical and pharmaceutical industries.
- 11. Promote and raise awareness on the need for environmentally-friendly industries and businesses.

# WHO

- 12. Conduct training courses on chemical safety and environmental health risk assessment at subregional and country level.
- 13. Increase the duration of the training course to allow for hands-on practice in conducting environmental health risk assessment.
- 14. Develop a comprehensive training course for trainers in the various languages of the Region. The package should include guidelines for the trainers, translated training and reference material, etc.
- 15. Include real-time case studies from the Region for the purposes of practice.
- 16. Develop a regional website for environmental health risk assessment to enhance information exchange and knowledge in this field.

# Annex 1

# AGENDA

- 1. Inaugural session
- 2. Adoption of the agenda and election of officers
- 3. Objectives of the meeting
- 4. Overview of the status of chemical safety activities in the Region
- 5. Overview of environmental health risk assessment in the Region
- 6. Definitions of terms used in risk analysis
- 7. WHO human health risk assessment toolkit for chemicals
- 8. IPCS/WHO risk assessment toolkit case studies exercise
- 9. Environmental health risk communication
- 10. Country presentations on national chemical safety programme
- 11. Conclusions and recommendations
- 12. Closure

# Annex 2

# PROGRAMME

# Sunday, 18 September 2011

08:30 - 09:00	Registration
09:00 - 09:15	Opening session
	Message from Dr Hussein A. Gezairy, Regional Director, EMRO
09:15 - 09:45	Election of officers
	Adoption of agenda and programme
09:45 - 10:00	Objectives of the workshop
	Dr Haifa Madi, EMRO
10:30 - 11:15	Overview of the status of chemical safety activities in the Region
	Dr Mohamed Elmi, EMRO
11: 15 – 12:00	Overview of environmental health risk assessment in the Region
	Dr Amir Johri, CEHA
12:00 - 12:30	Definitions of terms used in risk analysis
	Dr Mohamed Elmi
13:30 - 14:30	WHO human health risk assessment toolkit for chemicals
	Dr Kersten Gutschmidt, WHO HQ
14:30 - 15:00	Discussion
15:15 - 16:30	Outline of the IPCS/WHO risk assessment toolkit case studies exercise
	Dr Kersten Gutschmidt and Dr Amir Johri
16:30	End of day 1

# Monday, 19 September 2011

	IPCS/WHO risk assessment toolkit case studies exercise
	Case studies: chlorine gas; benzene; endosulfan
08:30 - 10:30	Group work on case studies (Group 1 - chlorine gas, Group 2 - benzene,
	Group 3 – endosulfan)
	Facilitated by Dr Kersten Gutschmidt, WHO HQ, Dr Amir Johri, CEHA,
	and Dr Mohammed Elmi, WHO EMRO
11:00 - 12:30	Group presentations on case studies (hazard identification and character)
13:30 - 15:30	Group work on case studies
	Facilitated by Dr Kersten Gutschmidt, WHO HQ, Dr Amir Johri, CEHA,
	and Dr Mohammed Elmi, WHO EMRO
15:30 - 17:00	Group presentations on case studies (exposure assessment and risk
	characterization)
17:00	End of day 2

# Tuesday, 20 September 2011

8:30 - 10:00	Environmental health risk communication
	Mr Mazen Malkawi, CEHA
10:30 - 11:00	Environmental health risk communication: stakeholder analysis
	Mr Mazen Malkawi
11:00 - 12:30	Environmental health risk communication: outrage management strategies
	Mr Mazen Malkawi
13:30 - 17:45	Country presentations on national chemical safety programmes
17:45	End of day 3

# Annex 3

#### LIST OF PARTICIPANTS

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