SOUND MANAGEMENT OF HAZARDOUS WASTES FROM HEALTH CARE AND FROM AGRICULTURE

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Joint WHO and FAO Regional Workshop

World Health Organization
Regional Office for South-East Asia

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REPORT

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Executive Summary

The workshop brought together participants from the countries of the South East Asian Region (SEAR) and a number of international experts, to share experiences in managing hazardous wastes. The workshop was set out to help develop a regional action plan for the sound management of hazardous wastes. Specifically, the event allowed participants to obtain an overview of the potential environmental health problems that are linked to the way these wastes are managed currently.

Besides having the opportunity to learn from and exchange on national experiences — such as lessons learnt from Indonesia, Sri Lanka, Thailand and Maldives in post tsunami — the participants were also technically updated on recent international developments. WHO's global policy for sound health care wastes management (HCWM) and the activities of FAO's Programme on the Prevention and Disposal of Obsolete Pesticide Programme were presented and discussed. Participants were briefed on possibilities for capacity building such as the distance learning HCWM programme offered by the Indira Gandhi National Open University (IGNOU) in India. Enriched by these various inputs, the participants could identify priorities for action and develop draft elements to strengthen existing national and regional initiatives addressing the sound management of hazardous wastes in the SEAR.

From the start of the workshop, the emphasis was put on capacity building: Dr Y. N. Kandun, Director General, Ministry of Health, Government of Indonesia, encouraged FAO and WHO to continue supporting these joint activities in an effort to narrow the existing gap in national capacities to manage chemicals in a sound manner.

The participants benefited from over fifteen excellent country presentations. Focus was given on problems related to the existence of counterfeit and substandard chemicals and medical drugs in SEAR countries. Poor data, low enforcement of already outdated legislation, scarce quality control and lack of coordination amongst concerned authorities were presented as reasons for the low capacity to address challenges posed by chemicals in general. The porosity of national border controls is also a major contributor to this lack of order. The poor management systems were seen as main reasons behind the build up of hazardous wastes in the agricultural and health sector. Poor storage leads to loss of quality and inadequate transportation to unwanted contaminations. At the user's level, the prevailing inadequacy between demand and supply – notably in the case of large imports of pesticides and drug donations – are the origin of the unnecessary build up of chemical stocks. These excessive volumes become obsolete, as in the case of outdated medical drugs.

The presence and inadequate disposal of hazardous wastes from agriculture and health pose public health risks, via direct exposure by consumption of outdated and/or substandard drugs, or indirectly via environmental pollution affecting the quality of water and food. Examples from India and Myanmar were discussed.

Medical wastes are a serious health threat in most SEAR countries, as they are often ill-managed at all stages of their life cycle and are generally disposed of by inadequate incineration. More capacity

building and awareness need to be implemented in a big way. The agricultural sector and the health sector are called to act urgently, in a coordinated manner.

Important emphasis was put on the huge challenges that accumulated pharmaceutical wastes from post tsunami donations created in Indonesia. The several hundred tons of outdated drugs, stored in poor conditions represent two main risks for human health: illegal sale and consumption of substandard drugs stocks by unwary patients and potential environmental pollution from either leakage or unmonitored destruction. Participants concluded that the existing WHO guidelines need urgent revision.

The new WHO policies on "Sound management of Health Care Wastes" and on Mercury in the Health sector" were presented and discussed. Participants took note of the WHO's proposed step by step approach which prioritizes the reduction, segregation, sound handling and treatment of all medical wastes. The policies were found to be useful to increase the quality of HCWM practices, also because they promote the use of non incineration systems and mercury free medical devices in the long term.

Obsolete pesticide stockpiles pose serious threats to health and the environment. To avoid high removal costs (up to 4500 USD per tonne) and technically complex operations, countries must put in place measures to prevent the accumulation of obsolete pesticides. Prevention programmes should be of equal status to initiatives for obsolete pesticide disposal and should be adequately funded in national projects.

At the same time, understanding that pesticides will continue to be used, prevention programmes should address the entire life cycle management of pesticides from their manufacture or import, through distribution, use and waste management after use. Preventing the accumulation of hazardous wastes also encompasses initiatives that aim at reducing reliance on pesticide use, in agriculture and in the health sector. Implementing low external input production systems and applying the principles of integrated pest management or IPM and/or other less pesticide dependant cropping systems, are key to prevent the accumulation of obsolete pesticide stocks. The health sector is called upon to implement similar approaches to manage disease vectors via integrated vector management or IVM. The features of an IPM/IVM pilot project in Sri Lanka were presented and its preliminary results applauded.

Responding to the express need for capacity building, a representative of the Indira Gandhi Open University — IGNOU offered an overview of the now available 6 month distance learning certificate course on sound health care waste management. Participants can enroll through national study centres for a fee of 400 US$. Bangladesh, Nepal and Sri Lanka showed interest in setting up a study centre in Colombo. Several countries at the workshop showed interest in updating their existing national system to manage chemicals from cradle to grave, to review options for treatment and final disposal. Bhutan declared interest in preparing its national profile, and will ask SEARO for support.

The participants elaborated a set of 20 recommendations requesting national authorities, and in particular the health and agriculture sectors, to implement systems that lead to the sound management of chemicals and to closely coordinate for awareness campaigns on the health risks inked

to hazardous wastes. Countries in the region are called to implement pest and vector management schemes that rely less on pesticide use. Health sector is asked for boosting capacity building, also making use of the availability of the IGNOU distance learning course on HCWM. Agriculture is encouraged to seek assistance and guidance from FAO to carry out national inventories of obsolete pesticide stocks. Both sectors are called upon to guarantee the delivery of the needed funding, WHO and FAO are asked to support this process. The participants singled out two urgent matters: call for immediate national, regional and international action to reduce mercury containing medical devices and for halting excessive drug donations in and after emergencies. Finally, the participants call for stronger pro active regional collaboration, making best use of the existing regional human and technical capacities.

Foreword

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The improper management of wastes generated in health care facilities can severely affect the health of caregivers, patients and individual members of the community. It also has an adverse impact on the environment. In addition, pollution from inadequate treatment of waste can indirectly affect the health of the community. Throughout the world, an estimated 16 billion injections are administered annually, according to WHO Report 2002. Needles and syringes that are not disposed of properly, pose a grave hazard to public health due to the risk of injury and infection and due to the opportunities for re-use.

Sharps waste, although produced in small quantities, is highly infectious. Poorly managed, discarded syringes expose health care workers, waste handlers and the community to infections. Contaminated needles and syringes represent a particular threat as they may be scavenged from waste areas and dump sites and be reused. Based on a global review carried out in 2000, WHO estimated that injections with contaminated syringes caused:

- 21 million hepatitis B virus (HBV) infections (32% of all new infections);
- two million hepatitis C virus (HCV) infections (40% of all new infections); and
- 260 000 HIV infections (5% of all new infections).
  (Source: Yvan J F Hutin, Anja M Hauri, and Gregory L Armstrong
  Use of injections in health care settings worldwide, 2000: literature review and regional estimates, BMJ 2003; 327: 1075)

Additional health hazards occur from scavenging on waste disposal sites and from manual sorting of the waste at health care facilities. These practices are common in many regions of the world. The waste handlers are at immediate risk of needle-stick injuries and other exposures to toxic or infectious materials. The safe disposal of used needles and syringes and other infectious sharps should, therefore, be seen as a critical component of any health care waste management programme, if infection is to be prevented.

Wherever possible, the management of health care wastes from immunization activities should be integrated into existing health care waste management systems. Furthermore, it is essential that health care waste management is accepted as an integral part of health care by all those concerned. Auto-disable syringes virtually eliminate the risk of patient-to-patient transmission of infectious diseases with blood-borne pathogens (such as hepatitis B, C and HIV) because they cannot be re-used. Their increasing use in immunization services worldwide is, therefore, extremely encouraging.

Biomedical waste, whether generated at small primary health centres, rural clinics or in larger facilities, can be managed where adequate well-operated infrastructures exist. However, where resources are

limited, small-scale incinerators are being used as an interim solution in less developed and transitional countries. These incinerators often operate at low temperatures, and this may lead to the emission of highly toxic and persistent pollutants such as dioxins and furans. In 2002, the results of a WHO assessment conducted in 22 developing countries showed that the proportion of health care facilities that do not use proper waste disposal methods ranges from 18% to 64%.

Obsolete, unwanted and banned pesticides and persistent organic pollutants (POPs) are serious environmental hazards. Leaking and corroding metal drums filled with obsolete and dangerous pesticides dot urban and rural landscapes of developing countries around the world. These chemical leftovers have become villains in the agricultural world they were designed to help, affecting not only a nation's agriculture and its environment, but also fundamentally, the health of its people and consequently, development in general, be it in rural areas or in urban settings.

This global environmental tragedy is a direct result of several decades of mishandling and misuse, but is most dramatic in the developing world where there is no awareness of the inherent danger of pesticides. The unaware, therefore, draw water from contaminated sites for their own survival and that of their animals.

Poor nations have been led to believe that the only alternative to combat pests agricultural or otherwise effectively, is solely by using pesticides.

Recipient countries, anxious to limit damages from pests to the minimum or, being less aware of the negative consequences, usually receive pesticides from several sources. This leads to an uncoordinated influx of pesticide donations and trading, subsequently leading to excessive supply. While some of the donors are genuine, others take the opportunity to dump unwanted and illegal pesticides on the poor and unsuspecting countries. Pesticides reach individual farmers or households that value them dearly. Often, they keep pesticides at home, together with food and animals. The poor or the unaware, often know that pesticides are poisonous but they rarely realize how dangerous they are to life. Most people believe that pesticides are like medicines. Pesticide vendors seize this opportunity to promote pesticides aggressively.

It is not uncommon to find pesticides being stored in the open or in heavily populated zones and usually in substandard stores, and sold along with food and drinks, etc. Children are used in advertising sales of pesticides and often get easy access to pesticides. They play with empty pesticide cans or use them to store drinking water or milk. Most pesticide cans litter high or are simply dumped in open municipality dumps for subsequent open burning leading to serious emissions of dioxins.

Mistakes have been made in the past and recognized, but urgent measures need to be taken to prevent repetition because large quantities of obsolete pesticides remain as a heritage of more than 30 years of misuse.

In the South-East Asia region, India, Nepal and Sri Lanka have already conducted their first national inventories to identify and quantify obsolete pesticides stocks. INFOCAP—the Information Exchange

Network on Capacity Building for the Sound Management of Chemicals—reported that in May 2004, Bhutan had disposed of 32 tons of obsolete pesticides.

The challenge to ensure proper management of wastes increased dramatically in the aftermath of the 2004 earthquakes and tsunami that severely affected some countries in WHO South East Asia Region. Beyond the difficulties in restoring the local capacities to better manage hazardous wastes such as asbestos-containing construction rubble, the post-tsunami period also saw large volumes of hazardous wastes in the shape of obsolete pharmaceuticals. In January 2006, these stocks were estimated by WHO and Pharmaciens Sans Frontieres to be anywhere between several hundreds to 6,000 tonnes. These were mainly products damaged by the tsunami, products provided as aid which were obsolete and products which became obsolete after their delivery.

Obsolete pharmaceuticals pose grave environmental and occupational health risks, especially since they may be introduced into the market and distributed as legitimate drugs. Fortunately, national authorities reacted promptly and used some of the available resources from the UN Flash Appeal to support national and regional authorities in rebuilding their waste management systems. This was particularly the case in the Maldives and in Indonesia. The challenges, however, still persist.

By ensuring the commitment of health and agriculture policy makers in the Member States in the South-East Asia Region, and the active participation of experts from key related agencies and institutions as well as the technical support of WHO and FAO. The current bottlenecks can be overcome and sustainable strategies for the management of hazardous wastes developed, so as to reach the 2020 goal: produce and use chemicals with no adverse effects on global health.

Inauguration of the Workshop

The workshop was inaugurated by Dr Y. Kandun, Director General of Communicable Diseases and Environmental Health, Ministry of Health, Indonesia. He stressed upon the need for placing the Human Being at the centre of our work. He recognized that the health sector bears the brunt of all environmental factors that impact health adversely, and for that reason urged more inter-sectoral collaboration and more emphasis being laid on effective prevention. Using tools such as the Environmental Health Impact Assessment will improve disease prevention and especially help determine and better address environmental risk factors that affect our health. He saluted WHO/FAO collaboration and regional interest in this topic. He insisted on the need for more capacity building: *"Soldiers will not fight until they know what they need to fight for",* he concluded.

Source: *http://www.btcctb.org*

Overview of Hazardous Waste Problems in SEAR Countries

SEAR is a region with a significant amount of consumption of chemicals. It is also heavily involved in the production of chemicals. Both, local consumption and manufacture of chemicals lead to the generation of hazardous wastes. Agriculture and Health contribute to the mountain of hazardous wastes produced annually, 338 million tons in 2001, according to the Basel Convention (Annex 10, P21). Hazardous waste refers to any waste that could pose a threat to human health and the environment, if managed improperly. Hazardous waste exhibits any of the following characteristics: ignitability, corrosivity, reactivity, infectiosity or toxicity. Wastes from chemical incidents such as Bhopal (see box 1) and from health services also pertain to this group. Managing hazardous wastes in SEAR still poses major challenges, many of which are of legal nature.

Table 1 Estimated annual generation of hazardous wastes in some SEAR countries

Country	Total (MT)	Kg/capita
Bangladesh(*)	960,000	2.7
India(**)	86,000,000	90
Indonesia	11,100,000	55
Maldives	352	1.3
Myanmar	188,500	4.0
Nepal	33,500	1.5
Sri Lanka	67,950 (***)	3.7
Thailand	1,630,000	27

Source: Strengthening of Hazardous Waste Management in the Countries of South East Asia, WHO SEARO, 2000

Notes:

(*): Of which 93 400 MT are pharmaceutical wastes;

(**): Of which 7,300,000 MT are pharmaceutical wastes:

(***): The Sri Lanka delegate at the workshop reported an estimate of 57 890 MT for 2002

SEAR member states also import hazardous wastes for recycling. Due to loopholes in the current legal systems, custom authorities can take on-the-spot decisions and provide ad-hoc rules exemptions. Further, there is poor distinction between capital goods and non-capital goods; as an example, old computers imported as a donation would come under the 'capital goods' category and access various tax benefits.

Over 500 million used computers are exported to Asia, anually. On an average a computer is 23% plastic, 32% ferrous metals, 18% non-ferrous metals (lead, cadmium, antimony, beryllium, chromium and mercury), 12% electronic boards (gold, palladium, silver and platinum) and 15% glass. Only about 50% of the computer is recycled, the rest is dumped. The toxicity of the waste is mostly due to the lead, mercury and cadmium — non-recyclable components of a single computer may contain almost 2 kilograms of lead. A large portion of the plastic used contains flame retardants, which makes it difficult to recycle (Source: Annex 10, P21).

Box 1 Bhopal, India, 1984

The Bhopal gas leakage in 1984 is considered the worst ever chemical incident in history. Bhopal, India became a global symbol of industrial dangers to health when a chemical reaction at a Union Carbide pesticide plant released 40 tons of toxic gas over the city, on the night of 2nd to 3rd December 1984. The accident has claimed 16,000 lives to date. More than 7,000 people died within a matter of days. Over the last 21 years exposure to the toxins has resulted in chronic illnesses for thousands of others, for which treatment is largely ineffective.

Protesters outside the Dow Chemical headquarters in Mumbai, during a demonstration in December 2002 to mark the anniversary of the disaster, demand the clean-up of Bhopal. © Maude Dorr.

21 years later, the survivors still await just compensation, adequate medical assistance and treatment, as well as comprehensive economic and social rehabilitation. The site of the tragedy, has still not been cleaned up. Consequently, toxic wastes continue to pollute the environment and contaminate the water that surrounding communities rely on. Union Carbide Corporation (UCC), then owner of the pesticide factory in Bhopal, and Dow Chemical, which merged with UCC in 2001, have publicly denied all responsibility for the leakage and the resulting damage. Astonishingly, no one has been held responsible.

More at: *http://web.amnesty.org/pages/ec-bhopal-eng*

Hazardous Wastes from Agriculture and from Health

The existence of counterfeit and substandard chemicals and medical drugs in some countries of the region, is related to poor data, low enforcement of already outdated legislation, scarce quality control, lack of coordination amongst concerned authorities and low levels of awareness and capacity. Porous border control is also a major issue here. The build up of hazardous wastes also happens due to inadequate transportation, poor storage (loss of quality, poor stock management such as disregard for the First-In First-Out principle or FIFO).

3.1. Pesticides

The use of pesticides has become an important source of hazardous wastes. As reported by delegates of many country during the meeting, most SEAR countries run the risk of purchasing substandard chemicals, which becomes a major issue, in the absence of regular quality control. Such bulk quantities of chemicals are inefficient and tend to remain unused, accumulating to become hazardous, obsolete pesticides. Countries without an adequate legislation that guarantees quality for locally manufactured pesticides run a similar risk. Often the process of pesticide manufacture generates hazardous wastes. After use, empty pesticide containers such as metal drums, plastic jars, paper and cardboard used for wrappings, jute and other bags, add to the volume of polluted wastes. Empty pesticide containers are often re-used, despite some awareness about the environmental health risks posed. Leftover pesticides are often buried, or discharged in water bodies. Stocks of obsolete pesticides are often stored under poor conditions, allowing theft and leakages to the soils and groundwater. Alternatively, if not re-used, they are buried or burnt in the open.

A survey on the fate of empty pesticide containers, carried out in **Nepal**, showed that 44% threw away the empty pesticides containers; 16% buried them; 4% reused them for storing water at home; 6% stored empty containers to keep cooking oil; 30% disposed them in public garbage containers (Source: Annex 10, P11).

In most disaster prone SEAR countries, constant inadequacies between the demand for and supply of pesticides and/or drug donations, have always lead to the unnecessary accumulation of chemical stocks in excessive volumes. This has resulted in stockpiling of obsolete pesticides and /or of outdated medical drugs. Information on obsolete stocks is presented in Table 2.

Stocks of hazardous wastes from agriculture and/or their inadequate disposal, present major public health risks either through direct exposure or indirectly through the environment. Improper storage, handling, transportation, treatment and disposal of hazardous wastes can threaten human health and the environment through leakage of toxins into groundwater, soil, and the atmosphere. Populations may be adversely affected when toxic wastes are ingested through contaminated water sources and polluted air, and when poor labour practices put workers in direct contact with hazardous wastes (Annex 10, P3).

Table 2 Annual consumption of pesticides in some countries of the SEA Region

Country	Area (km2)	Consumption of pesticides (Metric Tons active ingredient)	Comments
Bangladesh	144 000	25 466 (2005)	Empty containers are often re-used for water, oil and food storage. Consumed 15 376 MT in 2001. Currently using 18gm a.i /Ha.
India	3 287 000	48 350 (2003)	India is 4th largest producer of agricultural chemicals after USA, Japan and China. Produced 2 350 MT in 1950, 46 000 MT in 2000. Hazardous waste generated during manufacture, after banning use and de-phasing labels and from lack of adequate stock management.
Indonesia	1 905 000	2 500 (2002)	
Myanmar	676 000	6 332 (2006)	Market dominated by private sector. In 2005, 4 000 Mt insecticides consumed.
Nepal	147 000	177 (2004)	Inadequate implementation of existing laws. Nepal faces serious concerns about smuggling substandard pesticides across its borders. It imports most pesticides from India (90%), for an annual volume worth 2 million USD. Consumed 146 MT in 2001.Currently using 43 gm a.i./Ha. 251 trade names and 75 technical products registered.
Sri Lanka	66 000	4 850 (2004)	There are 50 formulation and pesticide marketing companies. Volumes consumed have not increased significantly since 1990.
Thailand	513 115	39 904 (2002)	

Source: Country presentations at the workshop (Annex 10), WHO (2005)

Box 2 Pesticide residues in food

In **Myanmar**, the presence of pesticide residues in vegetables, sediments, weeds and drinking water in and around the Inlay Lake has been reported, many of them being organochlorine compounds such as DDT, Aldrin and their derivates. Country delegates opined that integrated pest management schemes were needed to reduce these problems in future. Further, there is a need for updating national pesticide legislation, ideally, along the lines of the FAO Code of Conduct. To achieve this, Myanmar would need support. (Annex 10, P7).

More than 550 food samples were analysed in **India** between 2000 and 2003: 117 cereals, 91 pulses, 131 spices, 15 meat products, 50 milk products, 119 vegetables and fruits, 62 tea/coffee, 49 oil/fats, 30 oil seeds, 34 baby foods, 10 dry foods. All samples contained DDT amongst other unwanted residues, albeit below the national standards valid at the time. (Source; WHO, SEARO, 2003).

3.2. Health care wastes

Health care wastes (HCW) are generated in the process of providing medical services. They are hazardous by nature and are basically classified in infectious and non infectious wastes. They can be solid or liquid, but gas emissions from medical waste incineration are also considered health care wastes. Outdated pharmaceuticals are also contributing to the stocks of hazardous waste generated by the health sector. HCW pose significant health hazards

Table 3 Estimated health care waste generation in some SEAR countries, 2000 (based on 1kg/bed/day)

Country	Bed Strength	Estimated volumes (Metric tons daily)	Estimated annual volumes (Metric tons)
Bangladesh	50 885	51	18 615
Bhutan	1 361	1.4	511
India	746 048	746	273 020
Indonesia	133 566	136	49 640
Maldives	653	0.7	255
Myanmar (*)	31 563	32	11 680
Nepal	6 654	7	2 555
Sri Lanka	65 515	65	31 025
Thailand	141 526	142	51 830
Sum	**1 177 771**	**1 180**	**4 30 700**

Source: Strengthening of Hazardous Waste Management in the Countries of South East Asia, WHO SEARO, 2000.
(*): At the workshop, **Myanmar** reported that 172 tons of HCW had been incinerated in 2004, and 50 tons of sharps wastes buried in sharps pits.

in all SEAR countries, as they are, to a large extent, ill-managed throughout the life cycle and often disposed of by inadequate incineration.

The daily amount of health care wastes generated in the SEAR countries' health facilities, is estimated to be over 1000 metric tons (see Table 3). Most of these wastes are not segregated—infectious and non infectious items are discarded together – and most often, disposed of under very poor conditions. SEARO data was presented and is summarised in Table 3.

Burning waste in a drum incinerator on the rooftop of a hospital, **Nepal** (Photo: WHO)

Problems with incineration of health care wastes

The facilitator from India presented the current challenges posed by the use of incinerators in health care facilities in the country.

By incinerating, the aim of complete combustion of waste to totally sterile ashes, is achieved. However a major health problem is created by some of the HCW components, mainly PVC containing materials such as plastics, which can

India: Wrongly understood worker's safety. Photo: SHRISTI

emit highly toxic dioxins and furans. The ashes remain hazardous because they are still sharp and are often contaminated with heavy metals, like mercury. Most health care settings in SEAR have opted for setting up sound HCW management systems, yet many have chosen to install small scale incinerators, as they appear to be a cheaper solution.

Properly designed and operated, dual-chamber, controlled-air, small-scale incinerators represent an improvement over uncontrolled drum or pit burning practices. But, they require pollution control devices to minimize emissions. Numerous design, construction, site selection, operational and management deficiencies result in poor performance. Based on available surveys, such weaknesses are common, not the exception. Thus, incinerator emissions of both conventional (e.g., particulate matter) and toxic pollutants (e.g., dioxin/furans) may pose risks that potentially impact:

- Health staff and patients in health care facilities;
- Waste workers and incinerator operators;
- Local communities, through both inhalation exposure and through the consumption of locally-produced food that becomes contaminated from incinerator emissions;
- Regional/global environment, through the discharge of toxic and persistent chemicals. Incineration of health-care waste, producing relatively high emissions of persistent compounds controverts the Stockholm Convention aimed at elimination of these compounds.

The availability of incineration may negatively affect the development and use of preferred waste treatment options. Still, cost-effectiveness of incineration does not appear to be favourable over autoclaving in developed countries. Several low-cost non-incineration technologies suitable for small quantities of waste in remote areas, have been demonstrated in India. (Sources: Annex 10, P20, and "Assessment of Small-Scale Incinerators for Health Care Waste" By S. Batterman, WHO, 2004.)

Legislation

Most countries in SEAR lack, or are only in the process of drafting specific health-care wastes legislation. This was confirmed by the participants, and is shown in Table 4. The participants felt that the case for sounder management of

Table 4 Status of SEAR countries regarding national policy on health-care waste management (2005)

Country	Legislation has been passed	Policy and guideline published	National committee	Sub-national committee
Bangladesh	In process	2001 and 2004	In process	In process
Bhutan	In process	1998 and 2005	No	No
India	1998	2000 and 2005	Yes	Partially
Indonesia	In process	In process	In process	No
Maldives	In process	In process	Not available	Not available
Myanmar	No	No	No	No
Nepal	In process	In process	In process	In process
Sri Lanka	Yes	2001	No	No
Thailand	2002	2000	In process	In process

Source: WHO, SEARO, 2005

Box 3 BMW Rules in India

Ministry of Environment & Forest (MoEF) proposed the first draft rules in 1995. The rules recommended on-site incinerators for all hospitals with more than 50 beds. At the same time, in a public interest case, the Supreme Court of India, in March 1996, ordered the inclusion of alternate technologies and their standards in the Rules. The second draft rules were notified in 1997. The final rules (July 1998) and were called Bio-Medical Waste (Management & Handling) or BMW Rules 1998 (see website at: http://dpcc.delhigovt.nic.in/act_bmw.htm). A first amendment (March 2000) changed Schedule VI of the rules, concerning having waste management facilities for treatment of waste. The second amendment to the rules (June'2000) nominated Pollution Control Boards/Committees as Prescribed Authorities, since the work involved a lot of technical intervention like monitoring the air emission from the incinerators and the waste water effluents. Source: Annexe 10, P20.

wastes issued from health services needed to be addressed in particular.

Mercury

The participants recognized that health care facilities are one of the main sources of mercury release into the atmosphere, because of emissions from the incineration of medical waste mixed with mercury-containing medical devices. Currently, all SEAR countries allow unrestricted use of mercury thermometers. Only a few local initiatives have adopted resolutions encouraging physicians and hospitals to reduce and eliminate their use of mercury-containing equipment such as thermometers and sphygmomanometers. Such initiatives were reported by participants from **India** and the **Maldives**.

Mercury is a naturally occurring heavy metal. At ambient temperature and pressure, mercury is a silvery-white liquid that readily vaporizes and may stay in the atmosphere for up to a year. Mercury ultimately accumulates in lake sediments, where it is transformed into its more toxic organic form, methyl mercury, which accumulates in fish tissue. It may be fatal if inhaled, and harmful, if absorbed through the skin. If absorbed in the blood through the lungs, it may cause harm to the nervous, digestive, respiratory system and to the kidneys, besides causing lung damage. Adverse health impacts from mercury exposure can be: tremors, impaired vision and hearing, paralysis, insomnia, emotional instability, developmental deficits during foetal development, and develop–mental delays during childhood. Recent studies suggest that mercury may have no threshold, below which adverse effects do not occur.

The most common potential mode of occupational exposure to mercury is through inhalation of

Box 4 Mercury in gold mining, Indonesia

In 2002, 44000 industrial and small-scale gold mining operations were recorded, more than 200 tons of mercury is employed annually. Small-scale gold mining co-exists with large-scale mining and is economically viable. It is simple to do, and can be a part-time job before the harvest season. Large amounts of mercury are used in the process. Big mining operations ultimately convert to toxic swamps, the mercury-contaminated waters of which are used by local populations for all purposes, with contaminated fish becoming a regular part of the local diet. A schematic presentation of long-term environmental and health problems from mercury pollution, showed that once it occurs, human and environmental toxicity persists for over 150 years and affects multiple generations. A comprehensive scheme for managing the health aspects of mercury pollution was offered which describes the pathways for screening, diagnosis, treatment and surveillance in these populations. Source: University of Indonesia, Annexe 10, P4.

metallic liquid mercury vapours. If not cleaned up properly, spills of even small amounts of elemental mercury, such as from breakage of thermometers, can contaminate indoor air above recommended limits and lead to serious health hazards. Since mercury vapour is odourless and colourless, people can breathe mercury vapour without realising that they have done so.

Dental amalgam, the most commonly used dental filling material, is a mixture of mercury and a metal alloy. In 1991, WHO confirmed that mercury contained in dental amalgam is the greatest source of mercury vapour in non-industrialized settings, exposing the concerned population to mercury levels significantly exceeding those set for food and for air.

Box 5 Step Guide to Clean-Up of mercury spill

1. Remove jewellery
Remove all jewellery from hands and wrists so the mercury cannot combine with the precious metals.

2. Put on old clothes
Change into old clothes and shoes that can be discarded if they become contaminated.

3. Evacuate area
Remove everyone from the area where cleanup will take place and shut the door. Turn off interior ventilation system to avoid dispersing mercury vapour throughout the facility.

4. Identify surface
Wood, linoleum, tile and any other like surfaces can easily be cleaned. Carpet, curtains, upholstery or other such surfaces cannot. These items should be discarded according to the disposal means outlined below. (For carpets, only the affected portion needs to be cut out and removed.)

5. Wear gloves
Put on rubber or latex gloves. Place all broken objects on a paper towel. Fold the paper towel and place in a zip lock bag. Secure the bag and label it as containing items contaminated with mercury.

Note: When labelling bags, do so as directed by your local health or fire department to prevent confusion about contents.

6. Locate mercury beads
Locate all mercury beads, then carefully use the cardboard to gather them together. Use slow sweeping motions to prevent accidentally spreading the mercury. Small and hard-to-see beads can be located with the flashlight: hold it at a low angle close to the floor in a darkened room and look for additional glistening beads of mercury that may be sticking to the surface or have gathered in small cracked areas of the surface. Note: Mercury can move a surprisingly long distance hard and flat surfaces: be sure to carefully inspect the entire room.

7. Use eyedropper
Use an eyedropper or syringe (without a needle) to draw up the mercury beads. Slowly and carefully transfer the mercury into an unbreakable plastic container with an air tight lid (such as a plastic film canister). Place the container in a zip-lock bag. Label the bag as containing items contaminated with mercury. After you remove larger beads, use sticky tape to collect smaller hard-to-see beads. Place the duct tape in a zip lock bag and secure.

Note: Powdered sulphur or zinc stains mercury a darker colour and can make smaller beads easier to see. Be careful not to breath the powder, as it can be mildly toxic.

8. Put everything into rubbish bag
Place all materials used during the cleanup, including gloves, into a rubbish bag. Seal the rubbish bag and label it.

Contd...

Box 5 *Contd...* Step Guide to Clean-Up of mercury spill

9. Final disposal

Contact your local hospital manager responsible for toxic clean up and proper disposal, to ensure disposal in accordance with local or state laws. In their absence, collect the mercury spill waste in a secured steel drum ventilated to outside air.

10. Outside ventilation

Keep the affected area ventilated to the outside (with windows open and fans running) for at least 24 hours after your successful cleanup. If sickness occurs, seek medical attention immediately. Note: This guide only applies to small spills, such as a broken thermometer. In the event of large spills, turn down the temperature, turn off internal ventilation, open the window, and inform your local health and safety authority.

Six things you should NEVER do:

1. Never use a vacuum cleaner to clean up mercury: The vacuum cleaner will vaporise the mercury and drastically increase exposure in the area.
2. Never use a broom to clean up mercury: it breaks up the mercury droplets and moves them around, making it harder to decontaminate the area.
3. Never pour mercury down the drain: it can lodge in the plumbing, and contaminate the septic tank and sludge in sewage treatment plants.
4. Never wash mercury-contaminated items in a washing machine: mercury can contaminate the sewage system and the washing machine.
5. Never continue wearing shoes and clothing that might have been contaminated in the mercury spill: this increases the wearer's exposure and helps spread contamination.
6. Never burn shoes, clothing, fabric or anything that has been contaminated with mercury: this puts mercury into the atmosphere.

Tsunami and Hazardous Wastes

The *tsunami* and earthquake in December 2004 affected 82 health facilities in **Sri Lanka** and 180 in **Indonesia**. The management of medical wastes became an urgent issue. Isolated incidents of leakages of industrial and agricultural chemicals were reported, as well as a spill of radioactive material from a destroyed cement factory in Banda Aceh. **Sri Lanka** reported that of the hundreds of environmental samples analysed, no toxic substance exceeded WHO recommendations. More investigations are on going.

4.1 Pharmaceutical waste

The participants at the workshop highlighted the huge challenge posed by accumulated pharmaceutical wastes from post tsunami donations. This problem affected not only **Indonesia** in Banda Aceh Province and more recently in the post earthquake Jogyakarta area, but also other tsunami struck countries like in **Sri Lanka**. Several hundred if not thousands of tons of outdated drugs, are stored in poor conditions. The introduction of these substandard drugs stocks into the market represents two major public health risks:

1. Sale to and consumption of substandard drugs by the unwary public, and
2. Environmental pollution from either leakage to soil and groundwater or release of potentially toxic gases into the atmosphere from ill-monitored waste incineration.

The participants felt that immediate local action needed to be taken, including the following:

- As far as possible, pharmaceuticals should be kept in their original packaging. They should not be opened, crushed, repackaged in other containers or otherwise manipulated. This is to ensure that their transportation for final disposal becomes easier and cheaper.
- All obsolete pharmaceuticals found should be kept in secure stores to prevent their infiltration to local markets.
- All waste management options whether based on chemical processes, incineration, or landfill, are merely processes for converting the waste into other products. The converted products may be more or less harmful that the original waste. When dealing with hazardous waste all appropriate measures must be taken to ensure that no harmful by-products penetrate the environment.
- Sub-standard hazardous waste disposal methods such as open burning and uncontrolled landfill will result in environmental pollution and therefore, should not be permitted for the disposal of obsolete pharmaceuticals.
- The final disposal of the obsolete pharmaceuticals should be carried

Box 6 Post tsunami donations of outdated pharmaceuticals

After the *tsunami* of 26 December 2004, international aid was rapidly mobilized from around the world. It included shipments of large quantities of pharmaceuticals for immediate and medium term health care needs of the local population.

As is common in emergency situations, there was little opportunity to coordinate needs with supplies. Local infrastructure was virtually non-existent and some pharmaceuticals were supplied directly to hospitals and clinics; others were centralized, while some others were mixed with a variety of goods and had to be separated and redirected over a period of time.

By early 2006, large volumes of outdated/obsolete pharmaceuticals had accumulated in quantities estimated to be anywhere between several hundred and 6 thousand tons. The volumes have since increased, as tens of aid containers had not yet passed customs review.

A WHO supported survey was carried out in May 2006 by *Pharmaciens Sans Frontieres* (PSF) with DEPKES/DINKES/FDA, Indonesia. PSF found that out of more than 4000 metric tons of drugs, received for a population of 2 million, 60% were not on the national list of essential drugs, 70% were labeled in foreign languages and 25% had an inadequate expiry date. Some drugs arrived in excess amounts, in some cases covering the annual needs of the entire Indonesian population.

Over 30 tons of drugs are stored in unsecured places, courtyards or open sheds. Of the facilities surveyed, 84% was inappropriate to store perishable goods such as medical drugs.

Another survey was conducted in **Nias Island**, struck by *tsunami* in 2005 and by an earthquake in March 2004. Out of the estimated total 500 tons of donated drugs, 200 tons were found to be useless. Again, out of this 150 tons were segregated, re-collected and stored in temporary shelters before being sent off for incineration at a cement factory. The disposal cost is 1000 US$ per ton (Annex 10, P6).

In **Sri Lanka**, 160 MT post tsunami donated pharmaceuticals were found to be inadequate and 100 MT have already been destroyed in a local cement factory. WHO has funded a follow-up project. (Annex 10, P12).

"Segregated" obsolete pharmaceuticals, Nias Warehouse. Photo A.Kartika, UNDP

Ad-hoc dumpsite for tsunami damaged pharmaceuticals Photo: M Davis, FAO

Source: WHO, 2006; Pharmaciens Sans Frontieres, 2006; Country presentations (Annex 10)

out in dedicated hazardous waste management facilities, preferably in an industrialized country. The "Back to Sender" principle should be applied, and support from the Basel Convention should be sought.

- Donors should be approached immediately, for assistance in financing the immediate export and destruction of obsolete pharmaceuticals, in close coordination with the Basel Convention. FAO's lessons learnt from dealing with obsolete pesticide stocks should be made use of.
- The existing WHO Guidelines for Drug Donations (samples of the document were distributed at the meeting) are valid per se, but in the light of this situation, they need urgent revision. The guidelines need to be disseminated widely and made operational so as to be translated into action, through specific local training.
- More capacity building and awareness are needed to start addressing these unwanted stockpiles in a big way. Both, the agricultural sector and the health sector need to act urgently in a coordinated manner.

Box 7 Asbestos:

The term "asbestos" is used for a group of naturally occurring minerals that take the form of long thin fibres and fibre bundles. These minerals have great tensile strength, conduct heat poorly and are relatively resistant to chemical attack. Asbestos is non-biodegradable.

The principal varieties of asbestos are chrysotile (white asbestos) a serpentine mineral, and crocidolite (blue asbestos), amosite (brown asbestos), anthophyllite, tremolite and actinolite, all of which are amphiboles. The chrysotile form is the one most commonly used now.

Asbestos is widely used throughout the world, particularly in building and insulation materials. Typical uses include: Boilers and heating vessels; cement pipes; clutch, brakes, transmission components; conduits for electrical wire; pipe coverings; roofing products; duct and home insulations; fire protection panels; furnace insulating pads; pipe or boiler insulations; sheet vinyl or floor tiles; underlay for sheet floorings.

Asbestos-containing materials can be disposed of, in landfill sites, provided these have appropriate measures to prevent the release of asbestos fibre, e.g. a liner and a system for leachate collection. But asbestos should not be disposed of, by burning.

Damage to asbestos-containing material can result in the release of small asbestos fibres that become air-borne and are readily inhaled. These fibres can remain in the lungs for long periods thereby causing serious lung disease.

Asbestosis: slowly developing and progressive scarring of the lungs caused by the inhalation of high concentrations of asbestos dust and/or long exposure. Lung cancer: smokers have a higher risk of developing lung cancer than non-smokers when exposed to asbestos.

Diffuse pleural thickening: non-malignant disease in which the lining of the lung (pleura) becomes scarred. The disease is a chronic condition with no cure.

Mesothelioma: malignant tumour of the pleura or peritoneum. It is linked with exposure to all types of asbestos. Besides being an occupational hazard, it may develop in non-occupationally exposed people living in the same household as asbestos workers or in the vicinity of strong asbestos emission sources.

4.2 Post tsunami clean-up of asbestos-containing materials

During the clean-up of damaged and destroyed buildings—including health care facilities—after the tsunami, there was a need to handle, break up and dispose of asbestos-containing building and insulation materials. Much of this work was undertaken by volunteers and local residents who are unaware of the hazards of asbestos and who may be unable to identify asbestos-containing material.

The asbestos issue concerned most tsunami affected countries, but it was not discussed at length. **Sri Lanka** reported estimates of its annual asbestos waste generation to be of 108 MT (Annex 10, P12).

In early 2005, WHO SEARO issued the following guidance for debris removing teams:

1. Restrict access to sites where there are piles of building debris, and to demolition sites and waste sites. In particular, keep children away.
2. Try to keep any manipulation of asbestos-containing materials to a minimum asbestos structures should be dismantled as gently as possible. If it is necessary to move, saw or break up such materials, keep them thoroughly wet to reduce the amount of airborne fibres and dust. Take particular care with friable materials.
3. Clean surfaces contaminated with asbestos-containing materials using wet methods. Do not dust or sweep or use a domestic vacuum cleaner because this will puff fibres and dust up into the air.
4. Keep piles of asbestos-containing materials covered e.g. with tarpaulins or sheets of plastic until they can be safely stored or disposed of. Wet thoroughly before moving the materials.
5. Store asbestos-containing waste material in sealable containers until it can be disposed of safely. Containers can be drums of metal, plastic or fibre, or strong polyethylene bags (ideally put one bag inside another, sealing each with tape). Label the containers in the local languages and a hazard warning, e.g. "DANGER CONTAINS ASBESTOS FIBRES, HARMFUL IF INHALED, MAY CAUSE CANCER, KEEP SEALED, AVOID CREATING DUST ".

WHO Policies for the Management of Health Care Wastes (HCW)

The new WHO policies on "Sound management of health care wastes" and on "Mercury in the health sector" were presented by the WHO facilitators, and discussed. Participants took note of the proposed step-by-step approach, adopted in both policy documents, to prioritize the reduction, segregation and sound handling and treatment of all medical wastes in the immediate term and to solely promote non incineration systems and mercury-free medical devices, in the long term.

5.1 Policy for better HCW management

The WHO guiding principles for health care waste management (HCWM) are based on preventing the health risks associated with exposure to health care waste for both health workers and the public, by promoting environmentally sound management policies for health care wastes. WHO is supporting global efforts to reduce the amount of noxious emissions released into the atmosphere to reduce disease and defer the onset of global change. Thereby, WHO is also in line with the principles underlying the Stockholm Convention on Persistent Organic Pollutants (POPs) and the Basel Convention.

With a view to contributing to reduce the exposure to toxic pollutants associated with the combustion process, through the promotion of appropriate practices for high temperature incineration, WHO's strategy for sound management of health care wastes is divided in three strategic steps:

Short-term

- Production of all syringes/components made of the same plastic to facilitate recycling;
- Selection of PVC-free medical devices;
- Identification and development of recycling options wherever possible (e.g.: for plastic, glass, etc.);
- Research on and promotion of new technology or alternatives to small-scale incineration;
- Support countries in the development and implementation of legislation, national plan, policies on sound management of health care waste

Medium-term

- Further efforts to reduce the number of unnecessary injections and the amount of hazardous health care waste that needs to be treated;
- Research into the health effect of chronic exposure to low levels of dioxin and furan;
- Risk assessment to compare the health risks associated with (1) incineration and (2) exposure to health care waste.
- Support countries to develop national guidance manual for a sound management of health care waste

Long-term

- Effective, scaled-up promotion of non-incineration technologies for the final disposal of health care wastes to prevent the disease burden from (a) unsafe health care waste management and (b) exposure to dioxins and furans.
- Promotion of the principles of environmentally sound management of health care waste as set out in the UN Conventions;
- Support to allocate human and financial resources to safely manage health care waste in countries

Examples of Non burn technologies for health care wastes

- Chemical disinfection of infectious plastics at the point of generation or at a central location;
- Microwaving of infectious plastics;
- Hydroclaving of the health care facilities for treated infectious plastics and metal sharps.
- Sharps pit used as the final disposal option;
- Encapsulation of sharps from health care facilities;
- Plastic reprocessing: after treatment, the shredded plastic from syringes is collected by the formal or informal sector for material recovery;
- Metal reprocessing: smelting of metals as one of the final disposal options.

Source: "Safe Management of Bio-medical Sharps waste in India", WHO SEARO, 2004

5.2 Policy on mercury

WHO's policy on "Mercury in the health sector" proposes to work in collaboration with countries to ensure that safe handling procedures be instituted to minimize and eliminate patient, occupational, and community exposures. Proper procedures should include spill-clean-up response, educational programs, protective gear, appropriate waste storage containment, staff training, and engineered storage facilities. Countries that have access to affordable alternatives should develop and implement plans to reduce the use of mercury equipment and replace them with mercury-free alternatives.

WHO encourages countries to progressively reduce the import and sale of mercury containing health care devices and mercury use in health care settings. WHO also supports efforts towards developing global multilateral environmental agreements to this end. Countries need to make sure that the recovered mercury equipment is not pushed back in the supply chain. In the long term, WHO supports a ban for use of mercury containing devices and effectively promote the use of mercury-free alternatives.

FAO Programme on Prevention and Disposal of Obsolete Pesticides

Obsolete, unwanted and banned pesticides and persistent organic pollutants (POPs) are serious environmental hazards. Leaking and corroding metal drums filled with obsolete and dangerous pesticides dot urban and rural landscapes in most of the developing countries around the world as one can witness from the various pictures given below. These chemical leftovers have become villains in the agricultural world they were designed to help, affecting not only a nation's agriculture and its environment, but also fundamentally the health of its people and consequently development in general, be it in rural areas or under urban conditions. The most notorious of the persistent chemicals are organohalogens: carbon-based substances containing chlorine, fluorine, bromine or iodine. Around 11,000 organochlorines have been identified, most of which do not occur naturally. They include roughly 50 pesticides such as toxaphene and DDT; solvents such as perchloroethylene and multiple-use chemicals such as PCBs. However, the relative indestructibility of these chemicals, a boon for industry, has become a threat to human health and to the environment.

Obsolete pesticide stocks

Source: *FAO*

The FAO representative reported that obsolete pesticide inventories were carried out/updated in 2001 with support from FAO. Globally, close to 220 thousand tons were registered. Over 4 500 tons of obsolete pesticides were reported in seven of the SEAR countries (see Table 5 and Annex 10, Documents 1.2 to 1.8). Additional information was delivered at the workshop by the country delegates (Annex 9). The inventories are incomplete and would need to be updated urgently. Indeed, the storage conditions are often poor; besides the risks of leakages to the immediate environment, these stocks could also be stolen and brought back into the market.

6.1. Prevention of stocks build-up

Implementing IPM and/or less pesticide-reliant cropping systems is a key part of the prevention of the unnecessary accumulation of obsolete pesticide stocks.

The FAO expert wished to pinpoint that in 2003, following negotiations with donor agencies and the private sector, FAO achieved an agreement with all parties to no longer donate pesticides

Table 5 Obsolete pesticide stocks in SEAR countries

Country	Obsolete stocks (MT)	Remarks
Bhutan	68	Most of these stocks have been disposed of;
India	3,350	Most of them are organic persistent pesticides.
Indonesia	19	All belonging to the WHO toxicity classes I and II;
Myanmar	137	Mainly locally formulated products.
Nepal	96	Significant volumes of Aldrin, Dieldrin and DDT. Some Donation of DDT by Indonesia in 1994. A disposal operation was prepared in 1998 (ADB ready to lend 577 000 US$), but due to poor inter-sectoral coordination it failed. DDT and Endosulfan are reported to be used for fishing in rivers and ponds.
Sri Lanka	165	Stocked in 73 409 containers, in Sri Lanka, half of the stocks are Carbofuran (WHO Toxicity Class II).
Thailand	48	Scattered in over 480 locations.

Source: FAO, see Annex 11, Documents 1.2 to 1.8.

in emergencies on a bilateral basis, but to coordinate all emergency donations with FAO. This agreement could be an example for drug donations in the health sector.

Obsolete pesticide stockpiles pose serious threats to health and the environment. Removing them is costly and technically complex and is therefore an operation that is largely unviable. Alongside efforts to remove existing stocks of old chemicals, countries must put in place measures to prevent re-accumulation of obsolete pesticides. Prevention programmes should be of equal status to initiatives for obsolete pesticide disposal and should be adequately funded in national projects.

Prevention encompasses initiatives to reduce reliance on pesticide use in agriculture and health care. Reducing pesticide use is the most effective way of preventing build up of pesticide stocks that may later become obsolete. At the same time, since pesticides will continue to be used, prevention programmes should address the entire life cycle management of pesticides from their manufacture or import, through distribution and use to waste management after use. Countries should identify areas of weakness in pesticide life cycle management and develop activities to build capacity and fill gaps wherever they exist.

Analysis of main causes of accumulation of obsolete pesticides

In many countries, where a range of products has been banned or withdrawn for health or environmental reasons, the fate of existing stocks in the country is often given scare consideration. Stocks remain where they are stored and eventually deteriorate.

The government authority responsible for national pesticide stocks often does not have adequate storage capacity to store all its pesticides safely. Poor storage conditions accelerate the degradation of pesticides and their containers. New products are sometimes stored inappropriately because obsolete products are occupying the limited storage space.

Storekeepers of major stores and those responsible for national stocks are often not familiar with the rules for good stock management (proper stacking, product segregation, principle of "FIFO", etc.). Contamination and improper stacking may alter the condition of other products and may impede a consistent application of the principle of "FIFO". Stock records may not be regularly updated and communicated to the central authority responsible for establishing the country's pesticide requirements.

Drums and other packaging materials are often damaged through rough handling or in transport. Unnecessarily long periods of exposure to direct sun during transit is another important factor that affects both the container and its contents.

Because laboratory facilities for pesticide quality control are not available in most developing countries, it may be impossible to determine whether a pesticide may still be used after its indicated shelf-life has expired. Inadequate labelling and the absence of a date of manufacture/release on labels or on the container may complicate the matter.

Products may have been donated that were unsuitable for their intended use and have therefore remained in store and deteriorated. Inappropriate active ingredient or formulation.

Bulk quantities of pesticides are commonly supplied in 200-litre metal drums. For countries without good repackaging facilities this may create problems if the pesticides are intended for use by plant protection and rural extension staff or small-scale farmers.

In some cases, pesticides are not used because the potential user does not know the specifications of the product, or how to apply it, since labels are missing or incomplete, are illegible (as a result of rain, sunlight, leakage), or are in a language alien to the user.

In several cases, the quantity, active ingredient, formulation or packaging of donated pesticides are inappropriate for the intended use.

Consignments not used because the product had been adulterated by an unreliable supplier in order to increase profits and was no longer suitable for the intended purpose.

Inaccurate assessment of requirements due to not readily available or is incomplete information on needs and existing in-country stocks.

Countries sometimes established large strategic pesticide stocks in preparation for possible pest upsurges or invasions which do not occur, ending up with large quantities of unused products.

Most currently used pesticides have a two-year shelf-life. Tropical conditions characterized by excessive heat, high humidity and/or strong fluctuations in temperature may reduce this already short life span. Overstocking of such products is a common cause of pesticides becoming obsolete.

Aid agencies have sometimes provided pesticide donations far in excess of requirements. In several cases this has involved products manufactured in the home country of the aid agency or funding government.

Many countries are reducing or removing subsidies from pesticides. As a result, stocks may remain in store longer than planned and are at increased risk of becoming obsolete.

Slow processing of requests for pesticides, in some cases, has meant that the pesticides have arrived too late.

Agrochemical companies, or their local agents, often take the initiative to advise plant protection services and other large-scale users on their pesticide requirements. Sometimes such advice forms the basis for requests to donors. However, companies may not always put the public interest above their own commercial interest and assessments may be in excess of actual requirements.

Large sums of money are involved in pesticide supplies. As a result, a variety of hidden interests may play a role in decisions concerning pesticide procurement or donations.

Reducing the need for pesticide use

Participants agreed that there is an urgent need to address the problem at source and initiate and strengthen national and regional programmes that reduce reliance on chemical pesticides, such as IPM and IVM (see Box 7).

No to imports of banned chemicals

Efforts to control the use and trade of restricted or banned chemicals have led to the development of the Rotterdam Convention's Prior Inform Consent (PIC) treaty, a proposed convention that would require exporting countries to provide information on whether the chemical that they are exporting is restricted or banned nationally. The status of signature/ratification of key "chemical" Conventions is presented in Table 6.

6.2. Disposal options

The FAO expert informed the participants on the collaborative programme for the disposal of obsolete pesticides established by FAO in 1994 with the financial support of the Government of the Netherlands, as part of a concerted international programme to solve the problem. The cost of disposal is high. There is a need for as much

Table 6 SEAR Parties to Conventions

Participant (as per 01.06.2006)	Signature/Ratification			
	POP (2001)	Rotterdam (1998)	Basel (1989)	Montreal (1989)
Bangladesh	2001	no	1993	
Bhutan	no	no	2003	2004
Democratic People's Republic of Korea	2002	no	no	2001
India	2002	2005	2005	2003
Indonesia	2001	1992	1993	1998
Maldives	no	no	1992	2002
Myanmar	2004	no	no	1993
Nepal	2002	no	1996	1994
Sri Lanka	2001	no	1992	2002
Thailand	2005	2002	1997	2003
Timor Leste	no	no	no	no

Sources: 3w.basel.int/index.html; 3w.pops.int; 3w.pic.int; 3w.unep.org/ozone/ and Country Presentations (Annexe 10)

Box 8

Integrated pest and vector management

Irrigated agriculture exposes rural people to health risks associated with vectors of human disease and to potential ill effects from agricultural and public health use of pesticides. Collaboration between sectors of health and agriculture to jointly address these problems is generally lacking, leading also, to the risk of resistance build-up among the disease vector populations. In June 2006, WHO applauded the findings of the evaluation of an inter-sector project in rice irrigation systems in **Sri Lanka**, which uses the Farmer Field School (FFS) approach to integrate management of vector-borne diseases and improvement of rice productivity, a concept coined by integrated pest and vector management (IPVM). Rice farmers in intervention villages graduated from the FFS and were found to conduct vector control actions and reduce agricultural use of insecticides. Project partners developed a new curriculum integrating an agricultural and a vector-borne disease component. The intervention motivates and enables rural people to actively participate in vector management activities and to reduce several environmental health risks. There is scope for expanding the curriculum to include health effects of pesticides. Benefits of the approach for the health sector's own disease control strategy have not yet been optimally utilized. Also, evaluation and monitoring tools need to be developed and the institutional basis of IPVM be broadened. Source: WHO, SEARO, June 2006. See more at: www.ipmcommunity.org

as US$500 million to clean up critically affected areas of the developing world. The potential for environmental disaster will be complicated and more expensive if the situation is not dealt with, swiftly and safely. High temperature incineration in dedicated hazardous waste incinerators is the currently recommended method for disposal of obsolete pesticides (and pharmaceuticals). This is outlined in the joint FAO, UNEP and WHO Disposal Guidelines. But such sophisticated incinerators do not exist in developing countries. It is therefore necessary to re-package pesticide waste in new UN approved containers where they exist in developing countries, transport them overland to a major port and then by sea to a country where there is dedicated hazardous waste destruction facilities.

Shipment has to comply with the International Maritime Dangerous Goods Code (IMDG-Code) and the UN Basel Convention on the restrictions of transboundary movement of toxic waste. FAO estimates the cost of disposal ranges between US$ 3000 and US$ 4500 per tonne depending on a number of factors.

The workshop participants were encouraged to liaise with this FAO programme to start and strengthen inventory activities in their countries.

FAO's programme would typically support countries to carry out similar initiatives as reported by the delegate from **India**, where, in collaboration with FAO, a comprehensive inventory of banned and obsolete pesticides in the country started in 2006. It aims at increasing national capacity in pesticide and hazardous waste management. Capacity building measures are planned for trained master trainers and the local staff of the major stakeholders – both from the government and private sector – in the safe handling and storage of pesticides and inventory taking, using environmental assessment tools. Trainees are made aware of the need to

FAO coordinated disposal operations took place in Bolivia and Seychelles. Photo credits: FAO

safeguard and centralize the identified unsafe and obsolete stocks at selected sites. National authorities are carrying out a project to decide on the final disposal of a part of obsolete stocks. At the same time a review of current mechanisms for the prevention of accumulation of obsolete pesticides in the future has also started.

Obsolete pesticides tend to be a mix of contaminated chemicals, stored in obsolete containers together with wrapping and other materials, all of which need to be safely disposed of, including contaminated soil. To this end, no disposal or management method should be applied in a developing country which would not be permitted in advanced industrialized nations.

Local disposal facilities must be part of a national strategy for the management of hazardous waste, with full approval of all stakeholders, and not *ad hoc*, isolated solutions for a specific problem.

Hazardous waste management options include:

- High temperature incineration
- Chemical treatment
- Engineered landfill
- Long term controlled storage
- Reuse/reformulation
- New technology

High temperature incineration

The basic hazardous waste incineration rules consider that the process is officially approved and is carried out in a licensed facility under independent monitoring. The US EPA Toxic Substances Control Act (TSCA) Complex Organics Incineration Criteria requiring 1200 Degree Celsius/2 seconds and the EU Directive 2000/76/EC on Incineration of Waste requiring 1100 Degree Celsius/ 2 seconds need to be implemented. In case of cement kilns, residence time should be above 3 min at more than 1100 Degree Celsius. This will ensure that the "Self cleaning process" takes place properly and complex organics are destroyed, and minerals and ash become incorporated into the cement. Where such appropriate cement kilns are already available, input and emission monitoring systems

Box 9 Bhutan success story

Obsolete pesticide stocks in Bhutan were identified from 1990. Volumes mounted as direct pesticide subsidies were finally phased out in 1993. By 1997 the stocks amounted to 68MT. Most pesticides had come via India, but Bhutan's request to that country to take the stocks back was turned down. It was with the help of Denmark, that 50% of the stocks were re-packaged by Danish hazardous wastes specialists, as per international requirements, and stored in UN approved containers in Paro in 1999. An attempt to incinerate part of the stocks in a cement factory, close to the Indian border failed due to opposition from the local population. In 2002, the Swiss Development Cooperation (SDC) agreed to sponsor the final disposal of the stocks under the condition that Bhutan would become Party to the Basel convention, which took place in June 2003. The disposal operation, supervised by international experts, brought the re-packaged stocks by road from Paro to Kolkata, by ship to Hamburg and finally by road to Basel, Switzerland. The operation ended in 2006. (Annex 10, P2).

Box 10 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

This is a signifcant international treaty, designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries (LDCs). It does not, however, address the movement of radioactive waste. The Convention is also intended to minimize the amount and toxicity of wastes generated, to ensure their environmentally sound management as closely as possible to the source of generation, and to assist LDCs in environmentally sound management of the hazardous and other wastes that they generate. The Convention was opened for signature on March 22, 1989, and enforced on May 5, 1992. A list of parties to the Convention, and their ratification status, can be found on the Basel Secretariat's web page. Of the 166 parties to the Convention, Afghanistan, Haiti, and the United States have signed the Convention but are yet to ratify it. Basel has listed 47 categories of hazardous wastes requiring special consideration. Top of the list are the following: Y1: Clinical wastes from health care facilities; Y2: Wastes from the production and preparation of pharmaceutical products: Y3: Waste pharmaceuticals, drugs and medicines; Y4: Wastes from the production, formulation and use of biocides. More at: www.basel.int

must be installed and the waste input must be carefully regulated. New skills must be developed and maintained amongst operating staff, as it normally does not deal with contaminated material, soil and containers

Chemical treatment

This highly sophisticated disposal option provides limited or no solution for contaminated materials and containers. As it presents significant potential hazards, it requires high levels of expertise with supporting infrastructure.

Engineered landfill

Landfill of hazardous waste is very tightly controlled in EU and US. Important investment in infrastructure is needed and long term management and maintenance have to be planned for. Landfill is not a permanent solution; leachate and gas must be monitored and treated as hazardous waste.

Reuse/reformulation

It is important to point out that when the active ingredient of a particular chemical has dropped, by half for example, it is not possible to simply double the dose to obtain the original concentration. Indeed, the missing active ingredient may have triggered chemical reactions and created new, unwanted compounds with unknown toxicity. By doubling the dose, we would also be doubling the amount of these unknown compounds. Reformulation is thus, a complicated and very specific process, needing specialized infrastructure. The final product must not present additional unacceptable hazards. The question remains: who benefits from such a solution—people and the environment, or pesticide manufacturers and owners?

Dealing with stockpiles of obsolete pesticides is quite different from ongoing waste management and there are no "fit all" solutions. (Annexe 10, P18).

Source: *http://www.fao.org*

Capacity Building in Health Care Waste Management

The representative of the Indira Gandhi Open University — IGNOU gave an overview of the 6 month certificate course on sound health care waste management (HCWM) in which Indonesian participants can enrol through national study centres, for a fee of US$400. Discussions with the study centres are going on, a first batch of Indonesian e-students is expected to be ready for January 2007. WHO **Indonesia** indicated the will to support the registration as an incentive to the first e-students. **Sri Lanka** took interest in setting up a study centre in Colombo.

Using inputs from the IGNOU course, in 2005, WHO supported the government of **Maldives** in training 60 health workers, from 12 health care facilities in the country in sound HCWM practices. The training sessions, carried out at the SM Ramaiah Medical College in Bangalore, India, set the basis for the completion of the HCWM legislation in Maldives.

WHO, **Indonesia** with support from the European Union's humanitarian aid office ECHO, helped the local authorities implement the project "Clinical Waste Management in the Earthquake and *Tsunami* Affected Area of Northern Sumatra".

Immediately after the catastrophe, an early assessment found that there was a high risk of disease outbreaks due to mishandling of infectious wastes. Action was required to reduce this risk in the few functioning health facilities, and in the field hospitals set up in the overcrowded IDP camps.

The project thus focused on providing necessary HCWM training to health workers in the 13 affected districts using the IGNOU course. By April 2006, over 450 health workers in the province had been trained on the sound management of medical wastes.

All 180 health facilities in the 13 districts received ample support by being provided with the latest up to date non-burn technology to ensure that proper waste management practices can be imple–mented in a sustained manner.

A group of HCWM trainees in Banda Aceh, Indonesia, 2005

Towards the Sound Management of Chemicals

National Profiles (NP) for the sound management of chemicals allow assessing and diagnosing the existing infrastructure for the management of chemicals. This is an important step towards building national capacity in a systematic way. UNITAR, in particular, provide guidance, training and technical support to assist countries in assessing their relevant legal, institutional, administrative and technical infrastructures. At the country level, all ministries concerned with chemicals management, as well as industry and public interest groups, should be involved in the NP preparation process. To date over 150 countries, including several OECD Member States, have prepared or are preparing a NP following the UNITAR/IOMC National Profile Guidance Document. At the regional level, National Profiles provide a good understanding of the existing capabilities of countries, as well as their needs. **Bangladesh** prepared its first NP in 1997; **India:** 'Mini Profile' in 2000, updating in 2006, sponsored by Canada; **Indonesia:** 1997, sponsored by Australia and EC/DG XI; **Sri Lanka:** 1997, updated in 2002, sponsored by Switzerland; **Thailand:** 1998, updated in 2003, sponsored by The Netherlands; **Nepal:** In preparation. (More at: http://www.unitar.org/cwg/np/index.html).

A presentation was made by the WHO repre–sentative on the advantages of having a national system to manage chemicals from cradle to grave, throughout all the key stages of the life cycle, from import to use and final disposal. The participants agreed on the need to update their country's National Profile for the sound management of chemicals. **Bhutan**, will ask WHO/ SEARO for support.

Source: *http://www.fao.org*

Draft Plans of Action to Improve the Management of Hazardous Wastes in SEAR Countries

The working groups produced two major, related outputs: Synthesis of hazardous wastes problems and potential solutions in the SEAR countries (Annex 3) and elements for a national plan of action (Annex 4). While the first document lays emphasis on the main causes of the problems identified, the second document presents an explicit proposal for action, organized as per the lifecycle approach. It details activities, time frames and resources needed to increase the SEAR country's ability and capacity to manage chemicals and hazardous wastes in such a manner that harm to human health and to the environment is kept low. Participants were informed about the availability of limited funds from WHO SEARO/GAVI: US$ 40.000 per country (**Bangladesh, Bhutan, Indonesia** and **Sri Lanka**), primarily for activities related to HCWM.

It was agreed that the concrete action related to the use of these funds would be decided on a bilateral basis, after the workshop, but based on the joint action plan in Annex 4.

Source: *http://www.fao.org*

Recommendations

The participants elaborated a set of 20 recommendations requesting national authorities and in particular the health and agriculture sectors, to implement systems that would lead to the sound management of chemicals, throughout their life cycle. Implementing the FAO Code of Conduct would be one way to do so—and also coordinating for awareness campaigns on the health risks inked to hazardous wastes.

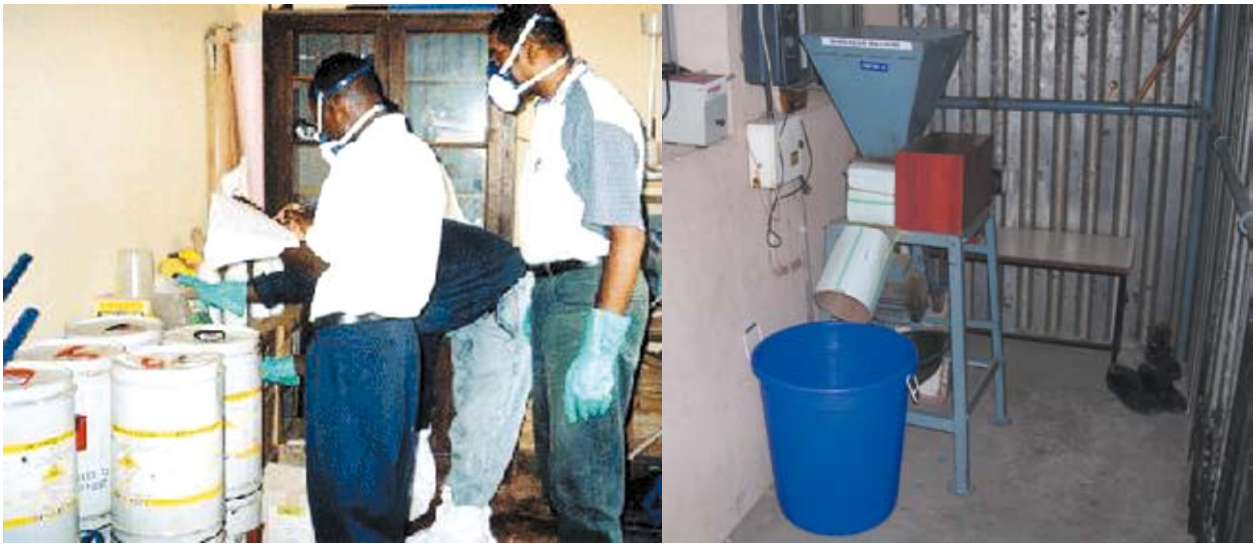
Countries in the region are called upon to implement pest and vector management schemes that rely less on pesticides.

The health sector is asked to boost capacity-building by making use of the IGNOU distance learning course on sound health-care waste management.

Agriculture is encouraged to seek assistance and guidance from FAO to initiate and strengthen national inventories of obsolete pesticide stocks. Both sectors are called upon to guarantee the delivery of the necessary funding, with WHO and FAO support.

The participants singled out two urgent matters and called for immediate national, regional and international actions—to reduce mercury-containing medical devices and to better control drug donations in and after emergencies.

Finally the participants call for stronger proactive regional collaboration, using existing national, regional and international human and technical capacities.



Source: *http://www.ens-newswire.com*

Summary Evaluation of the Workshop

Participants carried out an anonymous evaluation of the workshop which showed that most of them had appreciated the way the event had been organised and the interaction in the working group's sessions. Many individuals acknowledged the open and interactive parti–cipation as well as the quality of the outcome. But many looked forward to a longer workshop (5 days). However for some, the workshop was an eye-opener.

List of Annexes

Annex 1: Objectives and programmes

General Objectives:

To develop a framework for a regional action plan to implement sound management of hazardous wastes.

Specific objectives:

1. Participants are given an overview of the dimensions of the environmental health problems linked to the current management of hazardous wastes in SEAR, especially in *tsunami* affected regions.
2. Participants are technically updated on the WHO's activities for the sound management of health-care wastes, and on the activities of FAO's Obsolete Pesticide Programme.
3. Participants are informed on the WHO/ IGNOU training and distance learning HCWM programme.
4. Participants draw on lessons learnt from experiences in post *tsunami* hazardous waste management.
5. Participants identify and develop draft elements to strengthen existing national and regional initiatives to address the sound management of hazardous wastes.

Programme

Monday, 26th May 2006		
Timings	**Topic**	**Speaker/Facilitator**
8.30–9.00	Registration of participants	Secretariat
9.00–9.30	Inauguration: speeches	Representatives of MoH Indonesia, FAO and WHO
9.30–9.50	Presentation of participants and expectations	Participants/Ravi Agrawal
9.50–10.00	Objectives and programmes	A von Hildebrand, WHO SEARO
10.00–10.30	*Tea Break*	
10.30–11.00	Chemical safety: from global concern to local action (by means of video presentation)	Mark Davis, FAO Rome
11.00–12.30	Country presentations	Participants
13.00–14.00	*Lunch*	
13.30–15.30	Country presentations	Participants
15.30–16.00	Overview of current situation and challenges in specific countries in the SEAR	A von Hildebrand, WHO SEARO
16.00–17.00	Group work session A: Prioritization of issues to be addressed to strive towards the sound management of hazardous wastes in the SEA Region	Participants
19.00	Welcome reception	

Annex 2: Overview of Obsolete Pesticides Stocks in other regions

Countries in Africa	Pesticide stocks total (tonnes)	Disposed of
Algeria	207	
Benin	421	
Botswana	18 247	
Burkina Faso	75	
Burundi	169	
Cameroon	225	
Cape Verde	43	
Central African Republic	238	
Dem. Rep. of Congo	591	
Rep. of Congo	2	
Cote d'Ivoire	828	821
Egypt	591	
Equatorial Guinea	146	
Eritrea	223	
Ethiopia	3 401	
Gambia	21	21
Ghana	72	
Guinea-Bissau	9	9
Guinea-Conakry	47	
Kenya	56	
Libya	44	
Madagascar	174	174
Malawi	111	

Countries in Africa	Pesticide stocks total (tonnes)	Disposed of
Mali	13 761	
Mauritania	297	200
Morocco	2 265	
Mozambique	443	
Namibia	245	202
Niger	151	
Nigeria	22	
Rwanda	451	
Sao Tome and Principe	3	
Senegal	289	110
Seychelles	12	12
Sierra Leone	7	
South Africa	603	603
Sudan	666	
Swaziland	9	9
Tanzania	1 136	57
Togo	86	
Tunisia	882	
Uganda	254	90
Zambia	360	360
Zanzibar	280	280
Zimbabwe	27	
Total	**48 191**	**2 948**

Countries in the Middle East	Pesticide stocks total (tonnes)	Disposed of
Iran	1 139	
Iraq	232	
Kuwait	32	
Lebanon	189	10
Qatar	5	5
Saudi Arabia	241	
Syria	327	
Yemen	1 802	262
Total	**3 967**	**277**

Source: FAO, 2003, VOARISOA, 2000

Annex 3: Synthesis of hazardous wastes problems and potential solutions in the SEAR countries, according to the life cycle approach

Problems	Main Causes	Possible Solutions	Countries where mentioned as most relevant	Resources and experiences available
IMPORT				
Illegal hazardous chemicals sold in market; Availability of counterfeit and substandard pesticides and outdated drugs due to poor quality control, import inspection and verification systems.	Poor legislation, rules and regulations and policy guidelines	Develop clear legislation, rules and guidelines	Bhutan, Timor Leste	India
	Poor enforcement of law	Develop clear guideline and implement properly Engage communities, NGOs , media, ask for transparency	Bangladesh, India, Indonesia	WHO
	Poor data collection, poor inventory	Develop managerial capacity, logistics and organizational structure	Nepal, Timor Leste, Indonesia	FAO
	Inadequate lab facilities	Develop infrastructure		India: network of over 50 labs; Thailand
	Lack of inter-agency coordination	Clarify responsibilities	Indonesia, Nepal, Timor Leste	WHO
	Inadequate infrastructure /resources	Create more awareness amongst policy makers to obtain resources for infrastructure in terms of trained manpower, equipments and financial resources	All SEAR countries	
	Poor participation of private sector	Enforcement and PPP	All SEAR	
	Border control issues	Inter-country relations/customs regulations	Bhutan, Nepal, Bangladesh	

Problems	Main Causes	Possible Solutions	Countries where mentioned as most relevant	Resources and experiences available
STORAGE				
Obsolete stocks of chemicals	Inadequate storage conditions	International guidelines and first in, first out principle	All SEAR countries	FAO
Illegal pesticides and chemicals sold in the markets	Unsecured storage of obsolete chemicals	Develop legal instruments	All SEAR countries	FAO
TRANSPORT				
Poisonings, contaminations	Inadequate transportation, lack of specific vehicles	Enforcement of law	All SEAR countries	FAO
	Inadequate , top down training programmes	Participative training knowledge transfer for specific high-risk groups	All SEAR countries	FAO
USE				
Poisonings due to exposure to pesticides	Excessive use of pesticides in intensive cropping systems	IPM, IVM, IPVM alternative bio-control	Myanmar, Timor Leste	Bangladesh, India, Sri Lanka, FAO Global IPM Programme
	Reuse of empty pesticide containers	Develop clear guidelines and implement properly	Bangladesh	Sri Lanka, FAO Global IPM Programme
	Inadequate , top down training programmes	Participative training knowledge transfer for specific high risk groups	All SEAR countries	FAO Global IPM Programme
Presence of heavy metals in paints, batteries, electronics, automobile fuels, etc	Unregulated	Develop legal instruments	Bhutan	WHO, FAO

Problems	Main Causes	Possible Solutions	Countries where mentioned as most relevant	Resources and experiences available
DISPOSAL				
Improper final disposal of hazardous wastes	Inappropriate incinerator	Non-burn technologies not available	Myanmar	India, WHO
Lack of capacity for effective hazardous waste management	No common treatment facilities	Explore public private ventures	Most SEAR countries	India
	Lack of technical expertise	Capacity building	Indonesia, Nepal, Timor Leste	FAO, WHO
Environmental pollution from toxic wastes	Unsecured landfill	Develop clear technical guidelines	Most SEAR countries	Basel Convention
Poisonings from re-use of empty containers	Improper container management	Implement legislation, labeling	Indonesia, Nepal, Timor Leste	FAO Sri Lanka
	Lack of community awareness on hazardous waste	Create awareness, use of mass media and include in the training curriculum	All SEAR countries	Apell/UNEP, FAO
Contaminated food and water	Residue monitoring is poor	Food safety	India	FAO, WHO
Specific to health-care wastes (HCW)				
Poor management of HCW	No waste minimization	Train all the health care workers on sound management of HCW	Deficient in all countries	IGNOU distance learning certificate course, WHO
	No segregation	Life cycle approach	Most SEAR countries	WHO
	Ill storage			
	Poor treatment			
	Unsafe disposal, open incineration	Non-burn, alternative technologies	Most SEAR countries	India, WHO
	Lack of resources	Create more awareness amongst policy makers to obtain resources for infrastructure in terms of trained manpower,equipments and financial resources		WHO

Annex 4: Elements for a national plans of action

Elements to consider for inclusion in a national action plan for the sound management of chemicals, and in particular hazardous wastes issued from the agricultural and the health sectors

Import, Manufacture, Donation		
Action	**Time-frame**	**Resources**
1. Develop clear legislation and guidelines to ensure the sound management of chemicals and hazardous wastes, including agricultural and public health pesticides, pharmaceuticals and hazardous materials and wastes, throughout their lifecycle. This includes import, registration, licensing, labeling, storage, transportation, distribution, retail-marketing, use, recycling, treatment and disposal of hazardous wastes	1. 2009	Technical ◆ International guidelines developed by UN Agencies ◆ Capacity building programmes from FAO, WHO, Basel convention and UNEP - DTIE ◆ Technical support under TCPs with FAO ◆ Rotterdam, the Basel and the Stockholm Conventions. ◆ Disposal and treatment facilities in the private sector ◆ India has model rules and guidelines ◆ National laboratories Human ◆ Departments of Customs, Finance, Agriculture, Environment and Health ◆ Universities and research organizations ◆ Private sector ◆ NGOs ◆ Regional experts
2. Develop clear national policy and guidelines to implement standards and specifications for chemicals	2. 2008	
3. Strengthen analytical capability	3. Immediate 2007	
4. Provide legal base to carry out a national inventory of hazardous wastes	4. 2007	
5. Regulate and monitor the illegal traffic of sub-standard pesticides and pharmaceuticals	5. 2007	
6. Establish inter-country cooperation to strengthen border controls	6. 2007	
7. Develop legal basis to return unwanted chemicals to sender/manufacturer	7. 2007	
8. Ensure adequacy between demand and supply	8. Immediate and constant	
9. Ensure quality control and sanction law-breakers	9. Immediate. It is necessary to have all data required (notably MRLs, efficacy testing and data protection)	
10. Encourage organic farming and implementation of integrated pest and vector management systems the use of non-hazardous molecules	10. Immediate	

11. Observe the international agreements related to importation of chemicals such as the Rotterdam and the Basel Conventions 12. Observe the Stockholm Convention to phase out all Persistent Organic Pollutants 13. Develop/update national legislation for the management of health care wastes 14. Encourage and compel the private sector to develop and implement professional capacity and social responsibility and consciousness for the sound management of chemicals 15. Develop managerial capacity and infrastructure in the government and regulatory sectors to ensure quality control and sound overall management ofchemicals	11. Immediate 12. Immediate 13. 2007 14. 2007 15. 2008	Financial ◆ National budget ◆ State budget ◆ Direct taxes/incentives ◆ Private – public schemes ◆ International sources ◆ Regional cooperation ◆ WHO SEARO/GAVI: US$170000 for HCWM
Storage		
Action	**Time-frame**	**Resources**
1. Regulate the national standard for storage facilities used for chemicals 2. Implement international guidelines and first in first out principle (FIFO) to improve inventory management 3. Inventory of the existence of obsolete stocks and and avoid overstocking of stocks of hazardous wastes 4. Conduct capacity building for storekeepers, including spillage management 5 Registration of chemical storages to be made mandatory	1. 2007 2. Immediate 3. By 2008 4. 2007 5. 2007	◆ FAO ◆ SAICM ◆ WHO ◆ Regional expertise ◆ Municipalities ◆ Private sector

Transport		
Action	**Time-frame**	**Resources**
1. Develop/update rules and guidelines on safe transportation of chemicals 2. Enforce the rules strictly 3. Capacity building for transporters	1. By 2007 2. Immediate 3. Starting 2007	◆ FAO ◆ SAICM ◆ WHO ◆ Regional expertise
Distribution		
Action	**Time-frame**	**Resources**
1. Develop/update on safe storage 2. Ensure storage capacity is adequate to supply 3. Implement first in first out principle (FIFO) 4. Ensure compliance of the storage facility with law 5. Inventorize obsolete stocks and hazardous wastes 6. Conduct capacity building for storekeepers, including spillage management 7. Capacity building for agriculture and health extension workers on sound management of chemicals, specially concerning hazardous agro-chemical and health-care wastes	1. By 2007 2. Immediate and constant 3. Immediate 4. Immediate 5. 2007 6. To start in 2007 7. To start in 2007	◆ FAO ◆ SAICM ◆ WHO ◆ Regional expertise ◆ Private sector ◆ Health and agriculture authorities
Retail marketing		
Action	**Time-frame**	**Resources**
1. Make certification of retailers mandatory 2. Awareness and capacity building measures to avoid build up of date expired and banned pesticides and drugs 3. Train and make aware on sound handling, storage 4. Develop and enforce clear guidelines on the reuse of empty pesticide containers 5. Enforce regulations on the management of chemicals 6. Involve farmers groups and consumer associations in regulating and identifying sale of spurious pesticides and fake drugs	1. By 2007 2. By 2007 3. By 2007 4. By 2007 5. Immediate and constant 6. Immediate	◆ FAO ◆ SAICM ◆ WHO ◆ Regional expertise ◆ Municipalities ◆ District authorities ◆ Health and agriculture authorities ◆ Private sector ◆ Consumer associations ◆ Farmer associations

Use		
Action	**Time-frame**	**Resources**
1. Capacity building and incentives to promote integrated pest and vector management systems (IPM and IVM) to reduce reliance on pesticides	1. Continuous	◆ FAO IPM Programme ◆ WHO ◆ SAICM ◆ Regional expertise ◆ District authorities ◆ Health and agriculture authorities ◆ Consumer associations ◆ Farmer associations ◆ Private sector ◆ Use of PPE ◆ ILO Safety and Health in Agriculture Convention ◆ WHO SEARO/GAVI: US$40000 per country (Bangladesh, Bhutan Indonesia, Sri Lanka) for HCWM
2. Train and make aware on sound handling, storage and usage in accordance with label instructions	2. By 2007	
3. Capacity building and increase awareness on disposing of obsolete pesticides, sound HCWM and management of expired drugs	3. By 2007	
4. Enforce regulations on the management of chemicals notably sanctioning sale and purchase of spurious products	4. Immediate and constantly	
5. Develop and enforce clear guidelines to ban/severely restrict the reuse of empty pesticide containers	5. By 2007	
6. Monitor pesticide residues in food	6. 2007	
7. Carry out research projects on HCWM	7. Immediate	
Treatment and Disposal		
Action	**Time-frame**	**Resources**
1. Implement national legislation on treatment and disposal of hazardous wastes, including HCW	1. ASAP	◆ FAO ◆ SAICM ◆ WHO ◆ Regional expertise ◆ Health and agriculture authorities ◆ Private sector
2. Collect data from national inventory and draw an action plan for T&D of hazardous wastes	2. By 2008	
3. Develop action plan for repackaging and safeguarding selected stocks to be re-used, as per national legislation	3. By 2007	
4. Capacity building for specialized staff in the handling of hazardous wastes, including HCW	4. By 2007	
5. Develop links with existing disposal facilities, common treatment facilities, secured landfills and incinerators	5. Immediate 6. Immediate	

Annex 5: Recommendations of the workshop

The participants of the ongoing WHO/FAO joint Regional workshop for Sound Management of Hazardous Wastes from Health care and Agriculture, 26–29 June 2006, representing the SEAR countries Bangladesh, Bhutan, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand and Timor Leste,

– *After* obtaining an overview of the environmental health problems linked to hazardous wastes emanating from agricultural activities and from health services,

– *Having* become more aware of the current management of hazardous wastes in the countries of SEA, especially in the tsunami affected regions,

– *Upon* being updated on the WHO's activities and WHO's Global Policy for the sound management of health care wastes, and on the activities of FAO's Obsolete Pesticide Programme,

– *On* been appraised on the possibilities for capacity building in the sound management of health care wastes,

– *Recognizing* the parallels and links between Health Care Waste Management and Agricul–tural Pesticide Waste Management,

– *Acknowledging* that the reduced reliance on pesticides in food production and for vector control, effective life cycle management of pesticides and wastes in the health and agricultural sectors contributes to the production of safe food and to the protection of patient safety, improvement of food safety and patient safety benefits of the whole population,

– *Realizing* that obsolete pesticide stocks represent a significant risk to human health and the environment as also their being an economic burden on developing countries and a barrier to sustainable development,

– *Identifying* the causes leading to the current problems and formulated viable solutions for the SEAR countries,

– *Realising* the need to involve all stakeholders including farmers, health workers and NGOs, and,

– *Having* prepared coherent draft frame works, based on the life cycle approach, for national action plans aimed at strengthe-ning national and regional initiatives in pursuing the sound management of hazardous wastes emanating from agriculture and health care,

Adopted the following recommendations:-

1. National authorities to take into account the suggested frameworks of national action plans in order to strengthen existing initiatives addressing the sound management of hazar–dous wastes, through a lifecycle approach.

2. National health authorities to recommend at the World Health Assembly a resolution to adopt sound waste management strategies to be implemented by 2010.

3. National authorities in both the health and agricultural sectors to collaborate in the development and implementation of effective waste management systems in association with other relevant authorities such as environment and industry ministries.

4. All key stakeholders and authorities to be involved in these programmes including farmer groups, health care workers, manu–facturing and marketing industry, public interest NGOs. The media may be used to raise mass awareness levels about the issues and to inform the public of their role and the risks they need to be aware of.

5. WHO and FAO to collaborate more closely in assisting and supporting this process as needed, including provision of specifications and standards for procurement.

6. Countries to adhere to the FAO *International Code of Conduct on the Distribution and Use of Pesticides* as a baseline through legislation, enforcement and implementation of mea–sures to manage pesticides.

7. Action to be taken to reduce reliance on synthetic pesticides to the minimum as key to their effective management. Systems such as integrated pest Management or IPM for agricultural pest control and Integrated Vector Management or IVM for disease vector management to be promoted and implemented in countries.

8. Appropriate technology to deal with both accumulated stockpiles of hazardous waste and ongoing generation of waste in the form of empty containers and other wastes, be adopted. Participants call upon international and relevant agencies to provide guidance in these areas and encourage governments and industry to develop relevant solutions. Countries, with the assistance and guidance of FAO to make every effort to prioritize action to prevent and eliminate such stockpiles.

9. National authorities to integrate sound health care waste management as a key component of the national health delivery system, both in the public and private sectors, to ensure overall patient safety, which includes infection control.

10. National authorities to ensure budgetary resourcing of the management for health care and agrochemical waste, both through allocations as well as through the involvement of other stakeholders, including the private sector and aid agencies.

11. Health sector encouraged to build capacity to achieve the above by availing of existing opportunities such as the 'distance learning certificate course' on the sound management of health care wastes offered by the Indira Gandhi Open University –IGNOU – India. WHO to support this activity alongside.

12. IGNOU should consider developing a parallel training programme for the management of agricultural wastes.

13. Countries in the region to proactively make use of existing regional expertise, legal frameworks, experiences and lessons learned, and to consider the development of regional hazardous waste treatment facilities. This is being done to include experience from the post—tsunami rehabilitation project conducted by WHO/ECHO, as well as from other stakeholders, while devising their policies and programmes.

14. Health Sector to recognize and reduce the health impacts of exposures to mercury of health workers, patients and the community from the use of mercury in health care such as in mercury- containing medical devices, by raising capacity and awareness, implementing procedures for safe spill managements and preferential purchasing of non-mercury

devices. Lessons can be learnt from Maldives and other countries.

15. National authorities to urgently ensure the safe management, disposal and prevention of accumulation of stocks of outdated pharmaceuticals, notably those donated internationally, as part of *tsunami* and emergency relief. To carry out detailed national inventories of such stocks. To further provide adequate safe and secure storage to protect them from adverse climatic conditions and from potential looting and possible leaking into the black market.

16. National authorities to avail of international experience, resources, "return to sender" opportunities and best practices to ensure the safe disposal of such stocks, using expertise of agencies like the FAO and the Basel Convention.

17. WHO guidance on drug donations, i.e. the "Guidelines for Drug Donations" (WHO, 1999) be thoroughly revised and updated to also address specific challenges posed in and after emergency situations.

18. Direct drug donations in and after emergency situations should be discouraged and allowed to take place only through specialized agencies such as WHO, in close collaboration with national authorities, after adequate assessment of need and epidemiological profiling of requirements. Drug donors need to be made aware of the significant health risks posed by ill-managed drug donations and implications in terms of recurring costs for the safe disposal of the concerned stocks. Willful dumping of outdated drugs needs to be considered as a criminal act. Such behaviour should be declared illegal, through an internationally binding mechanism.

Date: 29th June 2006, Jakarta, Indonesia.

Annex 6: List of Participants

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Annex 7: Obsolete Pesticides Problems, Prevention and Disposal

The FAO Programme on the Prevention and Disposal of Obsolete Pesticides, with financial assis–tance from the Government of the Netherlands, the Government of Japan and UNEP Chemicals, undertook the enormous task of identifying and surveying stockpiles of obsolete pesticides in all developing regions. Indicative inventories of obsolete pesticides now exist for 95 countries in Africa, the Near East. Latin America and Asia.

The alarming information gathered during these surveys has provided concrete evidence of the real and immediate danger these stockpiles of obsolete pesticides pose to the global environment. Using these statistics to raise awareness has put FAO in a stronger position to impress upon donor agencies, the private sector and governments of developing countries the need to work together to put the problem on the international agenda to develop a global strategy and conducive plan of action that will lead to effective solutions.

In all disposal activities of the following inter–national conventions need to be taken into account:

Bamako Convention (OAU, 1991) on the ban of the import into Africa and the control of transboundary movements and management of hazardous wastes within Africa.

Basel Convention (UNEP, 1989): on the Control of Transboundary Movements of Hazardous Wastes and their Disposal — both to ensure prevention of environmental disasters. (see: www.basel.int/index.html)

Rotterdam Convention (UNEP/FAO, 1998): on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade — to regulate the international trade of hazardous materials. (see: www.pic.int)

What FAO is doing

- *Surveying and monitoring potential problems of existing stockpiles*
- *Providing technical guidance on management, elimination and prevention of obsolete pesticides*
- *Assisting countries to formulate and implement national and regional projects*
- *Providing training to build capacity in developing countries*
- *Supervision, monitoring and follow up of disposal and prevention operations*
- *Providing forums for exchange of experience and information among countries*
- *Working with partners to provide comprehensive solutions*

Stockholm Convention (UNEP, 2001): on per–sistent organic pollutants (POPs)-to stop the production and distribution of POPs for a better protection of environment and human health. **Nine of the 12 chemicals covered by the convention are pesticides or used in pesticide formulations**. (see: www.pops.int)

FAO has produced and published a set of guide–lines and other related documents for manage–ment and proper storage of needed pesticides and for technical disposal operations for unsafe, obsolete, unwanted or banned pesticides.

Guidelines

- Prevention of Accumulation of Obsolete Pesticide Stocks
- Pesticide Storage and Stock Control Manual
- Disposal of Bulk Quantities of Obsolete Pesticides in Developing Countries (under revision)
- Guidelines for the management of small quantities of unwanted and obsolete pesticides
- *Assessing soil contamination (A reference manual)*

- *Baseline study on the problem of obsolete pesticide stocks*
- *FAO training manual for inventory taking of obsolete pesticides*
- *Country guidelines*
- *Environmental Management Toolkit for obsolete Pesticide Disposal Programmes*
- *Guidelines for Inventory of Obsolete Pesticides*

Internet

Instant access to almost all of the information compiled by FAO since the inception of the FAO Collaborative Programme on Disposal of Obsolete Pesticides is available to any interested agency or organization throught the FAO homepage on the Internet: www.fao.org (click on Agriculture, Plant Protection).

CD-ROM

An interactive CD-ROM with all data from global surveys, FAO databases, text from the series of guidelines, photographs and video excerpts has been produced.

Causes for accumulation of obsolete pesticide stocks

- Inadequate storage facilities or storage containers
- Pesticides banned while in storage
- Prolonged storage of products with short shelf lives
- Inability to forecast pest outbreaks such as locusts
- Poor assessment of pesticide requirements
- Unawareness of pesticide hazards
- Poor stock management and record-keeping
- Inappropriate, out of season or unethical dumping as a pretext of donations
- Overpurchase through government or donor budget allocations
- Ineffective distribution or marketing systems
- Aggressive marketing by vendors

Policy Issues

Although past errors have been recognized and measures taken to prevent repetition, large quantities of obsolete pesticides remain as a heritage of more than 40 years of mismanagement.

Unless coordinated international action is taken this situation will continue to worsen. The following highlights the ongoing efforts of FAO.

Organizing a Global Effort to dispose of existing hazardous chemicals and also to avoid further accumulations

Playing a Key Role in ASP a multi-stakeholder initiative aiming to eliminate and prevent obsolete pesticide stockpiles throughout Africa

Providing Monitoring Services to ensure that contractors comply with international safety and environmental standards

Establising More Cooperation among donor governments and aid agencies, recipient governments and agrochemical companies, who all must assume some of the responsibility for the current situation

Reducing Reliance on Pesticides by promoting alternative methods of pest management such as IPM and IVM

Improving Stock Management to limit stocks of pesticides to short-term requirements and preventing obsolescence and damage to products in stores

Developing Waste Management strategies that aim to deal with unused pesticides and empty containers in safe and effective ways

Seeking Funding Resources for prevention and disposal projects.

Annex 8: Mercury in Health Care

World Health Organization

Policy Paper

Background

Mercury is a naturally occurring heavy metal. At ambient temperature and pressure, mercury is a silvery-white liquid that readily vaporizes and may stay in the atmosphere for up to a year. When released to the air, mercury is transported and deposited globally. Mercury ultimately accumulates in lake bottom sediments, where it is transformed into its more toxic organic form, methyl mercury, which accumulates in fish tissue.

Mercury is highly toxic, especially when metabolized into methyl mercury. It may be fatal if inhaled and harmful if absorbed through the skin. Around 80% of the inhaled mercury vapour is absorbed in the blood through the lungs. It may cause harmful effects to the nervous, digestive, respiratory, immune systems and to the kidneys, besides causing lung damage. Adverse health effects from mercury exposure can be: tremors, impaired vision and hearing, paralysis, insomnia, emotional instability, developmental deficits during fetal development, and developmental delays during childhood. Recent studies suggest that mercury may have no threshold below which some adverse effects do not occur.

Contribution from the health care sector and Regulation

Health care facilities are one of the main sources of mercury release into the atmosphere because of emissions from the incineration of medical waste. The Environment Minister of the Canadian province of Ontario declared on December 2002 that emissions from incinerators were the fourth-largest source of mercury.

In the United States, according to US Environmental Protection Agency (EPA) in a 1997 report, medical waste incinerators may have been responsible for as much as 10% of all mercury air releases.

Health care facilities are also responsible for mercury pollution taking place in water bodies from the release of untreated wastewater. According to a 1999 report, health care facilities may also have been responsible for as much as 5% of all mercury releases in wastewater. Environment Canada estimates that more than one-third of the mercury load in sewage systems is due to dental practice.

Dental amalgam is the most commonly used dental filling material. It is a mixture of mercury and a metal alloy. The normal composition is 45–55% mercury; approximately 30% silver and other metals such as copper, tin and zinc. In 1991, the World Health Organization confirmed that mercury contained in dental amalgam is the greatest source of mercury vapour in non-industrialized settings, exposing the concerned population to mercury levels significantly exceeding those set for food and for air.

(Source:http://www.who.int/ipcs/publications/cicad/en/cicad50.pdf)

According to a report submitted to the OSPAR Commission, in the United Kingdom, annually 7.41 tonnes of mercury from dental amalgam are discharged to the sewer, atmosphere or land, with another 11.5 tonnes sent for recycling or disposed with the clinical waste stream. Together, mercury contained in dental amalgam and in laboratory and medical devices, account for about 53% of the total mercury emissions.

Waste incineration and crematoria are also listed as major sources of mercury emissions. Many countries, such as Armenia, Cameroon, Ghana, Honduras, Pakistan, and Peru, recognize the contributions from hospital thermometers, dental amalgams, hospital waste and/or medical waste incinerators but lack quantitative data. Despite the lack of data, there is good reason to believe that mercury releases from the health sector in general are substantial.

Some countries have restricted the use of mercury thermometers or have banned them without prescription. A variety of associations have adopted resolutions encouraging physicians and hospitals to reduce and eliminate their use of mercury containing equipment.

Occupational health hazard

The most common potential mode of occupati–onal exposure to mercury is via inhalation of metallic liquid mercury vapours. If not cleaned up properly, spills of even small amounts of elemental mercury, such as from breakage of thermometers, can contaminate indoor air above recommended limits and lead to serious health consequences. Since mercury vapour is odourless and colourless, people can breathe mercury vapour and not know it. For liquid metallic mercury, inhalation is the route of exposure that poses the greatest health risk.

A variety of studies demonstrate that mercury containing health care equipment will invariably break. Small spills of elemental mercury on a smooth, non-porous surface can be safely and easily cleaned up with proper techniques. However, beads of mercury can settle into cracks or cling to porous materials like carpet, fabric, or wood, making the mercury extremely difficult to remove. Spilled mercury can also be tracked on footwear. Inadequate cleaning and disposal may expose already compromised patients and health care staff to potentially dangerous exposures.

Alternatives

A recent study found that at least one manufac–turer of the non-mercury alternative was identified where the cost differences between mercury and non-mercury technologies were minimal. The research findings suggest that many non-mercury alternatives are available to address the full range of functions required by consumer products. For health care, these include blood pressure devices, gastrointestinal devices, thermometers, barometers, and in other studies, include the use of mercury fixatives uses in labs.

Both mercury and aneroid sphygmomanometers have been in use for about 100 years, and when working properly, either gives accurate results.

Of all mercury instruments used in health care, the largest amount of mercury is used in mercury sphygmomanometers (80 to 100g/unit), and their widespread use, collectively make them one of the largest mercury reservoirs in the health care setting. By choosing a mercury-free alternative a health care institution can make a tremendous impact in reducing the potential for mercury exposure to patients, staff and the environment. Aneroid sphygmomanometers provide accurate pressure measurements when a proper maintenance protocol is followed. It is important to recognize that no matter what type of blood pressure measurement device is used both aneroid and mercury sphygmomanometers must be checked regularly in order to avoid errors in blood pressure measurement and consequently the diagnosis and treatment of hypertension.

International Conventions

The UNEP Governing Council concluded that there is sufficient evidence of significant global adverse impacts from mercury to warrant

further international action to reduce the risks to humans and wildlife from the release of mercury to the environment. The UNEP Governing Council decided that national, regional and global actions should be initiated as soon as possible and urged all countries to adopt goals and take actions, as appropriate, to identify populations at risk and to reduce human-generated releases.

Strategy

To understand better the problem of mercury in health care sector, it is recommended that countries conduct assessments of current mercury usage and waste management programs. WHO proposes to work in collaboration with countries through the following strategic steps.

Short-term: Develop mercury clean up and waste handling and storage procedures. Until countries in transition and developing countries have access to mercury free alternatives it is imperative that safe handling procedures be instituted which minimize and eliminate patient, occupational, and community expo–sures. Proper procedures should include spill clean up response, educational programs, protective gear, appropriate waste storage containment, staff training, and engineered storage facilities. Countries that have access to affordable alternatives should develop and implement plans to reduce the use of mercury equipment and replace them with mercury-free alternatives. Before final replacement has taken place, and to ensure that new devices conform with recommended validation protocols, health care facilities will need to keep mercury as the "gold" standard to ensure proper calibration of mercury sphygmomanometers.

Medium-term: Increase efforts to reduce the number of unnecessary use of mercury equipment. Hospitals should inventory their use of mercury. This inventory should be categorized into immediately replaceable and gradually replaceable.

Replaced devices should be taken back by the manufacturer or taken back by the alternative equipment provider. Progressively discourage the import and sale of mercury containing health care devices and mercury use in health care settings, also using global multi lateral environmental agreements to this end. Provide support to countries to make sure that the recovered mercury equipment is not pushed back in the supply chain.

Long-term: Support a ban for use of mercury containing devices and effectively promote the use of mercury free alternatives. Support countries in developing a national guidance manual for sound management of health care mercury waste. Support countries in the development and implementation of a national plan, policies and legislation on mercury health care waste. Promote the principles of environmentally sound management of health care waste containing mercury, as set out in the UN Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Support the allocation of human and financial resources to ensure procurement of mercury free alternatives and a sound management of health care waste containing mercury.

WHO/SDE/WSH/05.08 (see: who.int)

Annex 9: IGNOU Certificate in Health Care Waste Management in South-East Asia Countries

Indira Gandhi National Open University (IGNOU)

Indira Gandhi National Open University, the largest open university in the democratic world, was established by an act of Indian Parliament in 1985, and started offering academic programmes in 1987 (Diploma in Management and Diploma in Distance Education with 4528 students). Today, it serves the educational aspirations of about 1.3 million students in 30 countries, including India, through eleven schools of studies and a network of 57 regional centres, five sub-regional centres, 1296 study centres/tele-learning centres, 35 partner institutions overseas. The University offers 101 certificate, diploma, degree and doctoral programmes comprising 900 courses, through a strength of 300 faculty members and academic staff at the headquarters and regional centres and about 33,000 counsellors drawn from conventional institutions of higher learning, professionals from various organizations and bodies, among others.

The University has been in existence for only two decades. In such a short time, the University has contributed significantly to higher education and continuing professional development in the country catering to the education of about 12 per cent of total students enrolled in higher education (and more than 50 per cent of total students in distance education) in the country. As a world leader in distance education, it was conferred the **Centre of Excellence** Award in Distance Education in 1993.

School of Health Sciences

The School of Health Sciences was established in the year 1991 as one of the eleven schools of the University. Its prime objective is the development and delivery of programmes in the field of medicine, nursing, paramedics through distance education mode and the maintenance of their academic standards. The Certificate Programme in Health Care Waste Management is one of the latest programmes developed in the School for the South-East Asia Countries.

Certificate in Health Care Waste Management

The concern for bio-medical waste manage–ment has been felt globally with the rise in deadly infections such as AIDS, Hepatitis-B and indiscriminate disposal of health care waste. The United Nations through UN Basel Convention on the control of transboundary movements of hazardous wastes and their disposal has classified health care waste as most hazardous waste, after radioactive waste.

According to WHO, the eleven South-East Asia countries together produce some 3,50,000 tons of health care waste per year, close to 1000 tons a day. As it is not segregated at source, all of it is to be considered hazardous despite the fact that only 10–20 per cent is infectious in nature (Health Situation in the South-East Asia Region, 1998–2000, WHO, 1999).

The main bottleneck to sound health care waste management programme is lack of training and appropriate skills, insufficient resource allocation and lack of adequate equipment. The need to educate different health care professionals/ workers, NGOs and other stake holders was thus identified as a priority. To cater the needs of these health care professionals, IGNOU and WHO, SEARO decided to develop and launch Certificate Programme in Health Care Waste Management

in the South-East Asia Region Countries. This programme is a 14 credit 6-month certificate programme, through open and distance learning.

This certificate programme has been developed to create essential knowledge and skills in health care waste and equip the learners to manage it effectively and safely and also safeguard the community against adverse health impact of health care waste.

Objectives

- Sensitize the learner about health care waste and its impact on our health and environment.
- Acquaint the learner about the existing legislation, knowledge and practices regarding infection control and health care waste management practices in South-East Asia Region Countries.
- Equip the learner with skills to manage health care waste effectively and safely.

Beneficiaries

Doctors, Nurses, Paramedics, Health Managers and other professional workers with a minimum of 10 + 2 Qualification.

Programme Package

It is a multimedia package consisting of print material in the form of booklets called blocks, audio-visual materials, teleconferencing and providing counselling by contact sessions where the learners are invited to the Programme Study Centres in India and Partner Institutions in other countries for hands on training. The package will have eight theory blocks, a project and programme guide.

Detalled Programme Design

Course Code	Title	Credits
BHM-001	**Fundamentals: Environment and Health,**	
	Health Care Waste Management Regulations	
	Block 1: Understanding Our Environment	**1**
	Unit 1 Introduction to Environment	
	Unit 2 Environmental Pollutants	
	Unit 3 Interrelationship of Environment and Health	
	Unit 4 Waste Management	
	Block 2: Health Care Waste: Definitions	**1**
	Unit 1 Definitions, Types and Categories of Waste	
	Unit 2 Principles of Health Care Waste Management	
	Unit 3 Handling Health Care Waste	
	Block 3: Need for a Sound Health Care Waste Management	**1**
	Unit 1 Impact of Health Care Waste on Our Environment	
	Unit 2 Impact of Health Care Waste on Human Health	
	Unit 3 Safety Methodology, Worker Safety and Precautions	

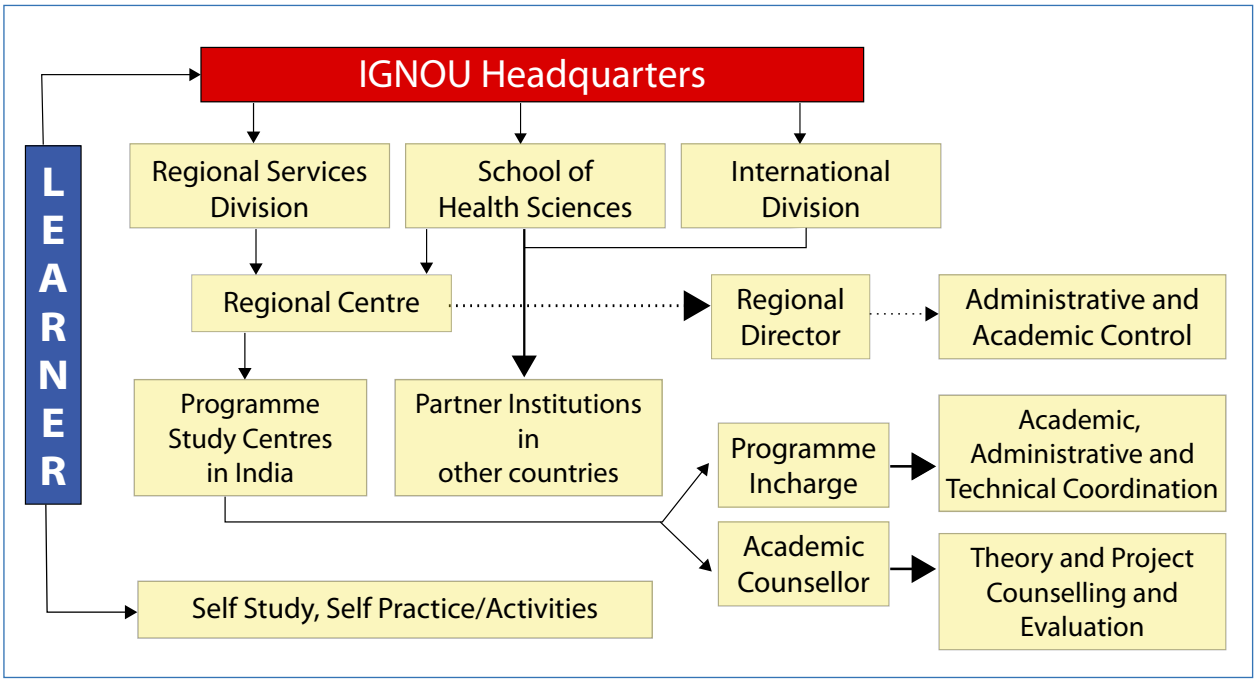
Course Code	Title	Credits
	Block 4: Current Status of Health Care Waste Management Legislation in	
	SEAR Countries	**1**
	Unit 1 Rules and Legislations	
	Unit 2 Regulatory Mechanisms	
	Unit 3 Current Status in India, Thailand, Indonesia, Sri Lanka, Bangladesh	
	Unit 4 Current Status in Bhutan, DPR Korea, Timor Leste, Maldives, Myanmar, Nepal	
BHM-OO2	**Health Care Waste Management: Concepts, Technologies and Training**	
	Block 1: Practical Aspects of Health Care Waste Management	**2**
	Unit 1 Managerial and Administrative Aspects	
	Unit 2 Integrated Infection Control Management	
	Unit 3 Disinfection and Transportation	
	Unit 4 Capacity Building, Training and Monitoring	
	Block 2: Systems and Technologies in Health Care Waste Management	**2**
	Unit 1 Systems Options	
	Unit 2 Treatment and Disposal of Health Care Waste:	
	Burn Technologies	
	Unit 3 Treatment and Disposal of Health Care Waste:	
	Non-Burn Technologies	
	Unit 4 Innovative Concepts and Possibilities	
	Block 3: Health Care Waste Management and Emerging Issues	**1**
	Unit 1 Managing Waste Water from Health Care Facilities	
	Unit 2 Management of Wastes from Immunizations	
	Unit 3 Occupation and Patient Safety	
	Unit 4 Success Stories	
	Block 4: Training Manual for Waste Handlers	**1**
BHMP-001	**Project**	**4**

Credit System

In IGNOU parlance, the study hours are measured in credit system. One credit is equivalent to 30 learning hours. For example, 14 credits of Certificate in Health Care Waste Management programme means an average student will be required to give 420 hours (14 X 30) of input for this programme which includes theory reading, undertaking a project, hands on training, video viewing, counselling etc.

Implementation Plan 2006

The programme will be implemented through a network of Programme Study Centres (PSCs) in India and Partner Institutions (Pis) located in



other South-East Asia (SEA) and other countries. These Programme Study Centres and Partner Institutions will be located in health care institutions like medical colleges, hospitals, district and private hospitals, rural health centres, etc. A team of trained teachers called counsellors will be identified and trained for providing academic counselling and supervising the Programme Study Centres/Partner Institutions. The administrative control will be through the Regional Centres (RCs) of IGNOU located usually at state capitals nationally, by the Partner Institutions, and Indian Counsulate in other countries and the School of Health Sciences (SOHS) located at the IGNOU Headquarters, Delhi, India.

Evaluation

Evaluation will be through theory and project evaluation. 70 per cent weightage will be kept for theory term-end, examination and 30 per cent for project evaluation. 50 per cent minimum pass mark in each component separately is required for successful completion of the programme.

Term-end examination of theory will be held twice in a year i.e. June and December. There will be no practical examination.

Admission Information		
Admission Fee	:	Rs. 2000/- in India US$ 400 for other SEA countries
Eligibility	:	Doctors, Nurses, Paramedics, Health Managers and other professional workers with a minimum of 10 + 2 Qualification
Duration	:	Minimum 6 months
	:	Maximum 2 years
Launching	:	January 2006
Session	:	January to June July to December

Annex 10: List of country and technical presentations

Country presentations

P1: *"Pesticides and Hazardous Wastes in Bangladesh",* Mr. Md. Hamidur Rahman
Director Plant Protection, Ministry of Agriculture, Bangladesh

P2: *"The Removal of Obsolete Pesticide Stocks in Bhutan: A Success Story",* Dr. Chador Wangdi,
Bhutan Agriculture and Food Regulatory Authority (BAFRA), Ministry of Agriculture, Royal Government of Bhutan

P3: *"Management of Hazardous Waste derived from Production and Use of Pesticides in Indian Agriculture"*:
Amit Jha, Director, Plant Protection, Ministry of Agriculture, India.

P4: *"Hazardous Wastes and Heavy Metals: Risks for Human Health",* Dr. dr. Rachmadhi Purwana SKM,
University of Indonesia, Jakarta, Indonesia

P5: *"Hospital Waste Management System in Indonesia"*: Drs. Yudi Suyudi MA, Head, Sub-Division for Basic Industry, Assistant Deputy Minister for Toxic and Hazardous Substance and Waste Management Manufacture and Agro Industry, Ministry of Environment, Jakarta, Indonesia

P6: *"Donated but Wasted: Lessons Learnt in Managing Donated Drugs",* Dr Astrid Kartika, UNDP,
Nias, Indonesia.

P7: *"Management of Hazardous Wastes from Agriculture",* May May Khin, Plant Protection Division,
Ministry of Agriculture and Irrigation, Myanmar

P8: *"Management of Hazardous Wastes from Health care",* Dr. Than Myint, Assistant Director,
Occupational Health Unit, Ministry of Health, Myanmar

P9: *"Health Care Waste Management in Maldives",* Fathuhulla Naseem, Assistant Director,
Department of Medical Services, Ministry of Health, Maldives

P10: *"Management of Health Care Wastes in Nepal",* Ms. Suhas Shrestha, Chief Nursing Administrator,
Narayan Sub-Regional Hospital, Birgunj, Ministry of Health, Nepal

P11: *"Management of Hazardous Wastes from Agriculture in Nepal",* Mr. Dilli Ram Sharma, Senior Agricultural Development Officer, District Agriculture Development Office, Gorkha, Ministry of Agriculture, Nepal

P12: *"Challenges Posed to Human Health by Hazardous Waste after the Tsunami 2004"*:
Dr. C. K. Shanmugarajah, Director, Environmental, Occupational Health & Food Safety, Ministry of Health care & Nutrition, Sri Lanka

P13: *"Human Health Effects of Re-usage of Used Pesticide Containers",* H.R.J.T. Peiris, Office of the Registrar of Pesticides, Kandy, Sri Lanka

P14: *"Country Report: Sound Management of Hazardous Wastes from Health and Agriculture"*: H.R.J.T.Peiris, Office of the Registrar of Pesticides, Kandy, Sri Lanka

Technical presentations

P15: *"Global Policies: Local Action"* Mark Davis, Coordinator, FAO Programme on Prevention and Disposal of Obsolete Pesticides FAO, Rome, Italy

P16: *"Environmental Health and Hazardous Wastes in South East Asia"*: Alexander von Hildebrand, Regional Advisor, WHO Regional Office for South East Asia, New Delhi, India

P17: *"National Chemical Management Profiles",* Alexander von Hildebrand, Regional Advisor, WHO Regional Office for South East Asia, New Delhi, India

P18: *"Disposal Technology Options",* Mark Davis, Coordinator, FAO programme on Prevention and Disposal of Obsolete Pesticides FAO, Rome, Italy

P19: *"IGNOU"* Dr Ashok Agarwal, Professor, School of Health Sciences, Indira Gandhi National Open University (IGNOU), New Delhi, India

P20: *"Health Care Wastes",* Ravi Agarwal, Director SRISHTI, New Delhi, India

P21: *"Overview of the Basel Convention and Management of Hazardous Wastes",* Mr D. Wardhana H.S., Basel Convention Regional Centre - BCRC SEA, Jakarta Indonesia

P22: *"The FAO Programme on Prevention and Disposal of Obsolete Pesticides",* Mark Davis, Coordinator, FAO programme on Prevention and Disposal of Obsolete Pesticides FAO, Rome, Italy

P23: *"PHO NAD-WHO-ECHO Health Care Waste Management Programme in NAD Province',* Mr. Hartojo, WHO Banda Aceh Office, Indonesia

Annex 11 : List of documents distributed at the workshop

Note: All the documents are available on the CD attached to this report

1. **FAO documents:**

FAO: International Code of Conduct on the Distribution and Use of Pesticides, 2002
FAO: List of obsolete pesticides: global overview
FAO: List of obsolete pesticides stored for disposal at Paro, Bhutan, 2002
FAO: List of obsolete pesticides, Indonesia, 2001
FAO: List of obsolete pesticides, Thailand, 2001
FAO: List of obsolete pesticides, Sri Lanka, 2001
FAO: List of obsolete pesticides, India, 2001
FAO: List of obsolete pesticides, Nepal 2001
FAO guidelines:

- Prevention and disposal of obsolete and unwanted pesticide stocks
- Guidelines for the management of small quantities of unwanted and obsolete pesticides
- Disposal of bulk quantities of obsolete pesticides in developing countries
- Assessing soil contamination: a reference manual
- Baseline study on the problem of obsolete pesticide stocks

2. **WHO Documents:**

Policy Paper: Safe Health care Waste Management, 2005
WHO Policy Paper: Mercury in Health Care, 2005
WHO posters: Four Steps for the Sound Management of Health care Waste in Emergencies, 2005
WHO: Regional Programme to Consolidate Initiatives for the Sound Management of Health care Wastes, 2006
WHO et al.: Guidelines for Drug Donations, 1999
WHO et al.: Guidelines for Safe Disposal of Unwanted Pharmaceuticals in and after Emergencies, 1999
WHO Report: Post -*tsunami* Donations of Outdated Pharmaceuticals in Banda Aceh Province, Indonesia: a Call for Ethics, January 2006
WHO Guidance document: Asbestos - Hazards and Safe Practice for Clear-up after *Tsunami*
WHO Report: Workshop on Mechanisms of Fibre Carcinogenesis and Assessment of Chrysotile Asbestos Substitutes 8–12 November 2005, Lyon, France
WHO Fact Sheet: Bovine Spongiform Encephalopathy, 2002

3. **UNEP Documents**

Secretariat of the Basel Convention: Parties to the Basel Convention April 2006
Secretariat of the Basel Convention: Technical Guidelines for Environmentally Sound Management of Persistent Organic Pollutants Wastes: Hazardous Waste Incinerators, 2004
UNEP: State of Waste Management in South East Asia, 2002
UNEP: Guidance Elements for Hazardous Waste Management In *Tsunami* Struck Areas, 2005

UNEP: Expert Group Meeting on e-wastes in the Asia-Pacific UNEP Regional Resource Centre AIT Outreach Building, Bangkok, 2004

4. **Basel Action Network:**
What is BAN?
Basel Action Network: Exporting Harm The High-Tech Trashing of Asia, 2002

5. **Urban Waste Expertise Programme — UWEP:** The Occupational Health Aspects of Waste Collection and Recycling: An inventory study in India, 1997

6. ***Pharmaciens Sans Frontieres,* DEPKES/DINKES/FDA:** "Assessment of Drug Donations in the Province of Banda Aceh", July 2006

Press Clippings:

I. ABC News: Is America Exporting a Huge Environmental Problem? Old Computers Often End Up in Toxic Heaps in Developing Countries", 2006
II. International Trade Canada — Trade Commissioner Service:"Hazardous Waste Management and Treatment Profile – India", March, 2005
III. Environmental News Service (ENS): India's Supreme Court Panel Cracks Down on Hazardous Waste, 2004
IV. The Times of India: "US Dumping e-waste in India, China: Study", 2002
V. BBC: "Chips Cost Environment Dear", 2002
VI. Asia week: "Death in Slow Motion: India has Become the Dumping Ground for the West's Toxic Waste", 2001

World Health Organization
Regional Office for South-East Asia