CHAPTER 2
Generation of Data and Risk identification

Objective 1: Whether the quantum of waste being generated in the country had been assessed and had the risks to environment and health posed by waste been identified.

Data provides information about the magnitude and scope of the problem faced. It can guide decision-making, and if broken down into various parameters of relevance, it becomes an accurate assessment of the quantum of any problem faced by the country. Hence, collection of data is the first step towards effective policymaking.

Articles 21.8, 21.9 and 21.11 of Agenda 21 of the World Commission on Sustainable Development (Rio 1992) emphasised the need for strengthening procedures for assessing waste quantity and composition changes of waste and declared that by the year 2000, countries should have the capacity to access, process and monitor waste trend information. It also emphasised the need for undertaking data gathering and analysis and to utilise data to assess the environmental soundness of national waste policies. According to United Nations Environment Programme (UNEP), the national government should develop and maintain a database on solid waste in the nation. Such database may include, among other things, data about generation, such as demographic information and quantities of waste generated, waste characteristics, such as waste composition etc,.

2.1 Assessment of waste being generated

2.1.1 At the central level

MoEF and CPCB were queried about the availability of data on the different kinds of waste generated in India for the period 2002-03 to 2006-07. The data provided by MoEF and CPCB is depicted in the table below:

Kinds of waste (in million Tonnes)	2006-07	2005-06	2004-05	2003-04	2002-03
Municipal solid waste	NA	NA	NA	NA	NA
Bio-medical waste	0.16	0.17	0.12	0.12	0.12
Hazardous waste	8.14	4.4	4.4	4.4	4.4
E waste	0.15	NA	NA	NA	NA
Waste from power plants	122.09	112.2	111.3	106.6	103.3

NA: Not available

In this regard the following observations are made:

(a) Municipal solid waste

MoEF did not make available data about quantum of municipal solid waste generated annually for the period under review and stated that the Ministry of Urban Development (MoUD) was the nodal ministry at the central level for solid waste issues. MoUD, while formulating proposals for the Twelfth Finance Commission, estimated that urban India produced approximately 48 million tonnes of municipal solid waste annually. This estimate did not include the amount of municipal solid waste generated in the rural areas. Thus, there was no comprehensive data either with MoEF or with MoUD about the amounts of municipal solid waste being generated in the country.

(b) Bio-medical waste

As per the information provided by MoEF/CPCB, the quantity of biomedical waste generated in India varied from 0.12 MT to 0.17 MT per annum during 2004-05 to 2006-07. These figures could not be confirmed with the Ministry of Health and Family Welfare (MoH&FW) as it did not maintain a database about the amount of bio-medical waste generated all over the country.

(c) Plastic Waste

Neither MoEF nor CPCB were aware about the amount of plastic waste being generated in the country. This information was also not available with the Department of Chemicals and Petrochemicals.

(d) Hazardous waste

According to the X plan document, India generated 7.2 MT of hazardous waste annually. As per the information provided by MoEF, the quantity of hazardous waste generated varied between 4.4 MT and 8.14 MT during 2002-03 to 2006-07.

(e) E-waste

CPCB stated that during 2006-07, the amount of e-waste was 0.15 MT. The amount of the e-waste generated for the other years under review were not available with CPCB.

(f) Other waste

For any of the years under review, MoEF had no information about the amounts of waste being generated by electrical items, construction & demolition waste/debris, agricultural waste, packaging waste, mining waste, end of life vehicles waste and waste tyres. As no separate legislation or rules have been laid down for safe disposal of these kinds of waste, the generation of these wastes would escape detection, leading to harmful health and environmental consequences.

Some of the possible parameters according to which data about waste can also be collected, like done in European Union (EU) countries, are population size and geographical size; size and number of main sectors generating waste; data about the amount of waste generated from activities like industries, commercial undertakings, agriculture and tourism; composition of waste according to seasonal fluctuations etc,. These parameters give an accurate picture about the sources of origin and amount of each kind of waste generated and thus, help in planning. It was observed in audit that such parameters were not taken into account while collecting data on waste.

Thus, MoEF and CPCB had incomplete information about the amounts of municipal solid waste, plastic waste, e- waste and other kinds of waste like construction and demolition waste, waste electrical items, end of life vehicles etc, being generated in the country. Waste data broken down into parameters of significance was also not available. This rendered any kind of trend analysis impossible. MoEF was also unaware of the amounts of various kinds of waste being generated in different states in the country.

2.1.2 At the state/ Pollution Control Board (PCB) level

(i) State governments and Pollution Control Boards (PCBs) in 24 states were queried about the availability of data on the different kinds of waste generated in India for the period 2002-03 to 2006-07. It was observed that no state or PCB, out of the sampled 24 states, had completely assessed the quantum of the different kinds of waste like municipal solid waste, bio-medical waste, hazardous waste, plastic waste, e-waste, construction and demolition waste etc., generated during the last five years. Amongst the sampled states, it was observed:

- Only 42 *per cent* of the sampled states had partial data on wastes. In the sample, ***Madhya Pradesh*** and ***West Bengal*** had the most comprehensive data wherein they had assessed the amounts of municipal solid waste, bio-medical waste and hazardous waste generated over a few years. ***Uttar Pradesh*** had assessed the amounts of municipal solid waste and bio-medical waste generated. ***Meghalaya*** had assessed the amounts of municipal solid waste and hazardous waste generated. ***Delhi, Gujarat, Rajasthan, Andhra Pradesh*** and ***Karnataka*** had assessed the amounts of municipal solid waste generated and ***Haryana*** had assessed the quantum of hazardous waste generated in the state.
- No data about the amounts of waste generated according to source was available in 42 *per cent* of the sampled states and was not verifiable in 16 *per cent* of the sampled states. List of the states is attached in **Annexure 2.**

(ii) In addition, it was observed that in the 24 sampled states, assessment of waste, according to population size and geographical area was done as follows:

- Assessment of waste, according to population size and geographical size of the area from which waste is generated was done by state government/PCB only in ***Madhya Pradesh, Maharashtra, Andhra Pradesh*** and partially in ***Delhi*** **and** ***J&K.***
- ***Delhi, Madhya Pradesh, Gujarat*** and ***Punjab*** had collected some data about the size and number of main sectors generating waste or data about the amount of waste generated from activities like industries, commercial undertakings, agriculture and tourism. ***Delhi*** stated that it had collected data under domestic and non-domestic categories and ***Uttar Pradesh*** stated it had collected data about hazardous waste generated from industries.
- Composition of waste according to seasonal fluctuations was either not analysed or could not be verified in audit.

Thus, even in the states, data about the various kinds of waste and its analysis was incomplete. Agenda 21 of the World Commission on Sustainable Development and UNEP had also emphasised the need for data gathering, analysis and maintenance of a detailed database on waste for the nation. MoEF/CPCB and state governments need to intensify efforts to build up a comprehensive database on waste.

With respect to municipal solid waste, MoEF replied in August 2008 that CPCB in association with the National Environmental Engineering Research Institute (NEERI) had carried out assessment of municipal solid waste generation in 35 metro cities and 24 State capitals during 2004-05 and the report in this regard had been published in April 2006. It also stated that assessment of waste generation at state level was the responsibility of the local bodies and that CPCB had emphasised the preparation of inventories on waste generation and characterisation by the PCBs. With respect to bio-medical waste, MoEF stated that since all the PCBs did not submit annual reports every year, data was not comprehensive and may not be comparable year-wise. With respect to plastic waste, MoEF stated that CPCB had not undertaken specific studies on assessment of plastic waste generation in the country. With respect to hazardous waste, MoEF stated that as per rules, it was the responsibility of the PCBs to maintain the records with regard to sector-wise hazardous waste generated in the respective states. However, as directed by the Supreme Court, presently, CPCB had requested all the PCBs for submission of the inventory of generation of hazardous wastes and the report are being received from the PCBs. MoEF had no comments to offer on the lack of data regarding e-waste, waste electrical and electronic items, other waste like construction & demolition waste, agricultural waste, waste from agriculture etc., MoEF also had no comments to offer on lack of waste data on significant parameters like population, geographical area etc,.

Thus, the fact remains that despite being the nodal body for the control of pollution, MoEF/CPCB did not have complete data about the amounts of waste being generated all over the country. They also did not have data according to parameters of significance affecting the increasing amount of waste and in the absence of this, planning for effective management of waste was deficient.

International good practices:

- ***Sweden, Germany, Norway, Spain, Poland*** and ***United Kingdom*** have a detailed waste database about various types of waste like packaging waste, construction & demolition waste, waste end of life vehicles, agricultural waste, waste from mining and quarrying etc,.
- ***Denmark's*** Information System for Waste and Recycling gives year-wise details of the total waste generation since 1994, the amount of waste analysed by source (households, manufacturing), type of waste (hazardous waste) and kind of treatment (recycling, incineration).
- ***Italy*** and ***Norway*** have database on amounts of waste generated by each sector like household, commercial, agriculture, manufacturing etc,.

Recommendations

- *CPCB, as the nodal agency for pollution related issues should carry out, periodically, a comprehensive assessment of the amounts of waste being generated, according to the major waste types. All the states in India should be involved in this*

exercise so that a comprehensive database on waste is generated for aiding policy-making and intervention.

- *Besides the total amount of waste being generated according to types, the waste data may also be collected according to parameters like geographical areas, sectors-wise (industrial, household, commercial, agriculture, tourism etc,.) and according to seasonal fluctuations to give accurate inputs for policy-making and intervention.*

2.2 Projections of the quantities of waste generated and identification of significant parameters affecting waste quantities

The kinds of waste and amounts may be significantly influenced, over time, by a number of parameters. In order to make realistic projections about the growth of waste in the future, the dominant parameters should be identified and their expected influence on the waste amounts should be described and evaluated. An absolutely certain and unambiguous forecast of future waste generation cannot be prepared but there is a need for some basis for creating additional capacity in the waste management methods to tackle the growth of waste over time.

2.2.1 At the central level

MoEF/CPCB did not make available information about the projected growth in quantity and composition of municipal solid waste, bio-medical waste, hazardous waste and plastic waste. Only projection figures were available for e-waste which was projected to increase to eight lakh tonnes by 2012 and that waste generated by power plants which would increase to 170 MT by the end of the XI plan period.

MoEF/CPCB also did not make available information to establish that it had collected information about or taken into account the increase in waste due to significant parameters that affect waste like:

- increase in waste due to increase in population,
- increase in waste due to greater economic growth,
- increase in waste due to increase in demand for consumer goods, and
- increase in waste due to changes in manufacturing methods.

2.2.2 At the level of states/PCBs

With respect to projections about growth in waste, it was observed in audit that out of the 24 sampled states:

- Only 25 *per cent* of the sampled states had made projections about the growth in waste. Among the sampled states, ***Delhi*** and ***Gujarat*** had projected growth of waste based on anticipated population growth. ***West Bengal*** had projected the growth in quantity of municipal solid waste, after taking into account the anticipated population growth in 41 out of 126 municipalities. ***Rajasthan*** and ***Meghalaya*** had also projected the growth in quantity of municipal solid

waste. In ***Karnataka***, geometric progression method was followed to arrive at projected increase in waste.

- 38 *per cent* of the sampled states had made no projections while it could not be verified in audit whether 37 *per cent* of the sampled states had made any projections. List of the states is attached in **Annexure 2.**
- Increase in waste due to factors like greater economic growth, increase in demand for consumer goods and changes in manufacturing methods was not estimated by any of the 24 sampled states, except in ***Delhi*** which stated that cognisance had been taken of factors like economic situation, demand for consumer goods, changes in manufacturing methods and new treatment methods. However, this could not be verified in audit.

All the factors discussed above can significantly increase the quantities of waste being generated and non-recognition of these factors would hamper any kind of planning. In the absence of such information with MoEF/states, it would be difficult to arrive at accurate estimations and specific strategies that can be tailored for waste management.

MoEF replied in August 2008 that estimations regarding the projected growth in quantity and composition of municipal solid waste and plastic waste were not available with CPCB. Hence, MoEF had not given recognition to these factors which affect the quantity of waste being generated and in the absence of such information, waste management plans and strategies were rendered ineffective.

International good practices:

- The Commission of the European Countries has predicted that municipal solid waste generation will grow until 2020 and the increase will be 42.4 *per cent* by 2020 compared to 1995 levels.
- **USA** has projected the trends on municipal solid waste generation, recovery & disposal and aggregate data on the infrastructure created for municipal solid waste management.

Recommendation

- *MoEF, with involvement of all the states, may collect data about growth of the various kinds of waste, analyse the factors contributing to its growth and the increase in waste quantities to arrive at strategies for waste management.*

2.3 Assessment of current and future capacity to handle waste

Assessment of waste currently being generated and the current waste disposal infrastructure like incinerators, landfills etc., help in assessing the adequacy of waste infrastructure. Projections about growth of waste would also indicate whether there is a need to create new facilities to handle the increase in waste in the coming years. This is

especially important as waste infrastructure is costly to build and requires planning in advance.

2.3.1 At the central level

(a) Municipal solid waste

MoEF stated that assessment of current capacity to handle municipal solid waste had been made and found to be inadequate to enable environmental friendly disposal of municipal solid waste. CPCB replied that no such assessment was done, as it would vary from one urban local body to the other. With respect to future estimation of disposal capacities for municipal solid waste, which needed to be created, while MoEF stated that it was carried out, CPCB replied that this estimation was under consideration. However, MoEF did not make available any reports that suggested that such estimation was carried out.

(b) Bio-medical waste

MoEF and CPCB did not make available any current or estimated future capacities for safe disposal of biomedical waste. CPCB stated that such estimation was the responsibility of the SPCBs/PCBs.

(c) Hazardous waste

MoEF had assessed the current capacity to handle hazardous waste and stated that there were 18 hazardous waste disposal facilities located in 7 states, which, according to MoEF, were inadequate. CPCB stated that future capacity, which needed to be created, was not estimated, as the PCBs were yet to submit hazardous waste generation data. MoEF stated that assessment of future capacity depended on receipt of inventory from the states. Thus, MoEF/CPCB did not have complete information as to the facilities, which needed to be created so that hazardous waste would not be dumped, with serious consequences to health and the environment.

(d) E-waste

No records were made available to show whether MoEF had assessed capacity to dispose e-waste. However, CPCB stated that being a new area, there are only two recycling facilities and recycling facilities were already coming up for the recycling of e-wastes.

(e) Other wastes

No rules existed for the management of other kinds of waste like packaging waste, agricultural waste, waste generated by construction & demolition activities, mining waste and waste generated by end of life vehicles. Hence, no records were available to suggest that assessment had been made by either MoEF or CPCB, of the current or the future capacity that were needed to be created for effective handling of such wastes.

2.3.2 At the level of states/PCBs

(i) Regarding current capacity to handle municipal solid waste, bio-medical waste and hazardous waste, it was observed that out of the 24 sampled states:

- Only 29 *per cent* of the states had assessed current capacity for handling some kinds of waste. ***Karnataka, Gujarat, Punjab*** and ***West Bengal*** governments/PCBs had assessed the current capacity to handle municipal solid waste, bio-medical waste, plastic waste and hazardous waste. ***Delhi*** and ***Meghalaya*** had assessed the current capacity to handle municipal solid waste; ***Madhya Pradesh*** has assessed the current capacity to handle bio-medical waste and hazardous waste.
- 42 *per cent* of the sampled states had not made this assessment, while it could not be verified in audit whether 29 *per cent* of the sampled states had made this assessment. List of the states is attached in **Annexure 2.**

(ii) Regarding creation of new and additional capacity to handle municipal solid waste, bio-medical waste and hazardous waste and plastic waste, it was observed that out of 24 sampled states:

- Only 33 *per cent* of the states had assessed the creation of new and additional capacity to handle waste safely. ***Delhi, Rajasthan, Tamil Nadu, Karnataka*** and ***Meghalaya*** had assessed whether creation of new and additional capacity to handle municipal solid waste safely in the near future was required. ***Gujarat*** had assessed the new capacity that needed to be created to ensure that municipal solid waste and bio-medical waste was treated safely in the near future and ***Madhya Pradesh*** had only assessed the new capacity that needed to be created to ensure that bio-medical waste and hazardous waste was treated safely in the near future. ***Punjab*** stated it had estimated that it had sufficient capacity to handle bio-medical waste for the next ten years and hazardous waste for the next 15 years.
- 38 *per cent* of the sampled states had not assessed the current and new capacity needed, while it could not be verified in audit whether 29 *per cent* of the sampled states had made this assessment. List of the states is attached in **Annexure 2.**

Assessment of the current capacity to handle waste and the future capacity that needed to be created for waste disposal was essential to ensure that all waste being generated was disposed off in an environmentally safe manner and that no waste remained untreated posing hazards to public health. In the absence of any meaningful assessment of current capacity and future capacity to handle waste by MoEF and the states, any waste management plan or programme would be rendered ineffective.

MoEF replied in August 2008 that as per the municipal solid waste rules, the Secretary-in-Charge of the Department of Urban Development of the State had the overall

responsibility for the enforcement of the provisions of these rules and that it was the role of the state to develop the necessary infrastructure for collection, storage, segregation, transportation, processing and disposal of municipal solid waste. MoEF also stated that with respect to municipal solid waste**,** CPCB had not categorically studied the capacities required by the local bodies for handling of waste generation at the state level and as per rules, each local body was required to prepare a detailed project report which would enable the local body to set up the requisite infrastructure and also to make provisions to handle the waste expected to be generated in future. With respect to hazardous waste, MoEF replied that at present there were 21 Treatment, Storage & Disposal Facilities (TSDFs) in the country spread in nine states and PCBs were in the process of finalisation of the inventory. MoEF did not offer any comments on the estimation of current and future capacity for bio-medical waste, e-waste and other waste.

However, MoEF being the nodal body for pollution control measures was expected to be aware of the current and future capacities which have to be created, so that waste being generated does not cause pollution. Also, as is evident, projections for future capacities were not taking place even at the level of the states, leaving the safe handling of waste doubtful. This would have deleterious effects on health of the public as well as the environment.

International good practices:

- ***Portugal*** estimates that it has sufficient capacity to handle all wastes till 2016. Thereafter, it will need to create 10 new biological treatment plants and a third incineration plant.

Recommendation

- *MoEF/CPCB, in conjunction with the states, may estimate the current capacity to handle all kinds of waste all over the country and ensure that additional capacity of waste infrastructure, if required, is created for safe disposal.*

2.4 Identification of risks to the environment posed by waste

Risk is exposure to a chance of loss or damage. Identification of risks is required to control loss or damage or to plan for the minimisation of damage or loss. Identification of risks to environment and health posed by waste is essential so that damage to health and environment can be minimised.

Article 21.29 of Agenda 21 of World Commission on Sustainable Development declared that by the year 2000, countries should establish sufficient capacity to undertake waste related pollution impact monitoring and conduct regular surveillance, including epidemiological surveillance[6]. Further according to UNEP, the disposal and treatment of

[6] Epidemiological surveillance is the systematic collection, analysis and dissemination of health data for planning, implementation and evaluation of public health programmes.

waste can produce emissions of several greenhouse gases (GHGs)[7], which contribute to global climate change. Landfill is the most common method for waste disposal and results in the release of methane from the anaerobic decomposition of organic materials. Methane is around 20 times more potent as a GHG than carbon dioxide. Landfills also have potential for soil acidification due to deposition of acid gases, increases in soil metals, vegetation damage due to oxides of nitrogen and sulphur dioxide etc,. Landfills can also result in contamination of ground and surface water with metals, organic compounds and bioaccumulation of toxic materials. These risks to the environment are compounded if the waste is dumped in open sites.

2.4.1 At the central level

MoEF did not make available records to show whether it had analysed and assessed the:

- Risks to quality of ambient air due to incinerators emitting noxious gases while disposing waste and the risks to environment from the green houses gases released by landfills/ dumpsites.
- Risks of contamination of ground water, rivers & streams and contamination of soil by wastes like bio-medical waste, industrial waste, plastic waste, municipal solid waste and other kinds of waste.

Thus, it could not be verified whether MoEF had assessed the environmental degradation that can be caused by improper handling and disposal of various kinds of waste.

While CPCB stated that it had assessed the risks to environment posed by hazardous waste, no assessment report was made available for review by audit. CPCB stated that it had not assessed the risks to environment posed by bio-medical waste. Further, CPCB was silent on whether it had assessed the risks to environment caused by other kinds of waste like municipal solid waste.

2.4.2 At the level of the state/PCBs

(i) Identification of all the risks to environment posed by waste like contamination of ground water and surface water, contamination of ambient air and contamination of soil, by state government/PCBs in 24 sampled states was not comprehensive as shown below:

- Only 50 *per cent* of the sampled states had partially identified some risks to the environment posed by waste. In the sample**,** the risks to environment posed by waste like contamination of groundwater and surface water, contamination of ambient air and contamination of soil was done by ***Rajasthan, Gujarat, Tamil Nadu*** (except contamination of soil) and ***Andhra Pradesh*** (except contamination of ambient air). ***Himachal Pradesh, Uttar Pradesh*** and ***Bihar*** had assessed the risks of contamination of ground water and surface water by waste while ***West Bengal*** had assessed the risks of contamination of soil by waste. ***Karnataka*** had carried out assessment of

[7] Greenhouse gases (GHGs) are gaseous constituents of the atmosphere, both natural and anthropogenic and are essential to maintaining the temperature of the Earth; without them the planet would be so cold as to be uninhabitable. An excess of GHGs can raise the temperature of a planet to lethal levels.

greenhouse gases for eight fast track cities while ***Assam*** and ***Orissa*** had assessed the risks of contamination of ground water by waste and ***Madhya Pradesh*** had assessed the risks of contamination of surface water by waste.

- 21 *per cent* of the sampled states had not assessed the risks to environment posed by waste while it could not be verified in audit whether 29 *per cent* of the sampled states had made this assessment. List of the states is attached in **Annexure 2.**

In the absence of comprehensive information at the apex as well as the state level about the risks to the environment caused by improper handling and disposal of waste, the potential damage to the environment would continue to escape detection.

MoEF replied in August 2008 that all landfill sites need authorisation from the concerned PCB, who in turn prescribe the conditions for monitoring of underground water and ambient air in the vicinity of the site and as per the Environment Impact Assessment Notification, 2006, environment clearance was needed for all such common sites. CPCB/PCBs were also required to be involved in monitoring, appraisal and interventions required from environmental angle.

The reply of MoEF has to be viewed in light of the fact that no risk assessment was carried out on the specific hazards to environment caused by waste. In the absence of such information, it was apparent that risks to environment would escape detection.

International good practices:

- ***United Kingdom*** has assessed that methane emission from biodegradable waste in landfills account for 40 *per cent* of the total methane emissions and 3 *per cent* of all greenhouse gas emissions in the country, with methane being 23 times as damaging a greenhouse gas as carbon dioxide.
- ***Canada*** has produced a document called *"Health and Environmental Effects of Burning Municipal Solid Waste"* which identifies specific risks to environment and health. It lists the pollutants from burning municipal solid waste like particulate matter, sulphur oxides, carbon monoxide, volatile organic compounds, CFCs etc., and states the damage to environment and health caused by each pollutant.

Recommendation

- *MoEF may carry out waste related pollution impact monitoring, on a regular basis, to study the effects of improper disposal of waste on the environment.*

2.5 Identification of risks to health posed by waste

Surface and ground water contamination and soil contamination have direct consequences on human health. Contaminants in the soil can harm plants when they take in the contamination through their roots. Ingesting, inhaling or touching contaminated soil, as well as eating plants or animals that have accumulated soil contaminants can

adversely affect the health of humans and animals. Leachate[8] is the liquid that forms as water trickles through contaminated areas, leaching out the chemicals. In agricultural areas, leaching may concentrate pesticides or fertilisers and bacteria may be leached from the soil. The movement of contaminated leachate may result in hazardous substances entering surface water, groundwater or soil. When wastes are incinerated at low temperatures or when plastics that contain polyvinyl chloride are incinerated, dioxins, furans, and other toxic air pollutants may be produced as emissions and/or fly ash. Exposure to dioxins, furans and polychlorinated by-phenyls may lead to adverse health effects.

2.5.1 At the central level

CPCB had not carried out any assessment of risks to public health posed by various kinds of waste. Further:

- Effects on health from the release of noxious gases from incinerators burning municipal solid waste, bio-medical waste, e-waste etc., were not assessed.
- Risks to human health from factors like contamination of soil and ground water and chemical poisoning from improper disposal of municipal solid waste, bio-medical waste, plastic waste or e-waste were not assessed.

Waste handlers are exposed to infectious and hazardous materials every day in the process of disposal of waste. Hence, they are at considerable risk while handling wastes like bio-medical waste, hazardous waste and even municipal solid waste. CPCB stated that it had studied the risks to waste handlers from municipal solid waste for Kolkata and Chennai only. It had not studied the risks to waste handlers from other kinds of waste.

2.5.2 At the level of states/PCBs

(i) Assessment of risks to public health posed by municipal solid waste, bio-medical waste, hazardous waste and other kinds of waste by the sampled 24 states revealed that:

- Assessment of risks was done partially only in 25 *per cent* of the sampled states. ***Karnataka*** had assessed health risks like spreading of vector borne diseases like dengue, chikungunya, malaria because of unclean garbage were identified while in ***West Bengal, Punjab*** and ***Himachal Pradesh****;* health risks due to bio-medical waste and municipal solid waste have been identified. In ***Bihar***, MoEF had sanctioned a project called "Environmental health Study" in Patna in October 2003 and the project was yet to be completed. ***Delhi*** had identified health risks to the general population because of dumping of waste.
- In 33 *per cent* of the sampled states, identification of health risks because of waste was not done, while it could not be verified in audit in 42 *per cent* of the sampled states whether health risks because of waste had been assessed. List of states is attached in **Annexure 2**

[8] Leachate is the liquid that drains or 'leaches' from a landfill; it varies widely in composition regarding the age of the landfill and the type of waste that it contains.

(ii) With respect to identification of risks to waste handlers, it was noticed that in the 24 sampled states:

- Only 8 *per cent* of the sampled states had identified health risks to waste handlers. ***Himachal Pradesh*** PCB in June 2007 has identified the risks to waste handlers that can arise due to handling of municipal solid waste, bio-medical waste and hazardous waste on a regular basis. ***Karnataka*** had made provisions for providing safety gear to municipal solid waste handlers, where handling of waste was outsourced as well as where waste was handled by municipality workers.
- 54 *per cent* of the states had not assessed the risks to waste handlers while it could not be verified whether assessment of risks to waste handlers had been carried out in 38 *per cent* of the sampled states. List of states is attached in **Annexure 2**.

(iii) It was also noticed in audit that none of the sampled states had a clear-cut law for the protection and safety of waste handlers against deleterious effects of waste handling.

Thus, in the absence of comprehensive studies by MoEF/CPCB and the states, on risks posed by waste to public health and improper disposal of waste, public would remain unaware of the health risks posed by waste.

MoEF replied in August 2008 that identification of the risks to the health posed by waste fall under the purview of the health departments at central/state level. Further, CPCB/MoEF has to carry out/ perform only the responsibilities stipulated under Schedule 7 of the hazardous waste rules. MoEF was silent on the lack of law/rule framed for the safety and protection of waste handlers.

However, being the nodal agency for pollution control, responsibility rests with MoEF to take a lead in undertaking such studies so that risks can be identified and safeguards be put in place in the pollution control laws, which are framed by MoEF for the control of such risks.

Good practices in India:

- ***Karnataka*** had formed a committee (IPD Saalappa committee) to look after the welfare and safety of waste handlers and its recommendations were implemented in the state by means of conditions built into tender documents to take care of safety of workers.
- In ***Punjab***, Post Graduate Institute, Chandigarh was carrying out an epidemiological study on the effect of open drains on health.

International good practices:

- ***Denmark*** has brought out a comprehensive study of environmental factors, including waste, on health. The report focuses on consequences of exposure from a

variety of factors including waste, how it affects human health and the extent of such effects on health.

- Department for Environment, Food & Rural Affairs (Defra) of the ***United Kingdom*** has reviewed the environmental and health effects of waste management in detail. The report has studied the health and environment impacts of emissions from various waste management methods and the consequent health impacts like asthma, cancer, respiratory disease etc,.

Recommendations

- *MoEF along with the states may also carry out regular surveillance, including epidemiological surveillance of waste related impacts on public health.*
- *MoEF may consider framing laws/ rules for protection of waste handlers.*

Conclusion

MoEF/states had not assessed completely the quantity of various kinds of waste being generated in the country, the different sources of waste and the points of origin of different kinds of waste. In addition, MoEF/states were not aware about the quantity of waste that would be generated in the coming years as the country moves towards greater industrialisation and consumerism. Hence, they were not in a position to make any assessment about the amounts of waste that might be produced in future and whether the capacity to handle waste currently and in the future was adequate. In the absence of data about waste, broken into parameters of significance, policy-making and waste management programmes would be rendered ineffective.

Risks to health and environment had not been adequately assessed by MoEF/states. Non identification of risks to health and environment caused by waste, would lead to insufficient recognition, both by policy makers as well as general public, to the problems caused by ineffective management of wastes.