

HAZARDOUS WASTES ISSUES IN DEVELOPING COUNTRIES

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Summary

Hazardous waste management programs in developing countries follow the same five major stages of development as in developed countries: problem identification and legislation; selection of a lead agency, promulgation of rules and regulations; development of treatment and disposal capacity; and creation of a mature compliance and enforcement program. However, most developing countries are still many years away from a mature hazardous waste management program.

Hazardous waste is difficult to manage everywhere, but less developed countries face a unique set of additional problems, including lack of advanced waste management technologies (and inability to afford such technologies), as well as acute economic and related difficulties that make hazardous waste management a low priority. Hazardous waste management programs also suffer from a general lack of awareness among citizens. Many less developed countries suffer from waste dumping and mismanagement, and economic liberalization can exacerbate such a situation by increasing the types, quantity and sources of hazardous wastes.

As is the case in developed countries, industry is a major source of hazardous waste in less developed countries. Notably, multinational companies often shift their plants to less developed countries and use technology banned in their home countries. Other sources of hazardous waste include transporters and disposal facilities, which face less strict management standards than in the developed world; as well as scavengers who reclaim and recycle wastes that are hazardous or contaminated with hazardous wastes. The agricultural industry is also a major source of hazardous wastes, and there are major problems involving mismanagement of hazardous agrochemicals in developing countries.

The informal economic sector, as well as severe socioeconomic problems, particularly set the developing world apart from the developed world in the area of hazardous waste management. The informal sector is the unregulated part of the economy in less developed countries that consists of small, labor-intensive businesses. The informal sector is normally not monitored and it employs a very large proportion of the workforce, which can result in widespread exposure to any hazardous materials that are used. Socioeconomic issues, on the other hand, contribute to low awareness of hazardous waste issues and to the general inability to afford adequate waste management. Finally, many developing countries do not have the trained specialists or technical knowledge necessary to assess information concerning hazardous wastes and their handling. Management practices should focus on basic functional elements of waste management (storage, collection, transportation, and treatment/disposal), and institutional deficiencies should be addressed. In many developing countries, controls that ensure the separation of hazardous waste from the rest of the municipal waste are ineffective. As such, hazardous wastes, including those from industries and health care facilities, find their way to municipal waste disposal sites.

1. Introduction

Like developed countries, hazardous waste management programs in developing countries follow the same five major stages of development: problem identification and legislation; selection of a lead agency, promulgation of rules and regulations; development of treatment and disposal capacity; and creation of a mature compliance and enforcement program. Although in an earlier development stage, developing countries like Hong Kong, Indonesia, Malaysia and Thailand, which had all enacted some form of hazardous waste legislation in the 1980s, have more recently passed major new legislation that addresses hazardous waste issues or develops regulations for comprehensive programs. These initiatives were the result of the enhanced attention that hazardous waste management was receiving as a result of economic growth. However, with the possible exception of Hong Kong, these countries are still many years away from a mature hazardous waste management program with adequate enforcement and compliance. One of the most advanced of the developing countries in terms of legislation and institutions to tackle hazardous waste problems is Mexico, but the country is still a very long way from bringing these problems under control (see Box 1).

While a focus on hazardous waste management typically occurs in countries that have already adequately addressed more direct threats to public health (e.g. contaminated drinking water), most developing countries have enacted some sort of hazardous waste

legislation. Authority over national hazardous waste management programs is generally given to just one regulatory body, and when several regulatory bodies exist, countries run the risk that lack of coordination will make their hazardous waste management programs weak. National harmonization of waste management standards is especially important for developing countries because decentralization can strain local institutional capacity, which may not have the financial or human resources to develop and enforce adequate programs. Even at the national level, resources often constrain waste management programs in less developed countries.

In addition to the establishment of specific environmental agencies for hazardous waste regulation enforcement, which is typical in developed countries, developing countries also sometimes give regulatory responsibility over hazardous waste management programs to existing environmental advisory institutions. The successful transition of such advisory bodies to regulatory authorities indicates the seriousness of the country's management program. Regardless of their structure, leading regulatory agencies need sufficient financial and technical resources and trained staff to operate effectively, and developing countries often face difficulties in this area. Indonesia's regulatory agency, for example, has had difficulty getting experienced, well-trained staff, and Malaysia's main agency has lost many trained personnel to better-paying private industry jobs. Technology is also often inadequate, which reflects the budget constraints that developing countries face.

Developing countries can, to some extent, look to the experience of waste management programs in developed countries, as well as other developing countries, for guidance. For example, many developing countries should recognize that it is not unusual, and in fact it is typical, for hazardous waste management programs to face uncontrolled waste disposal in their early years when few or no state-of-the-art treatment and disposal facilities exist. Programs at this early stage are also constrained by the fact that there is little or no information on waste generators, types of waste that are being generated, and where hazardous wastes are being disposed. However, while it is important to take the experience of other countries into account, approaches taken in one country may not be appropriate for another. This is an especially important consideration in light of the unique problems that developing countries face. Individual differences in geography, demographics, industrial profiles, politics and culture also determine the structure and function of a country's hazardous waste management program.

2. Hazardous Waste Management Problems

Although there are hazardous waste management difficulties everywhere due to their health and safety risks, less developed countries face a unique set of additional problems. Many hazardous substances are produced by technologies from the developed world, so less developed countries certainly face some of the same problems experienced by developed countries. Compared to economically developed countries, however, developing nations do not possess the advanced technology necessary for adequate hazardous waste management. Severe financial constraints often prevent these countries from acquiring the necessary technologies, and many are dependent upon donors for technology acquisition. This is exacerbated by the fact that a variety of other problems resulting from economic difficulties make hazardous waste management a low

priority compared to other more immediate concerns. In addition to economic constraints, hazardous waste management deficiencies in developing countries are also a result of the general lack of awareness among citizens. In Tanzania, for example, as well as many other developing countries, hazardous waste management has not received sufficient public attention (see *Case Study 1: Hazardous Waste Management in Tanzania: Retrospection and Future Outlook*).

Many less developed countries suffer from waste dumping and mismanagement because they lack legislative provisions or enforcement mechanisms necessary for proper hazardous waste management. The current trend of economic liberalization can exacerbate such a situation by resulting in the increase of the types and quantity of hazardous wastes. Economic liberalization can also lead to the growth of industries and other economic establishments that produce hazardous wastes in areas that were previously reserved for other uses, for example in residential areas or near water sources. High population growth accompanied by economic development has also caused a massive increase in the production of solid waste, including hazardous wastes. When coupled with the hazardous waste problems already faced by less developed countries, including safety and health issues, ignorance, legislative deficiencies, enforcement laxity, technological deficiencies, and poverty, it is no wonder that this has triggered discussions aimed to avert the potential public health and environmental catastrophe that could occur as a result of the additional waste production.

The true picture regarding health and environmental effects of hazardous wastes in developing countries cannot be accurately judged from the available statistics. This is due to the following reasons:

- Low awareness concerning the effects of hazardous waste exposure masks pertinent cases that have health and environmental consequences
- Poor data collection and record keeping implies that documented exposure effects are just the tip of the iceberg and that many more effects go undocumented.
- Poor medical services both in terms of quality and availability imply that many cases of hazardous waste exposure effects may not be properly diagnosed and documented or may not be treated at all.
- The lack of a culture of undergoing regular medical check-ups, makes it difficult to expose cause-effect correlation
- Diverse locations and types of sources of hazardous wastes make identification and follow-up difficult.
- Financial constraints at the national and individual level sometimes lead to practices that can increase human exposure to hazardous wastes. For example, the use of pesticides that are banned in developed countries is sometimes due to a lack of an alternative option. Also, in extreme cases, poverty and famine have been known to force people to wash the pesticide coating off grain seeds and eat the seeds even when people know that this can expose them to ill-effects or death.

3. Hazardous Waste Sources

As is the case in developed countries, industry is a major source of hazardous waste in less developed countries, but industrial hazardous waste sources in developing countries present more risks than in developed countries because of poor management and obsolete technologies. Notably, multinational companies often shift their plants to less developed countries and use technology banned in their home countries. The accident at the Bhopal plant in India, which belonged to Union Carbide of USA, is a prime example of this situation. A number of hazardous waste sources are specific to less developed countries. Transporters and disposal facilities for hazardous waste, for example, create greater hazards in developing countries due to less strict management standards. Another unique problem to developing countries is that hazardous wastes or wastes contaminated with hazardous wastes are often reclaimed and recycled by scavengers. Household sprays and insect repellents, which are in widespread use in hot climates, can also present higher risks in developing countries. Contaminated sites, spills and abandoned industries are often never remediated or restored to their original conditions, as is the case in Tanzania, so they continue to be sources of pollution to groundwater and soil through leachate, to air by volatilization and to surface water by surface run-off.

Developing countries possess a mix of industrial and less developed country-specific hazardous waste sources. The major sources of hazardous solid wastes in Tanzania, for example, are industrial activities, agriculture and agro-industry, medical facilities, commercial centers, households and the informal sector. The informal sector, the part of the urban economy in less developed countries that has small, competitive and labor-intensive businesses that are not regulated by the government, is a unique source of hazardous solid waste that is currently recognized as a major problem in many developing countries. Problems involving mismanagement of hazardous agrochemicals in particular are more serious in developing countries, especially in Africa and Latin America, than in the developed world. Agro-industry encompasses farming activities (including urban agriculture), livestock production (including processes that are pertinent to the processing of livestock products), and agro-produce processing activities. Common wastes from these sources include crop residues, grain bran, and animal carcasses. These waste fractions are generally re-used and recycled at a high rate as soil amendment agents in addition to being reused as animal feed or as raw materials for animal feed production. The hazardous agro-industry waste fractions include pesticides, industrial fertilizers, veterinary products, and animal carcasses. These components are of concern because of their health and environmental impacts and the fact that they are not properly managed. Notably, in Tanzania many stocks of obsolete and unwanted pesticides as well as veterinary products are poorly managed. Both fertilizers and pesticides find their way into ground and surface water sources with resultant impacts.

To address their unique hazardous waste difficulties, developing countries should learn from the experiences of developed nations while also looking for new and innovative solutions that achieve a better fit with the limited resources available to developing nations. Despite the numerous hazardous waste problems faced by developing countries, it is promising that concern for hazardous waste management is becoming a growing issue among less developed countries.

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Biographical Sketches

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