

C.L. Soskolne

*Department of Public Health  
Sciences  
Faculty of Medicine  
University of Alberta  
Alberta T6G 2G3  
Canada*

## **International transport of hazardous waste: legal and illegal trade in the context of professional ethics**

An example of illegal trade is presented in the context of hazardous waste movement across international borders. It highlights the fact that unethical conduct can have negative environmental health consequences, especially for impoverished countries. The example exposes how ethical principles are breached through illegal trade in hazardous waste, and points to the role that environmental epidemiology plays in the assessment of risk associated with trade in hazardous waste.

*Keywords:* human ecology,  
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### **1. Introduction**

Epidemiology is the study of the distribution, determinants and dynamics of disease and health in communities. It is an evaluative science and contributes to social and health policy by informing those engaged in the formulation of policy through the production of rational and objective scientific information.

Thus, it is the epidemiologist's role to evaluate potentially hazardous exposures to which people are subjected and hence to suggest to policy makers strategies and methods that could be invoked to protect the public health.

Epidemiologists engage in "natural experiments"; they take advantage of what occurs in nature. They analyse the data so derived in the form of cross-sectional, case-control, or cohort studies. Epidemiologists also undertake intervention studies (such as randomised controlled trials), analogous to a controlled experiment, in which new drugs, treatments, or devices are tested against a specified control or reference group. Finally, cross-sections of people from defined communities, are studied in correlational (also known as ecological) study designs. Here, aggregate data on disease rates are compared with aggregate data on, say, food consumption rates in order to relate food intake to disease patterns.

Randomised controlled trials can be undertaken using individual patients from physician or clinic populations. Further, whole communities also can be studied in an analogous way. In intervention studies of this type, the impact of an intervention, such as a certain health

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message, is assessed by comparing a measure of the effect of the message on the community that received it, as opposed to the same measure of effect in a comparison community that did not receive it.

From the ecological viewpoint, epidemiologists are concerned with those hazardous environmental exposures to which populations would have been, or would continue to be subjected and the associated health consequences of these exposures. Ecological studies in epidemiology tend, however, to be weak designs in terms of being able to make inferences about causality, by the very fact that the data upon which they depend are aggregate data as opposed to being individualised data. Clearly, it is better to be certain about the food intake of all individuals in a population than to average the food consumption patterns for the entire community and impute such averages to those who become ill (as the case or disease group) and to those who remain well (as the control or reference group) for hypothesis testing purposes.

## 2. The generation and transport of hazardous wastes

Hazardous wastes include, among other things, radioactive materials and chemicals. The movement of these materials from their source to other locations has been termed "toxic trade". It was in the late 1980s, that concern was raised about toxic trade, in particular, with Africa [1]. This set the stage for the recently recognized issue of environmental justice, in some regions also known as environmental racism, here, epidemiology focuses on protecting unempowered communities, Environmental epidemiologists thus have an important role to play in the global strategy for environmental justice [2].

Vir (1989) pointed out that as environmental safety laws became increasingly stringent in Europe and in the United States, and as the cost of disposal increased, "dumpers" or "waste merchants" began to turn their attention to poorer nations as potential and willing recipients of their waste products. This has provided a much needed source of revenue to these poorer countries. Some of these countries have been willing to take such waste at a fraction of the cost that developed nations would otherwise have had to pay for their disposal. To "nations that are drowning economically, this is an attractive deal" [2].

Asante-Duah et al show the exponential growth in the United States in the production of hazardous wastes since 1970, with the costs associated with treatment and disposal similarly increasing [3]. The authors of this paper argue for a controlled hazardous waste trade, one that is "regulated and informed". They note that "countries generating small quantities of hazardous wastes should view the waste trade as an important economic option, as long as the waste recipients do not compromise their environmental sustainability" [3].

In essence, Asante-Duah et al argue compellingly in favour of a controlled hazardous waste trade. In developing their argument, they recognise as an assumption that hazardous wastes will continue to be generated and that there are countries for which an increase in some of these substances would not increase the risk to health of either present or future generations. It might therefore be economically efficient for such countries to accept waste [3]. There are others who argue that waste should be disposed of only at the source and not be transported at all [4 - 6]. The latter argue from the position that science is incapable of providing any guarantees about the absence of risk.

One ethical principle that emerges from the foregoing argument is that of autonomy or, respect for persons. The question is one of the ability of a recipient country to adequately assess the level of risk associated with a shipment of hazardous waste

Assessment presupposes full disclosure on the contents of a shipment from the originating country and a level of local expertise to assess any potential impacts on the recipient country.

Because communities in developing countries are less likely to be informed about the potential risks associated with waste shipments, the "not in my back yard (i.e., NIMBY)" phenomenon so evident in the more affluent regions of the world is less likely to manifest in poorer regions. Furthermore, workers in developing regions of the world tend not to have the infrastructure related to worker protection, including information concerning the labelling of products with which they come into contact. Hence, workers in poorer nations involved in the management, storage and/or disposal of hazardous waste would lack the training to know how to protect themselves. Regardless of these ethical considerations, in the final analysis the economic benefits to be derived from accepting such waste shipments would need to be weighed against any potential harms that could arise in the short, medium and longer terms.

A second ethical principle emerging from the foregoing argument is that of distributive justice. The question is one of who takes the risks and who derives the benefits? When there is an imbalance between those who take risks and those who derive benefits, the principle of distributive justice is not being honoured. It has often been financially poor labourers who have been exposed to hazards without any ability to enjoy the fruits of their efforts. This has occurred in the context of producing relatively expensive merchandise in the developing world for the benefit of first world markets. Another example relates to the testing of new vaccines or drugs on developing country people who could never be able to afford access to them in their own countries.

## 3. Towards controlling the transport of hazardous wastes

Because of the recognised need to better control the dumping of hazardous wastes, the Basel Convention, in March 1989, was entered into by ministers of 33 countries [3]. The Basel Convention addressed the transboundary movements of hazardous wastes and required the notification and consent of recipient countries before any waste shipments could take place.

Subsequently, the United Nations Environment Program (UNEP), in close cooperation with governments and industry, launched its Cleaner Production programme to advocate low- and non-waste technologies [7]. In March 1994, a full ban was introduced on all transboundary movements of hazardous wastes from the 24 rich industrialised countries of the Organisation for Economic Cooperation and Development (OECD) to other states that are not members of the OECD. The ban was immediate for wastes bound for final disposal, and takes effect at the beginning of 1998 for all hazardous wastes that are said to be destined for recycling or recovery operations [4]. The countries most opposed to the introduction of a total ban were Australia, Canada, Japan and the United States. Despite this opposition from a handful of powerful industrial governments through the penultimate vote, the ban was finally agreed to by consensus [4].

Greenpeace, in 1994, stressed the primary prevention approach to solving the mounting waste crisis by addressing the root cause of the problem, namely minimising waste generation through clean production technologies [8]. In making this point, Greenpeace identified in its report [8] major countries exporting hazardous wastes (Australia, Canada, United Kingdom, United States, and Germany) and some countries importing them (Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Philippines, South Korea, Sri Lanka, Taiwan, and Thailand). Other Greenpeace documents expose the extent of the problem in terms of specific substances and approaches to disposal [5,9,10].

Indeed, the Canadian Environment Minister was quoted in March 1994, as intending to propose "some specific prohibitions on the export of hazardous waste" at a (then) upcoming meeting of environment ministers from the Group of Seven industrialised nations. In early 1994, the report states, she was considering a ban on non-recyclable hazardous waste from Canada. Using this report as but one example from one country, the report notes that in 1993 Canada had exported some 3.2 million kilograms of ash containing lead and zinc to India, South Korea and Taiwan and 5.8 million kilograms of plastic waste to Hong Kong [6]. The report goes on to point out that in that year, when the (then) current Minister of the Environment had been in the opposition ranks of the house of parliament as the environment critic, she is quoted as having taken the position that Canada "should deal with its own waste and not use the Third World as a dumping ground". She is said to have told the Commons that prohibiting exports "would be the best way to ensure the responsible management of wastes" [6]. In her intent to follow through on her position, Greenpeace pointed out that by permitting recyclables to be transported, this would be tantamount to a providing a loophole in the provisions. For, there is no certainty that receiving countries indeed would recycle the material other than to bury or dump it [6].

#### 4. An example of illegal trade

Despite the existence of conventions and laws, a recent instance provides one example demonstrating that regardless of such guidelines, there will be those who engage in illegal, immoral and certainly in unprofessional and unethical business practice. The example comes from Bangladesh from where it was alleged [6,11] that chemical tests performed on a consignment of more than 3,132 tonnes of zinc-oxy-sulphate fertiliser from the United States revealed that the consignment was contaminated with toxic industrial wastes and contained excessively high levels of lead and cadmium. However, even before the tests were fully completed, 1,113 tonnes already had been distributed. (The method of distribution is by hand in Bangladesh). At the time of the media report [12] in August 1993, a US federal court "earlier last year indicted four US companies, along with three executives, for exporting more than 3,000 tonnes of toxic fertiliser to Bangladesh. The charges were filed against the companies by the US Environmental Protection Agency (EPA)".

From this example, it is suggested that repeat offences might be minimized if business ethics were more a part of everyday business practice. The same, of course, holds true for those engaged in the professions. Ethics guidelines, codes of ethics, international conventions and laws are designed to protect the public interest. Therefore, it behoves those in powerful positions in business and in the professions to uphold these guidelines as hallmarks of civilised practice. Aside from more obvious reasons for adherence to ethical

practices, failure to set examples of respect for such guidelines could serve to encourage disrespect in the minds of the less powerful and the unempowered. The degree of potential social disruption and the associated costs of such disruption should be considered. Ultimately, the marginal short-term gain to be derived through one's own business or professional self-interest could be a small amount to forsake relative to costs associated with social distress.

#### 4. The role of epidemiology in toxic trade: risk assessment

As noted earlier, epidemiology is an observational, applied science that evaluates impacts of events that occur "in nature". Therefore, it is not surprising that epidemiology is at the centre of human health risk assessment which is invoked when concern is raised by a community about the consequences, if any, of exposure to hazardous and potentially toxic substances.

Among the concerns to the risk assessor would be hazard assessment, addressing both the quantities and forms in which the hazards might be present. A dose-response assessment then would be undertaken to establish whether (linear) extrapolation beyond the limits of experimental observations, in particular into the low-dose region, were needed. In addition, the risk assessor must establish what possibilities there are for people to be exposed to the hazardous substance(s), known as "exposure assessment". This involves determining, if exposure would be important by the inhalation route (through the nose and lungs), the absorption route (skin contact), and through the ingestion route (by contamination of the food chain or directly on foodstuffs).

The risk assessor then will apply models based on biochemical pathways, taking potential dosages of the hazardous product into account. In addition, the frequency of exposure also could be accounted for in the modelling. Finally, whether the body has the capacity to neutralise the contaminant and/or buffer its effects could be considered. The question of bioaccumulation also could be taken into account. Models taking several variables into account simultaneously then will be applied to the data and the risk of any negative health consequences for the exposed population will be provided (i.e., the risk will be characterised).

Some will regard the results of such an exercise as too conservative (failing to alert the community to a concern when, in fact, there is reason for concern) while others will consider them too liberal (raising alarms when, in fact, there is no reason for concern at all). Regardless of such criticism, the need for hard data dictates that some attempt to quantify the risk be made and it is the risk assessment team, often including an epidemiologist, that will be called in to provide the hard data to help inform the policy makers. Often, however, public opinion, for better or worse, can be more persuasive than the scientific inputs to policy formulation.

#### 5. Professional ethics

The procedures involved in the risk assessment process are standard, albeit sophisticated. It is entirely possible, however, that all procedures used (together with the assumptions underlying the application of these procedures) be made transparent. In this way,

those wishing to evaluate the results of any risk assessment exercise will be able to do so, and certainly with the assistance of (paid) experts helping them in their development of a critique.

Community involvement in the risk assessment exercise, however, might be one way of averting conflict at the end of the exercise. Communicating the results of any risk assessment exercise to the community also is best undertaken in the presence of inputs from community representatives (including all stakeholder groups) from the inception of the exercise.

It is up to the professionals to recognise that their task is to protect the public interest. Of course, there are professionals who serve as consultants and are therefore paid not from the public purse, but from the purse of one or other interested party. They are therefore beholden only to their client. However, if codes of professional practice were developed and adopted that dictated the appropriate mechanisms for the conduct of risk assessment and at the same time listed the procedures for ensuring transparency of the methods and underlying assumptions used, and possibly also for community involvement in the process, including that of risk communication, the chances of adversarial conflicts that could develop (especially between two professional groups) could be minimised. After all, these very disagreements between groups of professionals can cause public displeasure with the scientific enterprise. In this way, where public or private risk assessors are found to be non-compliant with the professional code, the public disrepute that they could bring on the profession perhaps would be lessened.

In such codes, besides the points alluded to above, attention might be given to the need for adherence to the principle of integrity: research/scientific integrity would require transparency and objectivity; personal integrity would require honesty among colleagues; and, professional integrity itself would require maintaining public confidence in the profession.

In terms of trade, autonomy, as noted by Asante-Duah earlier [3], would require the informed consent of the parties in a voluntary and non-coercive milieu. However, it is hardly possible that non-coerciveness could ever pertain in such a circumstance by virtue of the financial need of an importing developing world country. The analogue here is the now accepted ethical guideline which does not permit the payment of participants for anything but their direct costs (e.g., lost wages) from the time taken to participate in a study [13]. Other issues involved here would include, on the one hand, truth in the presence of unknowns or in the presence of scientific uncertainty and, on the other hand, the principle of caveat emptor (buyer beware). The ethical principle of non-maleficence requires the doing of more good than harm. Here the short-term, economic benefits (to whom?) of any trade agreement to accept toxic wastes must be weighed against the longer term harms to the environment, the public health and possibly also to future generations.

Finally, as noted earlier, the principle of distributive justice requires recognition of the parties deriving the benefits and those taking the risks in any trade deal. In the past, general practices have led to the recognition of the problem now known as environmental justice or environmental racism [1]. In addition, questions of environmental sustainability and integrity have become central concerns in the public forum.

Scientists will honour their social responsibility by being true to the principles of science. In order to do this they will be best held accountable by having explicit codes to which they may refer in times of doubt and/or tension. One recent attempt to bring scientists into closer harmony with society was the Toronto Resolution where scientists are encouraged to consider the social consequences of their pursuits [14]. It is only in the

presence of documented codes of practice that any reasonable attempt at professional self-regulation could commence in the risk assessment professions.

Perhaps by engaging risk assessment scientists, including epidemiologists, in the broader scientific realm of ecologists and other environmental and biological scientists, together with moral philosophers, lawyers and legislators, the notion of greater social responsibility will be even more fruitfully facilitated.

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