

Much room for improvement: occupational safety for solid waste workers

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Environmental engineers, scientists and researchers who work in the waste management field typically focus their attention on (a) reducing the volume of municipal solid waste (MSW) and (b) improving processing and disposal practices for unrecoverable residuals, all of which contributes to the protection of public health and the environment at large, at the community, regional, and even global scale. This focus is certainly warranted because it is well known that improper waste management practices can lead to the propagation of serious illnesses (from vector-borne diseases), impaired aesthetics (e.g. unsightly litter), and environmental degradation (such as impaired air and water quality) that adversely impact those living well beyond the physical boundaries of the waste-handling facilities.

It often takes years, however, for the negative impacts associated with substandard MSW management to be manifest in the community at large. On the other hand, workers employed to collect, process, dispose of and otherwise handle MSW, who perform the jobs needed to implement the grand designs, are on the front lines of the waste management industry. Thus, it is the members of this work force who face the most immediate and significant exposures to workplace hazards inherent in the MSW industry, and who too often pay a high price for that exposure.

Occupational health and safety exposures in the MSW management industry

People employed (either as paid workers or ad hoc scavengers) to collect, process, recycle, and dispose of MSW, and those who install and maintain emission control systems at these facilities, are routinely exposed to the wide range of physical, chemical, and biological hazards that are characteristic of MSW operations, as listed here.

- Soft tissue (e.g. muscles, ligaments, tendons) sprains, strains, and tears, and back injuries (e.g. from repeated lifting and tipping of rubbish containers which are often overloaded).
- Broken or severed bones or limbs (e.g. from careless use of compaction equipment).
- Slips, trips, and falls (e.g. into waste storage bunkers at transfer stations or while walking on uneven surfaces at landfills).
- Vehicle accidents (e.g. when rushing to finish a collection route or from interaction with employees and/or visitors and heavy equipment operating on a landfill).
- Contact with faecal matter and other infectious and/or hazardous materials.
- Prolonged exposure to sun and extreme temperatures.
- Exposure to dangerous plants and animals (e.g. poison oak, snakes, insects, spiders, bears, etc.).

- Exposure to hazardous atmospheres (e.g. oxygen-deficient atmospheres, methane, hydrogen sulfide, etc.).
- Confined spaces.

These conditions inevitably result in injuries, illnesses and, all-too-often, death among sanitation workers.

Occupational health and safety statistics

Occupational health and safety statistics illustrate the degree to which workers in the sanitation sector are exposed to occupational hazards even in developed countries. In the USA, for example, the Bureau of Labor Statistics (BLS) and the National Institute for Occupational Safety and Health (NIOSH) for decades have published reports of on-the-job accidents that result in injury, including those with lost work days, and even death. Such reporting is mandatory in the USA, so the data are considered highly accurate. Several facets of the MSW industry are tracked, including those who work on collection crews and at recycling facilities. In 2011, there were 36.4 fatalities per 100 000 employees in the sanitation sector. This was the fourth most deadly occupation tracked by the BLS that year (after the fishery, logging, and aircraft pilot/flight engineers categories), representing a death rate that is 10 times higher than that faced by the average worker.

Other statistics indicate that more than 5000 sanitation workers in the USA suffered work-related injuries in 2009, resulting in time away from work, a rate of 184 injuries per 10 000 workers. This injury rate is almost 74% higher than that of the average worker.

Occupational health and safety in developing countries

The situation is bad enough in developed countries, but sanitation workers in developing countries are exposed to substantially greater risks, in large part because (a) solid waste collection, recycling, and disposal practices rely mainly on untrained manual labourers who directly handle MSW every day, (b) many labourers are children who don't know enough to be careful, and (c) manual labourers generally wear little or no personal protective equipment (PPE) such as safety glasses, hard hats, gloves, safety boots, high-visibility clothing, etc.

There are little if any data available to define the occupational health and safety risks encountered by sanitation workers in resource-limited developing countries because agencies that focus on this subject are either in their start-up stages at best, or don't exist at all. Based on anecdotal evidence alone, occupational hazards in developing countries are substantial. For example,

many scavengers have been killed due to landslides at dumps, including 278 at the catastrophic Payatas dump landslide in metro-Manila in 2000. Studies indicate that the life expectancy of informal waste pickers can be as low as half their nation's average and that infant mortality among scavengers is several times higher than the population at large. Clearly there is a need for developing countries to compile more extensive and reliable information about occupational health and safety, because, as the adage goes, 'you can't manage what you don't measure'.

Potential for improvement

The waste management industry in the USA has been steadily improving its worker safety record in recent years. The overall lost work days decreased by 48% from 2003 to 2009, but as sanitation jobs are still among the nation's top 10 most dangerous, it is clear that there is still room for continued improvement.

The foundation for continued improvements in the USA includes at least three factors: (a) a well-established regulatory sector to enforce applicable laws and fine non-compliant employers when appropriate, and to establish education and outreach services, (b) a legal system that enables workers to recover compensation for on-the-job injuries; and (c) a bias towards labour-saving efficiency in commerce.

In developed countries, occupational safety and health enforcement agencies can impose heavy fines if employers are found to be negligent in the injury or death of an employee. In addition, workers' compensation insurance premiums are set in part based on a company's safety record. As a consequence, all municipalities and private companies that handle MSW conduct routine employee safety training and are constantly reminding them about the importance of safe work practices and using/maintaining the appropriate PPE.

In contrast, those who handle waste in developing countries are at greater risk because there are fewer occupational safety standards or regulations, and even less enforcement. In many developing countries it is not uncommon for hundreds of people to be self-employed as scavengers, attempting to recover even small quantities of saleable materials from the MSW left for collection in the city and/or at the dump. Most readers of *Waste Management & Research* have seen in person or in photos, scavengers roaming uncovered waste at dumps in sandals or bare feet, picking through the waste with bare hands to recover even small volumes of low value recyclables. In too many situations, even workers employed by municipal agencies often do not wear even the most basic PPE.

The increasing use of highly mechanized collection equipment has been an effective approach to reduce the occurrence of worker injury and death in the waste industry in developed countries. For example, in the USA, 40 to 50 years ago it was common for collection trucks to be staffed by a driver plus two, three, or more 'swampers' (collectors) who would ride on the back of a compaction truck and jump off at each stop to lift and tip containers by hand (and back and leg) into the truck's compactor body. This practice exposed workers to many hazards, including back strains, broken and dismembered limbs, and death by crushing. Consequently, as recently as the 1980s, it was rare for a rubbish collection worker to stay healthy enough to reach retirement age. Today, MSW is more often collected using a sophisticated truck equipped with an automated hydraulic arm that grabs, lifts, empties and returns the rubbish container to the ground, all under the control of a single skilled driver who rarely leaves his cab (and thus is not exposed to the safety hazards inherent in the manual collection process).

Labour-saving approaches can be costly to implement and may not be as effective to operate when collecting waste from multi-storey residential buildings. Furthermore, there is often little incentive to reduce a labour force in developing countries where labour is plentiful and wages are relatively low, and where workers are not as likely to be compensated for their injuries. Moreover, government leaders tend to earn political capital by supporting service systems that employ many citizens, even though such practices may be inefficient and lead to occupational hazards. Consequently, as long as these conditions prevail, it will be a challenge to markedly improve the safety of waste industry workers in developing countries by replacing manual labour with mechanical systems.

Engineering solutions with occupational safety in mind

Researchers periodically have addressed this subject over the past 25 years, most in much greater detail than is summarized above (see in particular *Occupational and Environmental Health Issues of Solid Waste Management; Special Emphasis on Middle- and Lower-Income Countries* by Sandra Cointreau, The World Bank Group, July 2006). The objective here is to keep the subject alive in the solid waste engineering and research realm, and to encourage contributors to *Waste Management & Research* to consider opportunities to build in worker protection attributes when designing and developing improvements to waste management systems and facilities. Those in the industry who do the real 'heavy lifting' deserve no less.



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