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Waste Management Practices and their Effect on Human Health

Souvik Sur, Assistant Professor
Department of Chemistry, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India
Email id- souviksur@hotmail.com

ABSTRACT: ***This paper examines the most up-to-date information on waste construction and demolition disposal options around the world, including the European Union (EU), OECD countries, and some developing countries (notably China), as well as (ii) the potential direct and indirect health effects of waste management activities. Though the primary emphasis is on municipal waste (MSW), bioaerosols from composting facilities and pathogens from wastewater treatment plants are also taken into account. The consequences of radioactive waste are briefly discussed as well. Hundreds of epidemiological studies have been published on the prevalence of a broad variety of potential diseases among waste facility workers and the general public. The overall result of the literature review is that proof of negative health effects for the general public living near landfills, waste incineration, compost facilities, and nuclear power plants is often inadequate and inconclusive. There is strong evidence that germs originating from sewage treatment facilities provide a significant risk of gastrointestinal disorders. Preference will be given to prospective studies with statistically reliable power, access to direct social evaluate overall, and data on health effect biological markers and predisposing biomarkers in order to improve the quality and utility of epidemiological studies applied to communities residing in areas where waste management facility is located or planned.***

KEYWORDS: ***Human, Health Management, Pathogens, Sewage, Waste.***

1. INTRODUCTION

Waste has always been made by human activities. When the human population was tiny and migratory, this was not a significant concern, but it became a severe one when cities grew and vast conurbations grew. Poor sanitation resulted in pollution of water, land, and the atmosphere, as well as a significant effect on public health. Epidemics linked to polluted water devastated Europe's population throughout the Middle Ages, and cholera was a frequent occurrence even more recently (19th century). Some of the direct health consequences of poor waste management are very well and may be seen, particularly in poor nations. The management of an ever-increasing amount of trash became a highly organized, specialized, and complicated task as science and technology progressed. The properties of waste products changed as people's lifestyles changed, and the number of novel chemical compounds found in different wastewater increased. Exposure to chemicals present in trash or generated at waste disposal facilities has a harder time measuring long-term health consequences, particularly when concentrations are low and alternative exposure routes exist (e.g. food, soil).

Nevertheless, a lack of proof may be concerning to the general public. NIMBY (not in my backyard) syndrome has resulted from well-publicized industrial catastrophes, many of which are unconnected to waste management operations. This phenomenon has led to strong resistance to the building of landfills, incinerators, and other garbage disposal. The public is growing pressure on government and health agencies to provide statistical proof of possible negative health consequences caused by such activities. Hundreds of papers on the effect of pollution near garbage disposal facilities have been published. Reviews and reviews on reviews have been published by

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a variety of writers. Although observational data have often shown a connection between human diseases and proximity to a waste disposal site or duration of residency near such a site, the vast majority of them have failed to establish a causal connection. The following are the major objectives of this study: (i) summarize the most up-to-date details on waste arising and landfilling options around the world, including the European Union (EU), Organization for Economic Co-operation and Development (OECD) countries, as well as some developing nations; (ii) assess epidemiological data of the short and long term health effects of waste management activities [1].

Municipal solid waste (MSW) is the primary emphasis, although compost facilities and sewage treatment plants are also included. In addition, the findings of epidemiologic studies on the consequences of radioactive material exposure are briefly discussed. Primary studies and evaluations of epidemiological investigations were included in the literature survey, which was conducted utilizing the same online resources. The following requirements were used to rank the studies in terms of their quality: (i) (sample size and confidence interval of the study; (ii) selection of confounders (such as other sources of pollutants both indoors and outdoors); (iii) availability of documentation (as opposed to using surrogate mothers such as range from waste management systems); (v) availability of exposure data (as opposed to using surrogates such as distance from waste management facilities). For readers who are familiar with the scientific methods employed in this area, general information on the many kinds of epidemiological research is also given [2].

The amount of trash generated across the globe has already been steadily increasing for years, particularly in wealthy nations, as shown by the relationship between country GDP and waste production per capita (World Bank, 1992; OECD, 2003). Though waste data on trash arisings is frequently inadequate and in some instances inaccurate, recent estimates show that around the turn of the century, worldwide municipal solid waste (MSW) generation surpassed 2 billion tonnes per year (e.g. Key Note, 2007). The United States generated more than 228 million tonnes of MSW in 2006 (EPA, 2008; OECD, 2008a, b), or 750 kg per inhabitant. In 2006, the total amount of MSW produced in the OECD region was over 619 million metric tonnes, or 580 kg per person (OECD, 2008b). In 2006, the Europe Union's 15 member states (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Ireland, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom) produced 219 million metric tonnes of MSW, or 560 kg per inhabitant (OECD, 2008a,b). Massive quantities of municipal solid waste are discarded of as less advanced countries like China and India industrialize and their populations urbanize, though the production per capita (less than 0.5 kg/day/capita in India and less than 0.9 kg/day/capita in China) is still small production volume in most OECD countries (up to 2.1 kg/day/capita in the USA). However, this conceals the reality that a significant percentage of MSW is generated in metropolitan areas.[3]

Every stage of the nuclear fuel produces radioactive waste and ionising, from mining and mineral treatment through uranium enrichment, fuel rod manufacturing and reprocessing, nuclear power generation, and nuclear power plant decommissioning. Another significant source of radioactive waste is military weapon manufacturing. According to 2007 estimates (IAEA, 2007), there are approximately 5.5 million tonnes of recognized uranium ore, and global uranium production is around 40,000 tonnes (39,600 tonnes in 2006), with major producers including Canada (25 percent), Australia (19 percent), Kazakhstan (13 percent), Niger (9 percent), and the Russian Federation (9 percent), (8 percent). The nuclear sector consumes approximately 67,000 tonnes of

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uranium per year, thus the extra need is met by supply from other sources, notably military sources and spent fuel recovery facilities.[4]

2. DISCUSSION

1. *Waste management practices:*

A series of severe and well publicized pollution events linked to improper solid waste management methods have sparked public concerns about a lack of oversight, insufficient laws, and the environmental consequences and human health. As a result, many federal authorities have been compelled to implement new regulatory framework and approach hazardous and unsustainable waste management activities. Trash prevention/minimization, waste re-use, recycling, and composting are prioritized in a waste management hierarchy based on the most ecologically sound factors. In many nations, a significant proportion of trash cannot currently be used, recycled, or composted, therefore landfilling and burning are the primary disposal options. Landfilling is the most common technique of waste disposal in Europe. In Western Europe, 57 percent of MSW was landfilled in 1999 (compared to 67 percent in 1995) and 83.7 percent in Central and Eastern Europe (DHV CR, 2001). In Western Europe, approximately 18 percent of MSW was burned and 25% was recycled in 2000, while in Central and Eastern Europe, incineration and recycling accounted for just 6% and 9%, respectively. In general, composting in Western Europe is growing. Due to a lack of data, identifying trends in Eastern Europe is challenging.[5]

2. *Health issues:*

Despite major technological advances, improved waste collection legislation and regulatory systems, and more advanced health assessments, public acceptance of the location of new waste disposal and treatment facilities remains low due to concerns regarding negative human and environmental health effects. Every step of the trash collection, treatment, and disposal process is linked to health issues, either straight (via collection and recycling activities or other occupations in the waste management sector, by dangerous substances in the refuse or emission levels from incineration plants and landfill sites, vermin, odours, and noise) or obliquely (via waste management industry waste collection industry waste disposal industry waste treatment business waste disposal sector waste disposal industry sewage treatment industry waste management manufacturing waste management industry sewage treatment industry waste management industry waste management manufacturing waste management industry waste management industry (e.g. via ingestion of contaminated water, soil and food). A significant number of landfills and incinerators have had poor performance in the past, even landfills constructed with a containment barrier (a clay liners or a synthetic membrane). Regardless of the fact that approximately a third of the 4000 sites examined had a clay liner, The noted that garbage failure was very common in the UK, leading in surface and groundwater contamination. The public has acquired a skepticism of politicians' and scientific advisers' views as a consequence of these technological failures. Plans for the building of a new sewage treatment facility or treatment plant are usually met with fierce opposing party from the local community, who are concerned about potential negative health effects, the association of these facilities with odors, noise, and visual impacts, as well as the loss of property ownership value.[6]

3. *Epidemiological investigations:*

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Due to ethical considerations, most epidemiologic research on the effect of recycling programs on human health are observational rather than experimental. Experimental studies are more common in clinical trials conducted by/for the pharmaceutical companies, and they include a test group (exposed to a particular chemical or medication) and a controls group (not exposed). In this instance, the anticipated result is almost always positive (e.g. good health outcomes as a result of administration of vitamins, reduction of high blood pressure with hypotensive drugs). A wide range of epidemiological studies are available, and interested readers may find comprehensive information in a number of publications.[7]

The following are the most frequent kinds of investigations:

1. Prospective cohort studies: Over a long stretch of time, two cohort of individuals (the exposed group and the non-exposed group) are evaluated, with the degree of exposure levels and the rate of illness development documented, as well as other data gathered through questionnaires. Human fluids or tissue are often collected and analyzed in these investigations (e.g. blood, urine, hair, teeth). A large population must be recruited in order to account for potential confounding variables and guarantee statistical significance of the findings, and the total cost may be significant.
2. Retrospective case-control studies: In this kind of study, a case group of individuals (patients who have previously acquired a particular illness) and a control group of healthy people are chosen. All of the subjects are questioned, and data on previous exposure is gathered retrospectively. These investigations are generally less costly than prospective cohort studies because they include smaller groups of individuals and need fewer researchers, but they are more biased.[8]
3. Cross-sectional studies: These are studies that are performed on a subset of the exposed individuals over a short period of time. They are the complete antithesis of observational research, which take place over an extended period of time. Cross-sectional research may be helpful for generating ideas that can then be tested in larger investigations. They may be useful if the disease being studied is very prevalent, and they are usually less expensive to do. Unfortunately, determining whether an illness occurred before or after the group was exposed to a possible danger may be challenging.[9]

Most of the time, environment epidemiologists must look into the emergence of clinical consequences in a population that has been exposed to emissions that are somewhat normal over background values. At locations where sanitary landfills, incinerators, or other waste treatment plants are state-of-the-art, constructed with the greatest possible technology, and managed according to standards and in complete accordance with law, their job becomes even more difficult. In order to prevent generating inaccurate test findings, the research must have statistical power in order to identify clinically meaningful differences between a control group and a ‘test' population. The power of the research is highly reliant on random sample since the difference in the frequency of particular clinical outcomes between the two groups is typically modest. Normally, this would entail examining hundreds or hundreds of thousands in both the exposure and control areas. The theoretical population size needed for sufficient statistical data interpretation may be greater than the total population of the geographical region under investigation. Such studies need a lot of resources, which are seldom accessible. A middle ground approach relies on a meta-analysis, which combines the results of multiple individual studies, though this form of assessment has its

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own flaws (e.g., difficulty controlling bias in the original studies, difficulty accessing studies that showed no statistically significant results and thus remained unpublished).[10]

3. CONCLUSION

The epidemiologic studies waste management and human health is debatable at best. The majority of research looked into the health consequences of older kinds of waste management facilities, particularly incinerators. There is a scarcity of data on actual human exposure, therefore most research rely on surrogate mothers such residency data, with the most recent studies adding information on possible exposure routes (e.g. pollutant concentration in soil, modelled atmospheric exposure). Most studies haven't yet properly accounted for confounding variables, such as social deprivation and exposure to sources other than the one being studied. Congenital abnormalities have the strongest link to human health in the case of landfills. Incineration is often linked to an increased risk of non-lymphoma Hodgkin's and sarcoma development. The dosages relationship of blood dioxins indicates that food, not inhalation, is the primary route of exposure. Few evaluation of new incinerators equipped with current emission-abating technology are known, and any future epidemiological investigations will find it difficult to identify excess harmful effects, since they will become even more difficult to quantify.

There is limited research on the health effects of composting on local people, although there is some indication that decomposition workers have more respiratory tract illnesses and higher antibody levels against fungi and actinomycetes. More study on the impact of possible pathogens (through bioaerosols, consumption of contaminated food, soil erosion, and mobilization into water bodies) on human health is needed since the spread of soil amendments (including sewage sludge and manure) has grown significantly in many countries. The majority of bandspreading research focuses on occupational diseases, while the rest focuses on respiratory ailments and gastrointestinal problems linked to polluted swimming waters. There is compelling evidence that microorganisms originating from sewage treatment facilities pose a significant risk of exacerbated symptoms. A strong dose–response association has been shown in the majority of instances, particularly with enterococci and faecal streptococci. The paucity of study in this field is unexpected, given the growing evidence of viruses as the source of human illnesses in untreated wastewater waterways, but this is largely due to a lack of funding.

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