

Poor waste disposal and effect on health- an insight and review

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ABSTRACT

Introduction: The generation of waste products, including urine, faeces, and household items such as glass and plastic, has increased in line with the growth of the world's population. Physical, psychological, and social issues can invariably arise if these wastes are not properly managed, which has a direct effect on the population's health and is the source of the nation's productivity. Waste dumping has been a persistent problem, despite the government's efforts to educate consumers on proper waste dumping. Despite regular enforcement activities, this socially unacceptable habit persists.

Methodology: Various studies on waste disposal and its potential deleterious effects on the health of humans, animals, and the environment were reviewed and included in this narrative review to summarise the nature of the problem and its health effects. These include both local and international articles on this subject. This is to ensure that various strategies can be developed to manage this important and ever-persisting issue.

Results and conclusion: The literature reviewed have been able detailed the physical, psychological, and social issues of improper waste disposal that may affect the health of the population. Taking care of the environment is a top priority, as are modern issues of climate change and its effects on the nation's coffers. Enhancing public education, promoting community-based environmental activities such as gotong-royong, using modern technology or methods, and stricter enforcement will ensure that waste is disposed properly. In turn, this will ensure the sustainability of Mother Earth for future generations.

KEYWORDS:

Waste Dumping; Health; Physical; Psychological; Social

INTRODUCTION

Malaysia is one of the fastest developing countries in the world, with the ambitious aim of achieving a developed nation status in the next 30 years. Along with the growth in urbanization, there is also a residual problem of waste generation. The peninsular Malaysia population alone produced about 19,100 tons per day of waste in 2005 or an average of 0.8 kg per capita per day, up 20% from the amount in 2001.¹ This figure is unfortunately expected to

grow further as Malaysia is already a one-trillion economy with an equally thriving birth rate. The latest data from 2024 show that Malaysia generates approximately 40 thousand tons of municipal solid waste daily, approximately 1.2 kg per person.² Food waste alone equates to 260 kg per person. This increase has been catalysed by urbanization, changing eating habits and population growth.² As reported in USA market intelligence website, Malaysia is seriously facing constraints in having sufficient space for waste disposal, further risking possible consequences in terms of health and environmental issues.²

Landfilling is the primary source of waste disposal in Malaysia.³ Solid waste is mainly generated from the municipal council (64%), followed by industrial waste at 25%, and commercial and construction waste that makes up 8% and 3% of the total waste, respectively.⁴ In landfills, recyclable materials can make up 80% of the total solid waste composition.^{5,6} The problem is not waste generation per se, but improper waste management resulting from waste dumping in many places other than homes, that is, on the roadside, into water sources such as rivers and beaches and even public places such as the parks.

This can in turn lead to many ill effects on health, namely physical, psychological, and social effects that will be explored in this article. Malaysia needs to step up its actions to regulate the unsanitary activity of improper waste dumping. After all, a healthy population is needed to drive the economy of the country, especially in the productive and young groups, which often become victims of tropical and vector-borne diseases, such as typhoid, cholera, malaria, and dengue fever. Therefore, this narrative review aims to showcase poor waste disposal and its effect on health worldwide, specifically in Malaysia. This eventually can help to draw up effective strategies to manage waste disposal, thereby reducing its potential health effects on the inhabitants of the earth.

Magnitude of the Problem

The magnitude of this potential health risk is enormous. Worldwide, billions of tons of waste are generated annually. Worse still is the fact that most of this waste is not recyclable and goes back into the vulnerable soils or water sources that will face the ultimate brunt from the uncivilized actions of waste dumping, despite the provision of adequate facilities for proper rubbish disposal in most countries.

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This is a problem of worldwide magnitude, affecting all five continents, from developed to the least developed countries. While improper waste management leads to the propagation of modern diseases such as cancers in the northern hemisphere (the so-called developed countries), in the southern hemisphere, which holds some of the poorest nations on earth, water-borne diseases such as cholera, typhoid, and malaria predominate, resulting in millions of fatalities per year, which are equal to some developed countries with smaller population, such as New Zealand and Iceland.

Comparing municipal waste generation by states in Malaysia, out of the 9,820 tonnes of waste generated, the central region states of Kuala Lumpur and Selangor contributed to one-third of waste generation, which is more than their population ratio in Malaysia (28.4%).⁷⁻⁸ In comparison, the east coast states of Pahang, Kelantan, and Terengganu only generated 517 tons of waste as compared to their population ratio of 14.1%.⁷⁻⁸ This indicates that the central region states are at greater risk of inappropriate waste disposal due to rapidly reducing landfill areas, relatively lower recycling habits, lack of infrastructure, and skills in waste management.²

Health effects

There are various negative effects on physical and psychological health, along with concomitant possible negative social outcomes that will be summarised here.

i) Physical health effects

Unscrupulous waste dumping can have many adverse effects on physical health. Poor waste management can lead to various physical illnesses. This can be divided into gastrointestinal infections such as typhoid, cholera, worm infestation, hepatitis A, and food poisoning; serious blood infections such as dengue fever and leptospirosis due to the presence of mosquito breeding grounds and flies and rodents; and respiratory illnesses such as asthma and irritation of the skin, nose, and eyes due to exposure to landfill gases such as methane, carbon dioxide, sulfur dioxide, and nitrogen dioxide.⁹⁻¹⁸

Improper sharp disposal can lead to accidental needle-stick injuries that may lead to serious diseases such as HIV/AIDS and, hepatitis B and C. In terms of water pollution, the size of total waste in the Pacific Ocean is already twice the mammoth size of the United States of America, thereby serving as a suitable environment for the growth of these undesirable bacterial and protozoal infections.¹⁹ This may lead to various manifestation of body and skin irritation due to the use of the polluted water, as well as infecting sea lives that are later consumed as meals by unsuspected consumers.²⁰

Heavy metals also present a clear danger to human health if it is improperly disposed. This includes metals such as cadmium, lead, copper, aluminium, and zinc.²¹ Cadmium may lead to serious problems like chronic kidney disease, cancer and teratogenic effect on the fetus. Lead, a common metal found in paints, can lead to behavioral problems and lower IQ, especially in children.

Aluminum can lead to serious damage to the central nervous system and may worsen the prognosis of patients with chronic kidney disease. Similarly, Copper causes serious damage to the brain. Zinc is more toxic to fish than humans, but may become toxic if the affected fish are eaten by human.²¹⁻²²

The discovery of microplastics in areas of waste disposal is also another great worry.²³ Various complications due to microplastic consumption have been reported in aquatic and land animals, such as reduced fertility, organ failure, and even death.²⁴⁻²⁵ These serious effects may also theoretically extend to humans if contaminated meat is consumed in large amounts.²³

ii) Psychological health effects

Besides its effects on physical health, there are also multiple psychological effects secondary to improper waste disposal. Studies conducted in least developed countries such as Peru and Brazil have shown that having diarrheal disease in the first two years of life may affect cognitive functioning in children when the child enters school.²⁶ Yet other studies have demonstrated that malnutrition and stunting secondary to chronic intestinal worm infestation resulting from unsanitary water resources, may affect the child's future psychosocial development.²⁷

There is also evidence of an increased risk of inattention and anxiety in stunted children.²⁶ Adults are also more prone to central nervous system toxicity due to heavy metals, as described above, and serious mutagenic risk that may eventually lead to cancer.

Other psychosocial effects such as disturbing odor, unsightly waste, and cognitive and stress-related problems remain a true and present danger of persistent improper waste disposal.⁹ This is especially true for odors from landfill sites, and their physical appearance, which can affect the income of nearby residents by undermining their livelihoods and lowering their residential worth or tourism potential, affecting the tranquillity and quality of life that often comes with increase in stress and anxiety level.²⁸⁻²⁹

iii) Social effects

Improper waste disposal can also have deleterious social implications. Studies have shown that places with inadequate sanitation have a high propensity for violence, social inhesions and insecurity.³⁰ This is can even be seen in certain low-cost residences in Malaysia where the incidence of vandalism and crime is somewhat high. Other possible social effects include poor social interactions and propagation of drug use.³⁰

Growing up in an environment surrounded by poor sanitation and waste disposal can also lead to the propagation of the above social problem.³¹ This is a serious problem that can seriously affect national aspiration to become a developed nation.

A case study conducted in Kuala Langat and Sepang, Selangor has shown that proper waste management policies are needed to prevent improper waste disposal by waste

dealers that can further contribute to environmental degradation.⁸ Another case study on household waste management in Malaysia also noted that a high volume of organic waste is dismantled in landfills and produces a toxic poisonous substance called leachate and greenhouse gases such as nitric oxide and methane, which are 21 times more potent than carbon dioxide.³²⁻³³

In addition, depletion of natural resources and the resultant climate changes with extreme hot weather and severe flooding continue to plague the nation, partially contributed by issues in waste disposal.³⁴ In addition, open dumping may also lead to air pollution through waste burning and offensive odors along with surface and soil contamination by leachate.³⁴

CONCLUSION AND RECOMMENDATIONS

Improper waste disposal is a real problem that must be addressed urgently and systemically. Failure to tackle this problem will lead to a vicious cycle of waste disposal, resulting in poor health, which in turn leads to improper waste disposal due to strain on income used to treating the resultant ill health.

The civic-mindedness of the community needs to be addressed to ensure that this problem does not get out of hand. Simple measures such as regular gotong royong together with proper waste disposal practices, coupled with enforcement by the authorities, will go a long way together, ensuring the sustainability of Mother Earth and life. Sustainable landfilling may be a viable solution for proper disposal of waste products.³⁵⁻³⁶

Studies in Malaysia have shown that community participation in environmental activities had a positive influence on healthy environment-related knowledge.³⁷ This in turn correlates positively with positive environment-related behaviors, participation, and attitudes.³⁸ This reiterates the old adage statement that a behavior that shows responsibility to the environment will in turn relate to consumption activities that will benefit and cause less harm to Mother Earth, more than other substitutable activities per se.³⁸⁻³⁹

Many initiatives have been launched by the Malaysian government to address ever-growing solid waste disposal issues. This includes enforcing the Extended Producer Responsibility (EPR) policy, which makes it mandatory for importers and manufacturers to be in charge of the waste disposal of their products and not only of its' sales.³ This is further enhanced by reinforcing the 2007 Solid Waste and Public Cleansing Management Act, which clearly spells out stiff penalties for violations and emphasizes holistic waste management practices. Another program being conducted is the National Strategic Plan for Solid Waste Management 2019–2030, aimed at lowering waste generation and its' management and encouraging recycling practices.³

Of course, great efforts to organizing public education and awareness campaigns on waste management and segregation, as mentioned above, including the 3R (reduce,

reuse, recycle) concept, also help in saving the environment.^{3,40} These efforts are expected to bear positive outcomes in the years to come.

In recent years, the use of advanced technologies or methods for waste disposal has helped further sustainable waste management. This includes mechanical methods such as biological pre-treatment, composting, and refuse-derived fuel production.⁴¹⁻⁴² It is also possible to separate the source of dry waste at home to ease the overall disposal services.⁴³

In summary, enhancing public education, promoting community-based environmental activities such as gotong royong, using advanced technology or methods, and stricter enforcement will ensure that wastes is disposed properly. In turn, this will ensure the sustainability of Mother Earth for future generations.

Declarations

Ethical approval and consent to participate: No ethical approval was required for this review as it is based on published research and does not involve any new studies of human participants or animals performed by any of the authors.

Availability of data and material: Data sharing is not applicable to this article because no datasets were generated during the current study.

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