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Poor Municipal Waste Management and Its Health Implication: A Case Study of Kabul City

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Abstract

A detailed study of the ongoing situation shows that the solid waste management in Kabul is not appropriate and a set of challenges exists in a different part of the system, local people have more concern with solid waste, but from another side, they devote less attention to them. Most of them do not have knowledge about the impact of hazardous waste and how to separate and recyclable. Management of municipal solid waste in Kabul has traived neglect from government and the general public. These negligence lead to several health issues such as direct injuries from a contaminated sharp object, water contamination by excreta and effect of heavy metal components of municipal solid waste as well as flood resulting from drain occlusion. All these flowers in the possibilities for the transition of food and waterborne zoonoses, and the emergence and re-emergence of new zoonoses. To ensure environmental protection and opportunity to the public health, more effort is required by the government, environmental agencies, and the general public. The whole system needs a behavioral change from the public site and better waste management practice on the local government side. Solid waste management practices are not adequate and show very common constraint in collection, management, and disposal of solid waste. The problem such as access to the proper facilities lack of treatment program lack of infrastructure planning and technical leadership and lack of knowledge. These efforts should be geared toward public enlightenment and enforcement of policies and legislation on sanitation, improvement of founding, development of recycling, and landfill to improve the standard solid waste management in Kabul.

Keywords: Municipal Waste Management, Kabul, Zoonoses, Heavy Metal, Public Health

1. Introduction

At the start of the twenty-first century, mankind is facing a global environmental problem, and the industrial sector is required to take the initiative in the establishment of recycling society for efficient utilization of natural resources. With an increase in the global population and the rising demand for food and other essential, there has been a rise in the amount of waste being generated daily by each household. This waste is ultimately thrown into municipal waste collection centers from where it is collected by the area municipalities to be further thrown into the landfills and dumps. However, either due to resource crunch or inefficient infrastructure, not all of these waste gets collected and transported to the final dumpsites. If at this stage, the management and disposal are

improperly done, it can cause serious impacts on human health. Waste that is not properly managed especially excreta and other liquid and solid waste from the household and the community are serious health hazardous and lead to the spread of infectious diseases. Municipal solid waste, commonly known as garbage, is refuse a waste type consisting of every day that is discarded by the public with variation from country to country. The management of this waste is gradually becoming a major challenge in developing countries like ours as a result of urbanization and the increasing of the human population. Municipal solid waste change considerably with time and may include durable good, and non- durable goods, packaging, container, food waste and yard trimming and miscellaneous inorganic waste with a different type. Four hierarchy ranking strategies have been developed by the united state of America for municipal solid waste management for environmental fraternity from the most preferred methods. These include; source reduction and reuse, recycling or composting, energy recovery as well as treatment and disposal [18].

The management of these waste becoming a major challenge in a developing country like Afghanistan, as results of urbanization and the increasing human populations. Now it is a serious concern in Kabul city. An increasing amount of waste which is not adequately managed in Kabul, resulting in the contamination of air, water, and soil. These environmental contaminations pose serious health threats. Economic development, increase in population, and urban growth are all the factors influencing an issue. After 2001, the intervention of the international community the geopolitical dynamics and its subsequent business opportunities, rapid population increase, and urban growth, triggered the planning and management of Kabul urban area. From the last three decades, Afghanistan has witnessed rapid urban growth and a huge number of rural-urban migrant due to the wars and conflicts (Hernandez and Gebremedhin, 2007). This migration caused huge pressure on the housing demand, and it leads to a high number of informal developments. Kabul municipality lack adequate solid waste management system, and this huge informal settlement have made it more difficult for them. The poor management of wastes will lead to lots of environmental and health impact. The responsibility of Kabul municipality is to manage the waste generated and reduce it's without technologically methods made negative impacts on environmental and human health. Waste management in Kabul is a loss for reasons related to the negligence from environmental stakeholder resulting in poor founding of municipality and oversight of national environmental protection of Afghanistan (NEPA). According to UNEP (2003), the average total solid waste generated in Kabul was 1080 tons/day. Per capita, SW generation in Kabul was estimated at 0.4 kg/day by Visvanathan (2006). According to the study by the (CIA, 2107), the total population in Kabul city 2015-2016 was 4.6 million and the range of solid waste produced during that time is reported 1840 tons/day and 0.4kg/capita/day.

The solid waste characterization data demonstrate that the solid waste stream in the Kabul city, although similar to the other developing countries in Asia, especially to south Asian countries, is unique in composition and it is generation rate. The solid waste stream was characterized with a huge part of the solid waste consist of the organic component of approximately 70% and a specific weight of $413 \pm 52 \text{ kg/m}^3$. The estimated solid waste generation rate ranged between 0.31 and 0.43 kg/capita/day (Forouher and Hristovsky, 2012).

The implication of poor waste management on human health such as contamination of air, lands, and water. This environmental pollution may results in the emergence specially on food -borne zoonoses, injuries from sharp hospital equipment and its dump in that sites also expose children, waste worker and adults scavenger to infectious diseases such as human immune -deficiency virus , tetanus, hematite B and C. this review will be aimed identifying possible public health implication in Kabul city and offer possible ways of reducing and overcoming these challenges.

Objective of the study

The mine aim of this study is to find out the waste management challenge in Kabul municipality and related governmental organization and receipt of essential point about poor waste management and find out the various disease due to the solid waste in the study area.

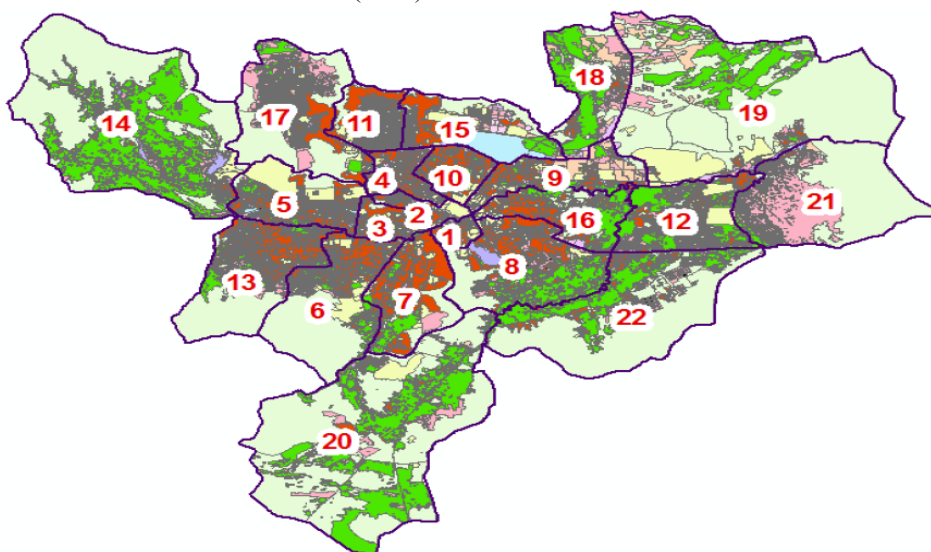
Study area

Kabul city is the capital of Afghanistan and is located 1791 meter above sea level. Situated in the eastern part of the country, Kabul is located between 34-31° North and longitude 69-12° East. The Kabul territory is about 1008.7 Km² until 20018 it was divided into 22 districts. District 19 has the largest area of 130Km². Kabul city has Bothe formal and informal settlement, with formal leading the number at 67%(JICA 2011) of the total land area. The Kabul urban agglomeration- an agglomeration that located in all part of the city cover an area of more than 60Km². There was no specific attention paid to solid waste management during this time anyway.

Fig. 1: location map of the study area



Fig. 2: The districts of Kabul city
Source: haidari and Lukumwena (2013).



Methods

This scoping review described acute poor waste management as a serious concern in Kabul city, and it becomes a big challenge to the Kabul residents. Because Kabul city is facing a serious of significant environmental problems. Air pollution, water pollution, the existence of huge quantities of solid waste, and lack of proper management, investigate the perception of household on public health, and relation to the dumpsite. If at this stage, the management and disposal are improperly done, it can cause serious impacts on human health. Waste that is not properly managed especially excreta and other liquid and solid waste from the household and the community are a serious health hazard and lead to the spread of infectious diseases. The case study design was adopted for the research. Case study research enabled the researcher to examine the phenomenon in a specific context Zainal (2007) argues that in most cases a geographical area and a specific number of individual as the subjects of inquiry are needed for case study research. Baxter and Jack (2008), also state that a case study is a research approach that facilitates exploration of phenomena within it is context by using a variety of data sources. The case study approach was used because the research concerned a specific- context situation the Kabul city, and also the problem was studied within the framework of a contemporary issue.

Municipal Solid waste generation

Municipal solid waste (MSW) is the abridgment of the waste generated from domestic, commercial, and construction activities by natural person that is collected and treated by municipalities. The exponential growth of population and urbanization, and the development of social economy, coupled with the improvement of living standard, have resulted in an increase in the amount of MSW generation throughout the world (Tanmoy Karak, R. MBhagat, 2012). Based on the solid waste management policy, three types of solid waste generated in Kabul: municipal solid waste, hazardous waste, and clinical wastes. Solid waste is the remaining materials derived as the results of production and consumption. The amount of solid waste generated mostly depend on the economic situation of a society, so the countries with lower GDP generate less solid waste (Shekdar, 2009). And also the solid waste generation rate is related to the population of an area. Getting information about the generation rate of SW is very important to describe the ongoing situation. Kabul is the fifth fastest growing city in the world (Citymayors.com, 2009). According to the UNEP, the average total solid waste generated in Kabul was 1080tons/day. Per capita, SW generation in Kabul was estimated at 0.4kg/day (Visvanathn, 2006) in developing countries, and the average generation rate was estimated to be between 0.3 to 0.5 kg/c/d (Tam, 1983). According to the study by JICA in 2007-2008 and the Central Statistical Agency (CSA), the total population in Kabul city was 3.1 million and the total solid waste produced during that time is reported 1603 tons/day and after simple calculation per capita waste generation was 0.51kg/C/Day, which was very higher than normal case 0.4kg/C/Day generation rate. The total amount of waste in 2015-2016 was 1840tons/ day at a total population of 4.6 million (CIA,2017).

Type of solid waste

Hazardous waste

Hazardous waste is appropriately identified and hand safely to protect human health and the environment. The generator of hazardous waste is regulated based on the amount of hazardous waste they generate in a calendar month, not the size of their business or facility(emsenv.com 2018).

Characteristic hazardous waste is material that are known are tested to exhibit one or more of the following hazardous traits:

- Ignitability
- Reactivity
- Corrosively
- Toxicity

There is no facility for treatment of hazardous in the Kabul city. Toxic and municipal waste are dumped in the same dump site. There was tow incinerator working on hazardous wastes, but due to the air pollution, these were

closed. All the hospital's wastes are considered as hazardous waste, and the ministry of public health (MoPH) has introduced hazardous waste separation at the major or hospitals, but still, the practice is not performed at 100% in all hospitals.

clinical wastes

MoPH is the responsible authority for the management of clinical or medical wastes. Clinical wastes are most hazardous and can face people with dangerous diseases. These are wastes which need special attention during collection, transportation, and disposal even if the amount is not too great. In the countryside, there is no special policy or procedure for the treatment of clinical wastes. Almost all the clinical wastes are collected and transferred to the landfill together with other municipal wastes. There are a few hospitals which have incinerator and burn the clinical waste. In the dump site, there are scavengers and informal group of people who collect reusable items. According to (Bashaar, 2017), in 2008, about 1.6 million by-products of vaccination against polio were discarded in municipal wastes, and this caused many infectious injuries to the reusable collectors (Harhay, 2009). Added that more than 60 hospitals in Kabul do not have incineration facilities. A JICA study team estimated the volume of medical waste at around 3.7 tons/day from all facilities.

Characteristic of solid waste

Waste characteristics are different in developing and developed countries. The daily solid waste generated in Kabul city is estimated to be 0.3Kg/capita/day-0.43Kg/C/D (froher, 2015). Since Kabul is not completely an industrialized city, the huge part of the solid waste consists of organic waste (70%, while plastic, paper, and glass content are 3.8 %, 5.5%, and 2.2% respectively. Metal demolition waste and textiles respectively add of 1.2%, 15%, and 1.2%. According to chemical and environmental study, all the solid waste divides into four categories:

- Corrosive: these are waste that includes acids or bases that are capable of according mental containers, e.g., tanks [3] Pervez alam
- Ignitability: this is waste that can create fires under certain condition, e.g., waste oils and solvents
- Reactive: these are unstable in nature, they cause explosions, toxic fume when heated.
- Toxicity: waste which is harmful or fatal when ingested or absorbed.

Impact of solid waste on Human health

The group at risk from the unscientific disposal of solid waste include the population the area where there is no proper waste disposal method, especially the pre-School children; waste worker and worker in facilities producing toxic and infectious materials. Other high-risk groups includes the population living close to the waste dump and those, whose water supply has become contaminated either due to waste dumping or leakage from landfill sites. Uncollected solid waste also increases the risk of injury and infection. Exposure to hazardous waste can affect human health, children being more vulnerable to this pollutants. In fact, direct exposure can lead to disease through chemical exposure as the release of chemical waste into the environment lead to chemical poisoning.

The direct effect of poor waste management on public health

Sharp objects such as syringes, scalpels, and razor blades disposed at waste dumping sites can cause serious injuries to children and municipal worker visiting these sites either to defecate or play as it is very common in Kabul. Municipal waste management workers and waste scavengers are also at risk of injuries caused by these sharp objects. This object can also pose serious health risks to these groups of people if contaminated with infectious pathogens. Because contaminated syringes caused hematite B, C virus, and human immune-deficiency virus infections[18]. This risk is particularly higher in developing countries where scavenging at waste disposal sites and manual sorting of hazardous waste from the health-care establishment is common. Another direct effect may include environmental pollution associated with the decaying of the long-standing wastes.

Indirect effects of plastic and municipal waste on public health

Contamination of underground water is vital to life, and quality of life of the people living in a region depend on access to clean water. Groundwater is a crucial link in the hydrologic cycle because it is the source of most of the water in rivers, lakes, and wells which are usually the municipal source of water. Contamination of groundwater often results from poor municipal waste management. A study by Karija et al. [4]. Showed that drinking water contaminated by municipal solid waste contained fecal coliform count ranging between 15.52 MPN/100ml of water against the recommended of 0 MPN/100ml of water [12]. This may be a confirmation that human and animal excreta are component of municipal solid waste in developing countries as was earlier reported [18].

Heavy metal, including lead, cadmium, mercury, and arsenic from municipal solid waste are also washed into surface and groundwater posing serious public health threats. Common sources of these heavy metal in waste may include point containers and other lead coated containers for lead, cadmium batteries and cigarette stumps for cadmium, broken mercury thermometers and barometer for mercury and containers of arsenic pesticides and wood preservatives for arsenic. This substance is not recycled in Kabul and are frequently dumped with household waste ending in the contamination of drinking water sources for human. Generally, the health effect of heavy metal can be life-threatening and may range from headache, irritability, memory deterioration, diminished intellectual capacity, kidney damage (39,21,44solomon), liver diseases (14) and bioaccumulation that lead to cancer (10,35)

One of the public health implication of dumping waste within human settlements is the risk of transmission of food and waterborne endemic zoonoses. These endemic zoonotic pathogens which are usually associated with human and animal excreta on waste dumping site are usually washed by rains into surface or groundwater, contaminating these sources of water for human and animal, resulting in illness. In addition, food animal serving as vertebrate intermediate hosts can feed on human excreta, acquiring, infections which are later transmitted to human causing serious health problems. Common sanitary food and waterborne endemic zoonoses documented developing countries.

Due to the use of chemical additive during plastic production, plastic has potentially harmful effects that could prove to be carcinogenic or promote endocrine disruption. Some of the additives are used as phthalate plasticizer and brominated flame retardants. Through biomonitoring, chemicals in plastic, such as BPA and phthalate, have been identified in the human population. A human can be exposed to these chemicals through the nose, mouth, or skin. Among the phthalate plasticizer, the most hazardous ones, i.e., BBP, DEHP, and DBP, are classified as toxic for reproduction. BBP is also very toxic to an aquatic organism with long-lasting effects. In addition, this phthalate, as well as DEP (diethyl phthalate) and DCHP (dicyclohexyl phthalate), are being evaluated for the endocrine disrupting properties (Groshart and Okkerman, 2000; Okkerman and van der Putt, 2002). The lead compounds used in heat stabilizer are classified as toxic for reproduction and the aquatic environment with long-lasting effects (both acute and chronic) and may also cause damage to organs.

According to the report in 2019, the prolific use of plastic continues in Kabul, and this city has turned into a trash can. People have no choice and must give plastic bags by every shopping, whether they buy small things. Kabul resident does not take care and to not indiscriminately throw out garbage and to take care of their environment.

The slow violence of pollution and municipal solid waste in Kabul

Beside developing country, less attention has been focused on the health and environment risks from poor waste management in Kabul. Yet now estimates indicate that it is killing thousands each year. The latest report from the health effect Global Air project estimate that hazardous waste cause 51600 death in Afghanistan in 2016. A review by UNHABITAT (2015), laid bar the enormous challenge facing municipalities in Afghanistan. Adequately dealing with Kabul's annual 653557 tons of waste would require 41% of the city's entire budget; for some regional cities, the cost would be two or three time their annual income. Thus, Kabul becomes most notorious for poor waste management and air quality. While the climate and geographical factors play a role in influencing air movements in the city, these are exacerbated by a high level of manmade emission. These include

the use of leaded and poor quality fuels in the vehicle and domestic generators, light industrial sources, and the burning of waste plastic, coal, and rubber. Growth, coupled with inadequate urban planning, the challenge of waste management and the limited provision of green spaces. The problem is particularly acute during the winter when resident relies on wood and coal for heating, especially burning waste plastic and rubber by poor residents because of diseconomy.

Possible intervention strategies

In Afghanistan, the executive board and legislation have failed to implement law and regulation (Outlook, 2015) according to the outlook news social practices are not in accordance with the law most of the time, and people consider their own interest instead of other's right. Afghanistan has environmental law and strategy for solid waste management, but this is not comprehensive, and implementation is often not considered. Enactment and enforcement of policy and legislation will serve as useful strategies in improving solid waste management in developing countries. As poor solid waste management was associated with weakness of policy enforcement and implementation. The legislative arm of Afghanistan government at the local state such as Kabul and general level encouraged to take up their responsibility by enacting new law and policies that will govern the management of municipal waste in Kabul to ensure the protection of the general public from the hazards associated with this menace. With legislation in place, the general public will have an understanding of what is required of them by the law and will abide by them. This can be achieved through the formulation of sanitary committees at the local, state, and national legislators who would sponsor and support all sanitation bills.

Ministry of education on the principle and effect of waste minimization and recycling is also a critical part of the waste management process. Afghanistan public should be enlightened on the risk of allowing children to scavenge and defecate on refuse dumping sites. Lack of knowledge and poor education about solid waste management among residents have caused problems in the system. The awareness of resident needs to be improved through the education program.

Another major challenge associated with poor waste management in Kabul is the poor founding of agencies coordinating sanitation. Kabul municipality has tow kind of revenue, one is the budget from the ministry of finance and the second type is related to their own revenue collected through taxes, according to community scorecard (SCA, 2016). Joseph (2007) proposed to the participation of the private sector to overcome problem generated from lack of budget and technical capacity. A drop of found allocations will be, of course, poor waste management. And so, ensuring a healthy environment in Kabul requires proper founding of municipality to be able to carry out this responsibility effectively. Founding may be done by the government at the national level as well as non- governmental organization.



Figure 3: refuse dumping site within a residential location in Kabul with a human waste scavenger and explore.



Figure 4: refuse dumping site within the human settlement in Kabul with a boy dumping refuse and scavenging animals.

Conclusions

This article carried out a literature survey to review poor municipal solid waste management in Kabul. Health hazards attendant by insufficiency of municipal solid waste management and cause serious public health problems ranging from the transmission endemic zoonoses to the emergence and re-emergence arising from the direct and indirect influence of poor waste management. The impact of these dangerous health risk can be reduced and achievement to minimum level through public education and awareness program for resident regarding the impact and value of solid waste. Enactment and re-enforcement of policies and legislation, private sector involvement in environmental sanitation and municipal solid waste management was encouraged (25). Establishment of appropriate law and regulation which give clear information on the responsibilities of Kabul municipality, Ministry of Public Health and National Environmental Protection Agency (NEPA) and other related organization. Improvement of funding for financial support and management of the related agencies for better ability to propose an appropriate method for Monitoring, supervision, and development of landfill, recycling waste, among others. It is pertinent that all human settlement regardless of their size and location to develop landfill for proper waste management, which will preserve the environment and promote well being of the Kabul resident.

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