ENVIRONMENTAL IMPACTS ON INFORMAL SETTLEMENTS ASCRIBED TO IMPROPER WASTE MANAGEMENT IN KABUL

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ABSTRACT

This study examines ways to ensure a sustainable and livable environment in Kabul's 8th district informal settlement. An examination of the impacts of improper waste management on Kabul's informal settlements is the subject of this study. The study analyses the current waste management situation and challenges and environmental effects on informal settlers in the city. A qualitative methodology was employed to collect the data, which combined direct observation and interview. Three panels of experts from the local authorities were interviewed. The purposive sampling method was employed for selecting respondents. Data were analyzed using thematic and template analysis techniques. The study revealed that the waste management situation was not frequent; lack of infrastructure and facilities, poverty, rapid urbanization, lack of municipality technical capacity, funds, and experts were the main factors of improper waste management. The waste was not properly collected due to weak accessibility and the imperfect nature of roads. Residents in informal settlements burn waste for house heating during winter as they are not aware of the environmental and health issues. Improper waste management creates severe environmental impacts such as land and water pollution, air pollution, infectious diseases, unpleasant smells, drain blockage, and loss of local biodiversity. This study has explored the effect of improper waste management in informal settlements on its residents and recommended improving the infrastructure, educating residents about environmental protection, and ensuring the municipalities' and communities' involvement. Therefore, sustainable redevelopment of the urban land use, which includes proper planning of informal settlements, is crucial. It will also help to ensure a sustainable environment. The outcome of this study will serve as the basis for information that policymakers should concentrate on when planning a course of action or inaction to improve the waste management systems in informal settlements.

Keywords: Waste Management, Informal Settlement, Environment, Health Issues

1.0 INTRODUCTION

In Kabul city, all settlements developed after 1978 did not conform to the Third Master Plan and Detail Plans. They are known as informal settlements. The rapid growth of Kabul city and large-scale internal displacement in Afghanistan's informal settlements is increasing exponentially, especially in Kabul city (Nazire et al., 2016). The Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) reported over 350,000 newly displaced people in 2017 had joined the already saturated informal settlements across the country. Statistics showed that informal settlements inhabited 76% of the existing residential area and around 74% of the population inhabited the informal settlement area in 2008 (JICA, 2015).

As a national authority, Kabul Municipality works under the direct supervision of the president's office. Waste collection, transportation, and disposal of landfills are a few of its responsibilities other than implementing the Kabul master plan and collecting revenue from households in Kabul Municipality. Although Kabul is experiencing rapid urbanization, 70% of the informal settlers are still experiencing lack of sanitation facilities and basic infrastructures. The road inaccessibility and

inexistence of collection points in informal settlements resulted in improper waste management over the past decades (Azimi, 2015). This environmental condition has also become upsetting to informal and formal settlements and requires proper management (ACRFH, 2015).

The improper waste management has caused many negative impacts on Kabul city's environment and society. The informal settlers are the victim of the environmental impact due to the ineffective waste management system. The residents of informal settlements are not aware of waste effects on the environment as they do not consider environmental issues. The residents of informal settlements do not dispose waste properly, which would end up creating pollution such as a pile of waste in public spaces and streets, bad smells, and attracting pests like flies and mosquitos. Residents cannot open windows to have fresh air due to unpleasant odours in informal settlements (Rawa, 2011 cited by Royaee, 2015). Waste management in Kabul city has been a huge problem. The government faces many difficulties in resolving this issue, which needs involvement from the people of Kabul, especially from informal settlements. Currently, they are not practicing proper waste management, and environmental pollution is a grave concern for the residents. Environmental pollution results from uncontrolled emissions produced by vehicles, domestic heating, brick kilns, lack of green areas, unacceptable waste disposal system, and lack of infrastructures (ACRFH, 2015). Improper waste management create serious health hazards and environmental impacts on inhabitants. Therefore, this study aims to assess the environmental impact of improper waste management systems towards the residents of informal settlements in Kabul, Afghanistan.

2.0 LITERATURE REVIEW

2.1 Waste Management

Waste management or disposal is a set of procedures and activities designed to handle the trash from its inception to its final disposal. It includes, but is not limited to, collection, transport, treatment, and disposal of waste and monitoring and regulation. It also includes the regulatory framework for waste management, including composting supervision. There are eight main components of waste management techniques: re-use of resources, livestock feed, recycling, composting, fermentation, landfills, incineration, and land use (Amasuomo et al., 2016). An integrated and proper waste management system can enhance soil fertility and crop production, as well as appropriately safeguard the biodiversity. It also reduces the cost of healthcare and creates employment opportunities and investment opportunities. The accomplishment of the SDG objectives is unfeasible without proper waste management (Andersson et al., 2016b). Waste is mostly generated through human activities (Maji et al., 2020).

2.2 Leading Factors to Improper Waste Management and Changes

According to Ferronato & Torreta (2019), a contiguous waste management system in a third-world country exhibits a range of challenges, including poor collection methods and inconsistent collection services, open waste dumping, and burning without consideration of air and water pollution. Technical constraints, financial constraints, institutional constraints, economic constraints, and social constraints are the factors that lead to failure in sustaining the waste management upgrading initiatives in developing countries.

2.3 Waste Management in Kabul city

Kabul city's waste-producing rate is around 0.31 and 0.43 kg/capita/day, and the amount of generated waste in a day reaches 1.702 tons in the city. Furthermore, 70% of the generated waste forms organic substances. Kabul city's solid stream is similar to the south Asian developing countries. The waste

stream in Kabul city contains a huge amount of organic material (around 70%) and an average specific weight of 445 kilograms per cubic meter (Azimi et al. 2020). Fig. 1 shows the similarity between the solid waste generation in Kabul city and several Asian countries. The informal settlements in Kabul city suffer from improper waste collection methods. The residents in these settlements dispose of waste everywhere they choose and make it a waste dumping point. Some households dump their waste in corners, the backyard, and streets instead of collection points that the municipality has specified. The lack of road accessibility, sanitation facilities, and inadequate infrastructure contribute to improper waste collection in informal settlements (Noori, 2017).

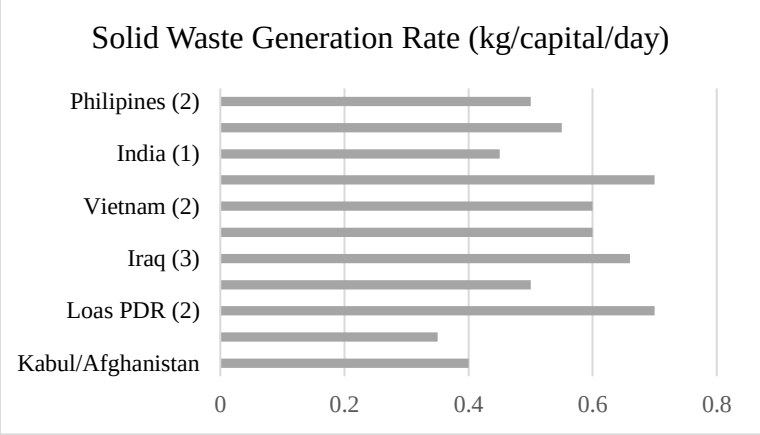

Fig. 1: Waste production rate in Afghanistan compared to Asian countries (adopted by Forouhar, 2012).

Moreover, UN-HABITAT (2015) reported an amount of 4500 cubic meters of waste-collecting every day, while the amount of waste generation in Kabul city is 6500 cubic meters per day. The remaining portion of uncollected waste belongs to the informal settlement. Narrow roads, lack of municipality capacity, lack of a proper plan, and unpaved streets, especially on hillsides, are huge challenges for the waste collection process. Fig. 2 shows the comparison of waste collection efficiency in different developing countries. From Fig. 2, it can be seen that Afghanistan has the lowest collection efficiency among the eight countries.

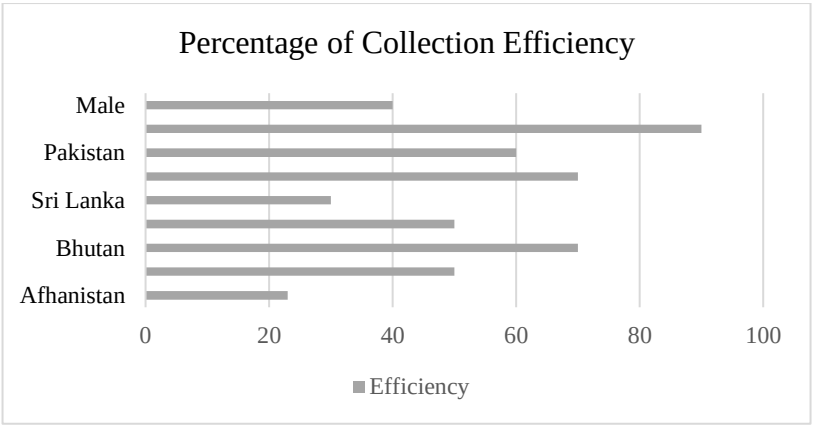

Fig. 2: Comparison of collection efficiency of developing Asian countries (Sahil, 2017)

2.4 Environmental Impacts Kabul

Environmental pressure results in environmental impacts, consuming natural resources (material,

energy, water, land) for human needs as input. Environmental pressures release particles on the output side (GHG emissions, waste, air, and water pollution). Environmental pressure causes changes in ecological conditions (Nguyen, 2019). Environmental changes lead to impacts on the social and economic functions of the environment, such as the availability of sufficient circumstances for health, access to resources, and biodiversity. Consequences frequently arise in the pattern: for example, primary effects like GHG emissions contribute to global warming, which increases the temperature as a secondary effect, in the end, mourning to loss of the natural ecosystem (Sala et al., 2019). According to Ferronato and Torretta (2019), concerning open-air final disposal, the main environmental impacts detected are unsightly environmental conditions, air pollution, unpleasant odour, greenhouse gasses (GHG) emission, diseases, and both underground water and surface water contaminants.

2.5 Impact Categories

Environmental assessment includes various categories of environmental impacts as the methodologies of Life Cycle Assessment (LCA) facilitate deliberation of the ecological effects of composition and consumption activities. Table 1 shows the environmental impact categories with brief explanations and victims of the impacts (Mcclelland et al., 2018).

2.6 Impact Victims

Many causes can be considered as environmental issues. The bad smell produced causes a contaminated environment, which bring unpleasant experiences to anyone.. According to the WHO (2018) report, more than 1 in 4 children's deaths under the age of years old are caused by unhygienic conditions. In 2015, 26% of the deaths of 5.9 million children resulted before their fifth birthday. Environmental impacts such as air pollution, water contamination, inadequate sanitation, second-hand smoke, and poor hygiene killed 1.7 children below 5 years old. WHO (2016) reports that women and children are at risk of household air pollution as they remain at home more than men do.

Table 1 The common categories of environmental impacts (adapted by Mclelland et al., 2018)

Impact categories	Brief description of impacts	Victims of impacts
Climate Change	GHG emissions change temperature and contribute to climate change.	Human and natural ecosystem
Biodiversity	A variety of plant and animal life in the world or a particular habitat is usually considered important and desirable.	animal species, endangered plants, and critical habitats
Acidification	It is caused by chemical substances which can damage water bodies	Natural ecosystem
Ecotoxicity	It caused by the presence of not degradable chemical substances	Human health and the natural environment
Eutrophication	It occurs by the nutrients and leads to algae blooms in water.	Natural Environment
Human Toxicity	The emissions from toxic chemicals and their impact on human health	Human health
Land Use	Increasing land use and land occupation, growing demand for land use.	Natural resources

Ozone Depletion	While photochemical ozone is produced at ground level, other ozone-depleting materials are led. Depletion of stratospheric ozone reduces the ability of the atmosphere to minimize dangerous radiation, in specific ultraviolet radiation, from space	Human health and Natural Environment
Photochemical Ozone Formation	Radiation from the sun and other chemical compounds arising from the incomplete burning of fossil fuels have harmful impacts on human health and agricultural production.	Human health and Natural Environment
Resource depletion	Biotic and abiotic resources like fossil fuel, electricity, water, etc.	Human and Natural Resources
Water scarcity	It occurs in situations where the absorption of freshwater exceeds the rating system, leading to water shortages.	Natural Resources

2.7 Importance of Environment Protection

The protection of the environment is a global issue. Humans, plants, and animals are part of delicate, interrelated environments. By harming one part of the ecosystem, the health of the other components is at risk. Today, we face the obstacle of stopping ecological degradation and preserving environmental sustainability. Sustainable development aims to improve the negative effects of environmental pollution, considering the need to meet current generation needs while at the same time maintaining the vitality of environmental influences for coming generations. The assimilation of the environment into the policy of the European Community is the major way to ensure sustainable development (Chu and Karr, 2017).

3.0 METHODOLOGY

3.1 Study Area

This study focused on the 8th district of Kabul city located in the southeast of the city centre, as shown in Fig. 3 and 4, boundaries of Kabul Municipality districts, and the study area's location specified highlighted in red. Most of the areas here are unplanned. As the population has increased rapidly, farmlands have been converted to residential areas, and in 5-10 years, illegal housing around hill slope areas is foreseen to be developed.

Fig. 5 shows the map of the 8th district of Kabul city. Residents of various ethnic backgrounds live in the 8th district. Approximately 45 percent of the district inhabitants are Pashtuns, 35 percent Tajik, and the remaining consist of Hazara, Turkman, Uzbek, and some other ethnicities. The area, consisting of 22 districts, is situated in the west-eastern part of Kabul. It has an area of 48.7 square kilometres. The total population is estimated at 215,000 individuals (IWA, 2016).

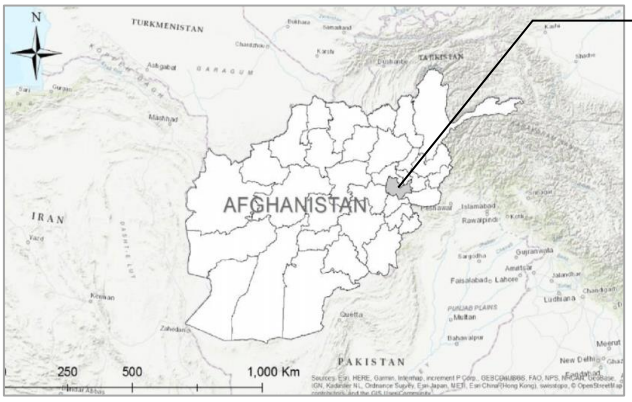

Fig. 3: Afghanistan province boundaries (MUDL, 2015)

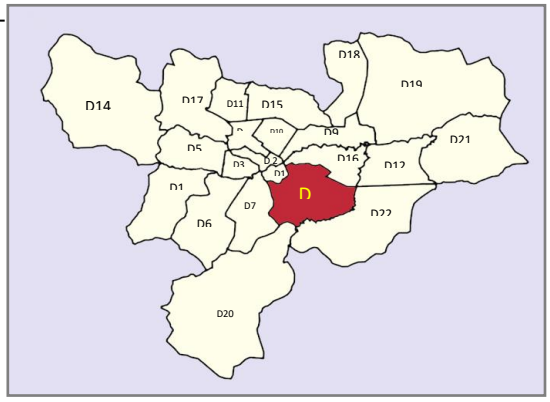

Fig. 4: Kabul city district's boundaries and location of the study area

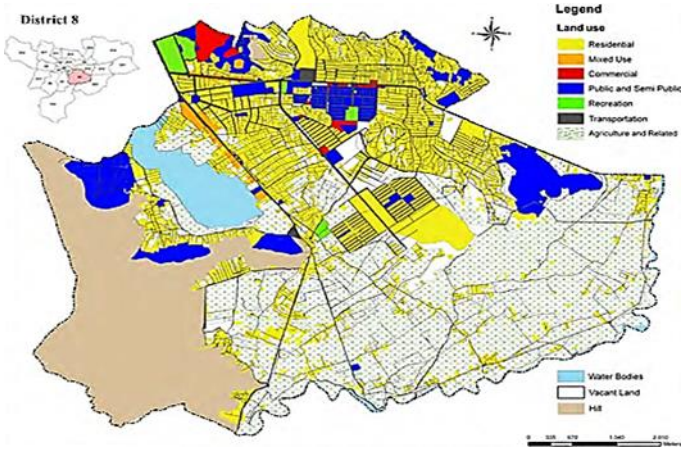

Fig. 5: Map of 8th district of Kabul city (JICA, 2015)

3.2 Data Collection - A Selection of Respondents

The qualitative method for data collection was employed in this research. The primary data collection was done through direct observation of the physical environment and semi-structured interviews with governmental officials or waste management stakeholders. Secondary data were collected by reviewing related documents. Structured direct observation, or in other words, observational study (Holmes, 2013), is conducted in real situations. This approach allows the researcher to obtain the meaning and significance of what people are saying and doing. Most research in waste management has used this as the research approach. This data collection method requires the researcher to go to the field and physically witness and gather accurate data using the information checklist.

Kabul Municipality is responsible for managing the waste management system in Kabul city and controlling the city's development encompassing informal settlements. In addition, the National Environment Protection Agency Afghanistan (NEPA) is accountable for environment protection, and the Ministry of Urban Development and Land Afghanistan (MUDL) is the agency managing urban development in the country. Interviews with responsible stakeholders were conducted in a

semi-structured format. The interviews were conducted through meeting appointments set with the selected respondents in their offices. Through this method, the expert feedback of the respondents was gathered and analyzed.

These interviews took place using the local language (Pashto and Dari). The recorded interviews were then transcribed and translated into English. According to (Gale et al., 2019), thematic analysis in a qualitative study is a prominent means of analysis. Interview transcripts were analyzed and put according to themes and categories. As evidence, the interview data were transcribed verbatim and compared with the notes taken and photos from site observation. Each interview transcription was coded thematically to reveal pertinent and developing themes. These transcriptions were manually analyzed and organized to explore themes, concepts, and the relationship between data.

3.3 Data Analysis

3.3.1 Interview Analysis

Template or keyword coding analysis is widely adopted as the analytical approach in qualitative studies. After conventions of template analysis, keyword codes were generated, and the identified themes were represented in the textual data (Guest et al., 2020). Codes are contemplated with three distinctive levels of themes (Eusofe & Evdorides, 2017).

T x P x L *Where*

T = Transcription Module
P = Pages
L = Lines

The template is divided into three levels: Level 1, the highest level, identified as the macro level, encompass the main themes, Level 2 includes the key component of the main criteria (themes), and Level 3 provides detail of the components in level 2. Purposive sampling was used in this research to select participants for focus interviews. The stakeholders of waste management and environment who participated in the interviews were the main stakeholders within the study area who provided relevant information to answer the research questions. Details of the interview sessions are shown in Table 2.

Table 2 The common categories of environmental impacts (adapted by Mclelland et al., 2018)

Name	Designation	Department/ Organization	Venue	Date and Time
Respondent-I	Director of Sanitation Services	Kabul Municipality Afghanistan	Kabul Municipality Deh-e-Afghanan Kabul Afghanistan	16/01/2020 10:00am 10:45am
Respondent-II	Deputy Director-General – Technical Affairs	National Environmental Protection Agency- NEPA	Darul-Aman sanatorium road، F4G9+FP Kabul, Afghanistan	18/01/2020 2:15pm 3:25pm
Respondent-III	Head of Engineering and Architectural System Development	Ministry of Urban Development and Land	3rd Makro Ryan Road Kabul, Afghanistan	03/02/2020 10:30am 11:20 am

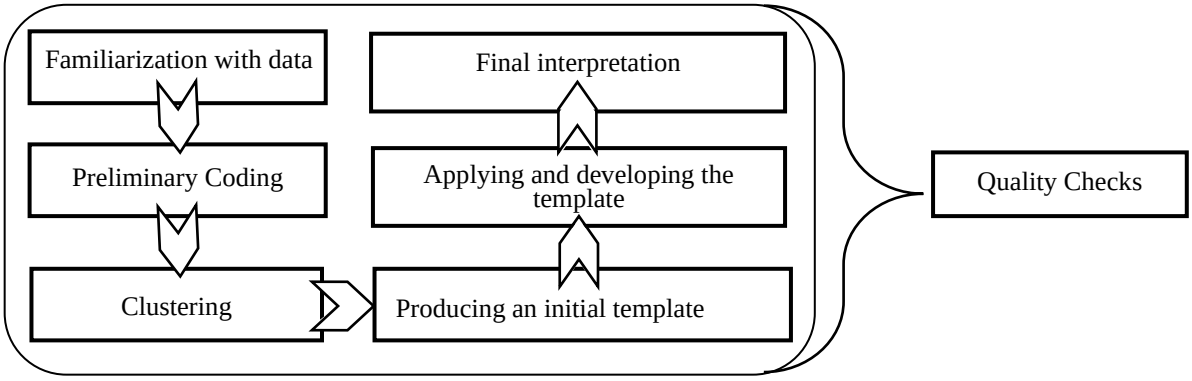

Fig. 6: Typical process of qualitative data analysis (King & Brooks, 2017)

3.3.2 Observation Analysis

The results obtained from the observation and interviews will describe the waste management situation, challenges with the informal settlement, and environmental impacts of waste on residents, which will explain the meaning of the themes. Interview surveys were transcribed verbatim and compared with field notes, and photos from site observation were used as evidence of the waste management situation. The typical sequence of analysis steps shown in Fig. 6 guided the researcher to find the direction of data analysis and facilitate the validation of information accuracy (King & Brooks, 2017).

4.0 RESULT AND DISCUSSION

4.1 Current Waste Management Situation and Challenges

This section discusses the current waste management problems in the study area, including leading factors of improper waste management, inappropriate infrastructures, waste disposal, waste burning, waste collection, and waste transportation. The explanation of each term is as follows:

Table 3 Theme 1- Current waste management situation

Themes	Level 1	Level 2	Level 3
Current Waste Management Situation	−Lack of policies, laws, equipment, facilities, infrastructure, a proper plan, budget, and expert staff. −Poor road accessibility	−Poverty. −Lack of public awareness and contribution. −Not paying the waste fee. −No regular waste collection	−Open dumping of waste. −Waste burning in open spaces. −Existing waste on streets and corners −Poor waste disposal

4.1.1 Leading Factors of Improper Waste Management

Among the leading factors of improper waste management in the 8th district of Kabul city mentioned by the respondents were lack of proper waste management and environment protection systems, the rapid growth of population, uncontrolled development of the city, and poverty. Moreover, all respondents concurred that the laws and policies in Kabul municipality were not comprehensive enough to ensure proper management. Almost all municipality laws and environmental protection policies are prepared without considering their implementation in the country and copied from other countries that need to be updated. Weak urban governance and lack of professionals or experts are

the significant factors that lead to improper waste management in the study area. The existing municipality law and environmental policy were general and not focused on current issues. The citizens are also not acting responsibly within these laws.

Informal settlement in the 8th district of Kabul city suffers from inadequate basic infrastructure. These settlers were poor and were not educated on the bad effects of improper waste dumping. Adding to this, Kabul Municipality has a low technical capacity and a lack of policy in waste management. They also do not collect the waste regularly. The waste production increased parallelly with development, and environmental issues resulted in more streets being covered by garbage. The government has realized this issue and established a comprehensive policy and regulation with international institutions. Despite this, respondents say that the policies and procedures are not workable because they were not developed based on the context of Kabul City but copied from other countries. The government is still working on improving and customizing it into a suitable framework for waste management in Kabul city.

Moreover, the problem with enforcing a proper waste management system in informal settlements is that its residents are the people who have moved from rural areas to Kabul city or those who have returned from neighbouring countries. There are a variety of cultures and lifestyles. The outcome of an interview with the National Environmental Protection Agency has found that the weakness of urban culture among informal settlement residents has also affected waste management. Residents lack understanding of laws and inability to comply with environmental rules. They were very irresponsible in protecting the environment. Throwing away waste in inappropriate areas results in several health issues for the community.

4.1.2 Inappropriate or Inexistence of Adequate Infrastructure

The basic infrastructure such as water supply, drainage, sewerage, and pollution control in the human settlement provides environmental services known as environmental infrastructure (EI). A broad network of water supply pipes, sewage pipes, and septic tanks are also part of the ecological infrastructure. The outcome of this study showed that one of the primary waste management problems was the inexistence of infrastructure in the study area. Gray water such as wastewater from kitchens or baths was directly discharging into open drainage canals in the streets, which had already become clogged by solid waste.

All respondents consented that inexistence infrastructures and services have badly affected the environment. In informal settlements, land use has been developed without proper planning standards. In addition, techniques and planning regulations that will ensure necessary infrastructure and services are available were disregarded. Water pipe, sewage pipe, and septic tanks that are compulsory to manage the sewage from household to disposal points were absent. This scenario contributes to the surface and underground water contamination in the study area shown in Fig. 7.

Fig. 7: Inappropriate infrastructure and narrow streets (field observation)

During the interview session, the Ministry of Urban Development and Land revealed that Kabul Municipality, in cooperation with national and international agencies, had implemented the KMDP project in several areas of Kabul city. The project aims to upgrade the informal settlements in the area. It also emphasizes infrastructure, streets, and housing, as most urban developments in Kabul city were not developed according to the master plan, so the government is focusing on an informal settlement upgrading program. The main upgrading intermediations were street paving and the construction of drainage facilities aimed to upgrade the physical condition of the area. All houses in the area were electric-powered (Nazire et al., 2016). UN Habitat (2016) and Ellis and Roberts (2015) reported that the city government is facing problems with its capacity to maintain rapidity in delivering public services and infrastructures to residential areas due to rapid and uncontrolled urbanization. In addition to the challenges of transportation, drainage or sewage, inadequate open spaces, narrow roads, and restricted pathways, informal settlements suffer from poor environmental quality. Furthermore, Amiri and Lukumwena (2016) confirm that scarce financial resources and rapid growth of informal settlements have resulted in inadequate upgrading of environmental infrastructure in Kabul city.

4.1.3 Waste Disposal and Waste Burning

Poor waste disposal is another effect of improper waste management on the environment apart from inadequate infrastructure. All respondents agreed that different types of waste generated by households and an unsustainable disposal manner could have an unpleasant impact on the environment and the residents. The majority of the respondents mentioned that there had been no proper plan to manage waste. There is no regulation imposed on the residents and parties that dispose of garbage irresponsibly and recklessly. The respondents from the Directorate of Sanitation revealed that despite the inexistence of a proper plan and insufficient infrastructure, lack of public awareness is another reason for poor waste disposal.

The residents do not consider improper waste practices as an environmental issue. Settlers gather around and burn waste during winter to heat their houses. It contributed to air pollution by releasing smoke into the air. The respondents from Decorate of Sanitary believed that this is the main contributor to air pollution in Kabul city. The homeless people also burn waste openly, although the number has slightly reduced recently. Getahun et al. (2012) reported that sanitary landfilling is the least favoured option compared to open dumping and is most practiced in many least developed

countries and regions. For example, 51% of households in Jimma (Ethiopia) dispose of their waste in open dumps, refuse pits, or backyards. Jager and Kok (2016) state that the dumping of garbage in open spaces and public places resulted from improper waste management and inadequate collection of waste by the local authority. It has led to the spreading of illnesses and diseases directly related to uncontrolled waste disposal.

4.1.4 Waste Collection and Transportation

During the interviews with all authorities, it was revealed that residents in several settlements' areas had begun to adopt community-based rubbish collection. They have come up with employing a person to collect waste from houses. Nevertheless, most informal settlements, including the 8th district of Kabul Municipality, are still experiencing uncontrolled and random waste collection. The municipality workers need to collect waste from dumping points and containers and transfer them to the dumpsite or Gazak Landfill outside the city. However, NEPA (National Environment Protection Agency) believes that Gazak Landfill is a sanitary landfill since various types of waste are being buried underground and pressed by machines. But still, garbage and rubbish can be seen on streets, corners, and roadsides as people do not dispose of their household waste in dustbins or the places specified by the municipality. The Department of Sanitary confirms that most children and elderly persons are waste disposers. They also created open dumpsites whenever they felt like it.

Both NEPA and the Kabul Municipality concur that garbage sorting and segregation are not practiced in Afghanistan, particularly in Kabul. The local government did not supply any recycling bins or containers. As a result, plastic garbage, paper waste, food waste, glass, iron, diapers, ashes in the winter, and other non-usable materials were all thrown together. This issue and problem need to be managed appropriately to reduce the negative effects of waste on the environment and residents' health. Government should promote the 3Rs approach to decrease waste generation and facilitate waste management properly. The respondent from NEPA explains that there are three landfills (dumpsites) in the city named i) Kampani dumpsite, ii) Bagrami dumpsite, and iii) Gazak landfill. The Gazak Landfill, on the other hand, is not a proper sanitary landfill because it still serves as a dumpsite. Even though the Department of Sanitary expresses that they have improved waste management in the 8th district of Kabul Municipality by providing vehicles, equipment, and increasing municipality workers and sweepers, according to Khoshbeen et al. (2020), landfills in Afghanistan are not being managed correctly. When it rains, rainfall flows into the groundwater system, which feeds wells near Kabul's Kampani landfill, contaminating drinking water.

The respondent from Kabul Municipality explains that street and road inaccessibility in an informal settlement is a crucial problem for waste collection and transportation. It contributes negatively to both waste and environmental management in Kabul city. Their streets and roads were very narrow because informal settlements were not built according to a predetermined blueprint. Due to this, it was impossible to access these areas using trucks. This situation caused the need for man-handling waste from households in the area. Mizero et al. (2015) stated that lack of funding was one of the reasons for low collection levels in the least developed countries. Resulting in either an inadequate number of collection vehicles or, where collection vehicles are present, they suffer from poor maintenance, frequent breakdown (punctured tires, lack of fuel), and are frequently out of service.

Lack of proper waste management planning is shown in Fig. 8a, showing that Kabul Municipality does not collect the waste regularly, and there are many depots of waste along streets and roadsides.

While this is an issue for the residents who need a suitable and comprehensive solution, Fig. 8b shows that Kabul is practising open waste disposal. The lack of dust bins is a severe challenge for waste management, negatively impacting both the environment and human health. The result from the interview with NEPA and findings from field observation indicates that there are only a few overflowing waste collection containers and bins in the study area. Residents need to walk quite a distance to reach a collection site because of inadequate collection points. As a result of insufficient space and road access for waste trucks, waste is thrown on the streets.

Fig. 8: Poor waste disposal in the study area (field observation)

4.2 Environmental Impacts of Improper Waste Management

The environmental impacts of improper waste management on informal settlements are in terms of health, social stress, and physical appearance of the study site, including water and soil containment, air pollution, health, and social problems.

Table 4 Theme 2 – Environmental impacts

Theme	Level 1	Level 2	Level 3
Environmental Impacts	− Lack of education and information about health and the environment. − Poor sanitation and the inexistence of facilities and environmental infrastructures − Direct access of children into polluted areas − Wastes in streets and open spaces	− Uncontrolled waste disposal and open spaces burning. − Open transportation of waste − Blockage of drain and sewage canals. − Greywater streams into streets and slug	− Negative effects on health and economy of residents − Different respiratory and amoebic diseases create social stress and depression − Smelt awful − Air pollution and contaminated water − Eliminates plants and green spaces

4.2.1 Water Pollution and Soil Containment

The Department of Sanitary confirmed that most of the children and elderly were the groups that disposed of waste. They tend to throw it anywhere they wish. Fig. 9 shows an example of a child that might not be aware and did not care about throwing garbage properly. Eventually, it became a trash depot within a few days since the residents had chosen it as an open dumpsite.

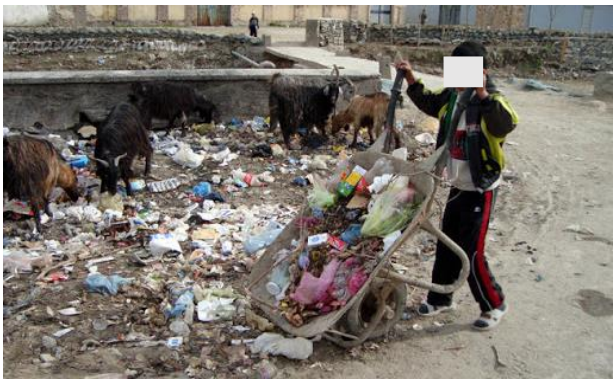

Fig. 9: Poor waste disposing of practice involving children or youngsters

According to WHO (2016), inadequate access to water and sanitation is another significant risk factor for environmental health, leading to increased diarrhea disease. In Afghanistan, diarrhea diseases are responsible for an estimated 10,000 deaths per annum and 2,971 Disability-Adjusted Life Years (DALY) per 100,000 people, mainly children under 5 years old. The increasing improperly managed amount of waste in Kabul city has caused air, water, and soil contamination, resulting in serious health threats for Kabul inhabitants (Yosufi, 2019).

4.2.2 Air Pollution

Kabul Municipality concurs that residents of informal settlements burn waste for house heating in winter and emit greenhouse gases (GHGs) which significantly impact the environment and contribute as the main factor in outdoor and household air pollution. The residents explained that waste burning is a common practice. Due to this, serious air pollution is a potential concern in Kabul city because the GHGs are continuously being released into the atmosphere. During the observation, it was discovered that the open burning of rubbish was a minor and unimportant problem for the research area's population. However, waste burning for house heating was a significant challenge for the residents. Plastics and other waste products were collected from the dump and burned to heat buildings during the winter, releasing smoke and pollutants, posing a major health concern. Rubbish burning pollutes household air and creates foul odours as well. It is common for waste to be burned in informal settlements due to poverty and a lack of public awareness. This practice is harmful to the health of women and children in the household as it involves improper waste disposal without sanitation rules consideration Fig.10 shows waste burning practices. It shows the lack of awareness and weak economic condition of the household.

Fig. 10: Waste burning practices in open spaces and households.

Residential open burning happens mostly due to inaccessibility and lack of collection, making it especially hazardous in impoverished homes in developing nations that fail to capture even half of the total municipal garbage created. In developed countries, the waste composition is mostly organic

waste, which contributes to 64% of waste in low-income countries. This characteristic of open burning is unsustainable, and no initiatives are done to mitigate the health and environmental impact of the burning (Cogut, 2016).

4.2.3 Public Health and Social Stress

The potential risk to the environment and health of informal settlers in Kabul city comes from improper waste management. Although the whole population within the study area are at risk, direct health risks are primarily a concern for children and women in the study area. Children use streets with existing waste and blocked drainage canals for recreation due to the extreme lack of public infrastructures such as parks, playgrounds, open spaces, etc. Furthermore, poverty is a leading factor for children's health risk, and the economic situation of the residents is very low, ascribed to those children gathering materials that can be sold in the market from waste dump sites to support their families.

On the other hand, the winter session in Kabul city is very cold. They gather waste to burn it in winter for house heating. Children are not aware of the risks to their health and environment; mostly, waste disposal is done by children. Children's involvement in mixing waste at dumping sites is a serious threat to their health. The risk of injury and infection is also high because of this activity, as children are more vulnerable to these pollutants. Municipal waste workers and scavengers are at risk of injuries and health. Waste material and objects can pose harmful infections of pathogens to these groups of people who have direct access to the waste dumps. During field observation, it was obvious that negative environmental effects on the appearance of the children and the residents of the study area were noticeable.

Deaths caused by environmental risks constitute 26 percent of all deaths in Afghanistan. Household air pollution (HAP) is the world's single most imperative risk circumstance for environmental health. HAP is estimated to cause more than 27 000 deaths per year in Afghanistan, while Ambient Air Pollution (outdoor) causes more than 11 000 deaths per annum. HAP is a particular risk for women and children since they remain at a longer period at home than men (WHO, 2016). The extensive use of plastic continues in Kabul. According to Yosufi (2019), this city has converted into a waste can. People have no desire, and any shopping must offer plastic bags, regardless of whether they are only buying small items or items in large quantities. The citizens of Kabul do not take better care of their environment and do not manage waste carefully.

6.0 CONCLUSION

A polluted environment has negative impacts on residents of informal settlements. The study found that waste collection and transportation in the 8th district informal settlement were highly difficult since residents have to walk a long distance to dispose rubbish. Waste burning for house heating and open spaces contributed to outdoor and household air pollution. Poor waste management has degraded the environment, resulting in spoiled beauty, foul odours, polluted water in streets, the spread of diseases, social stress, and destroying plantations. This resulted from the placement of trash in green spaces and the contamination of graywater in canals and drains. The septic tanks and polluted surface water harm the drinking water. Thus, people in the research area had been using water from contaminated wells. This study emphasizes how improper waste management creates environmental and health issues since poverty in the community and residents are not well-aware of environmental protection. It was seen that the municipality is struggling with a lack of budget, technical capacity, and the inexistence of well-developed policies and regulations to ensure proper

waste management and a sustainable environment in Kabul city, mainly in informal settlements. Therefore, this study concludes that some factors are known for the negative effect of improper waste management in Kabul city, which includes poverty, lack of education, poor road accessibility, poor waste management situation and challenges, insufficient infrastructure, ignorance of sanitation, and ineffective efforts by both municipality and community. These factors negatively affect the study area, and it is realized how environmental issues of waste management can create health concerns for the resident of Kabul city.

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