NEAR EAST UNIVERSITY
INSTITUTE OF GRADUATE STUDIES
DEPARTMENT OF ENVIRONMNETAL ENGINEERING

ENVIRONMENTAL HEALTH IMPLICATIONS ON SOLID WASTE MANAGEMENT IN SOMALIA

MSc. THESIS

ALI MUSE ABDI

Nicosia

JUNE, 2022

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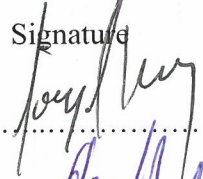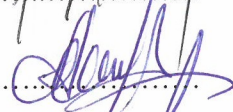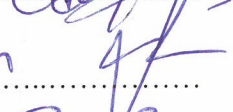## ALI MUSE ABDI

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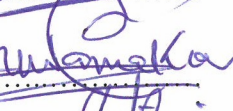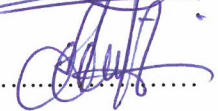**Assoc. Prof, Dr. Fidan ASLANOVA**

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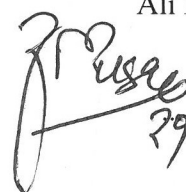
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Declaration

I hereby declare that this thesis is representation of my pure research work so that I declare I am the author of this thesis under supervision of (Dr. fidan aslanova) as far as I know this thesis contains no materials priory published apart from where references made clear and cited and I take full responsibility if found validation problems according to basic rules

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Acknowledgments

Abstract

ENVIRONMENTAL HEALTH IMPLICATIONS ON SOLID WASTE
MANAGEMENT IN SOMALIA

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MA, Department of Environmental Engineering

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Solid waste management involves collecting, treating, and disposing of non-usable solid material. Improper garbage disposal may lead to unclean conditions, environmental pollution, and outbreaks of rodent- and insect-borne diseases, despite the fact that everyone who is questioned will be touched in some way by the consequences of inadequate solid waste management, interviews will only be conducted with representatives of civic organizations (I), health care professionals (II), and environmental agencies (III). The research will also investigate the influence of solid waste on health and environmental degradations. In addition, since improper disposal of waste has the potential to have a substantial adverse effect on the health of community members, this aspect of the problem will be explored. Methods deployed were that around 250 individuals of leaders and health workers from Mogadishu participated in interviews between February and April of 2022. The English interviews of a random sample of the community members were then translated into Somali and Bantu. The major benefit of this technique is that research participants are chosen at random without any subjectivity or prejudice from field staff. Using a lottery, the residential communities were selected at random. Within each neighborhood, random houses were chosen for interviews. Data were entered into an Excel spreadsheet before being imported into SPSS 11.0 for Windows. Graphs and charts were then created to show the results of the study, inclusion since there are not enough resources or adequate infrastructures, not all of this rubbish gets collected and carried to the final dumpsites where it will be disposed of. This is because there is not enough of either. At this level, poor waste management and disposal may have the potential to have major detrimental consequences on the health of the ecosystem that is nearby. There is a potential for infectious diseases to spread throughout the community and put the lives of individuals as well as the lives of their families in jeopardy if their garbage, which includes human faeces in

addition to liquid and solid waste from homes and businesses, is not handled in an appropriate manner, the reliability of the results and feedback of the respondents was excellent as anticipated based on the level of the education and experience towards the field I believe that the result is well reliable up to (90%) and can be really use for future references, where p-values is less than 0.05.

Key Words: Waste, Health, Implications, Environment, Recycling, solid waste water borne diseases.

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List of Abbreviations

UNHCR:	United Nation High Commission of Refugee
GIS:	Geographical Info System
UNEP:	United Nation Environmental Programme
IMF:	International Monitoring Fund
GDP:	Gross Domestic Production
MSWM:	Municipal Solid Waste Management
MSW:	Municipal Solid Waste
USPHS:	United States Public Health Services
WHO:	World Health Organisation
VOC:	Volatile Organic Compound
KM, KG:	Kilometres and Kilogram
NOX:	Nitrogen Oxides
SOX:	Sulphur Oxides
F.U:	Fixture Units (For Drainage)
NH3:	Ammonia
US:	United States
ECO:	Ecosystem
MCQS:	Multiple Choice Questions

CHAPTER I

Introduction

Problem Statement

Waste resources conservation, recycling, improved waste storage, and collection have never been adopted due to environmental regulations and growing public involvement. It is estimated that developing countries spend between 20 and 40 percent of their municipal budgets on trash management, yet are unable to keep up with the magnitude of the issue, This is due to a number of causes, including a rising population, an urbanized population, and a growing economy, In Somalia, all types of rubbish, whether solid, liquid, or otherwise, are disposed of in the same way and at the same places. Instead of separating hazardous and nonhazardous waste, all garbage from big cities and towns is dumped in gigantic pits several kilometres away, which is not ecologically beneficial. Outside the municipal limits, tankers collect and dispose of wastewater. In the meanwhile, hazardous waste is being produced in Somalia, and international companies have been seen dumping it on the shore. Somalia has received aid from friendly countries and international organizations in monitoring and controlling solid waste until the government is able to do it alone. Due to the country's tumultuous history, particularly in the preceding quarter century, solid waste management is a growing concern in all metropolitan regions. These include the capital city of Mogadishu and a number of neighbouring cities, including Hargeysa, Burao, Bossao, Garowe, Berbera, and Kismayo. Because the Somali government was absent from international conferences on environmental health and waste management, Somali citizens were unable to participate. The purpose of this research is to determine what impact environmental health has on the nation's system for managing solid waste.

Aim and Objectives of This Study

The purpose of this master's thesis is to learn why and how waste management is ignored in Mogadishu, Somalia, which is a developing country, as well as to investigate the influence of solid waste on health and environmental degradations, and to determine what is required for environmentally conscious conduct. The research will also investigate the influence of solid waste on health and environmental degradations. In addition, since improper disposal of waste has the

potential to have a substantial adverse effect on the health of community members, this aspect of the problem will be explored.

The second objective is to evaluate the extent to which environmental health factors affect Somalia's solid waste management.

The third objective is to determine the extent to which environmental health factors have an effect on Somalia's population.

To provide a description of the physical environment in Somalia (Mogadishu)

To enhance and protect public health in Somalia by reducing the dangers posed by the environment

Main Focus

Despite the fact that everyone who is questioned will be touched in some way by the consequences of inadequate solid waste management, interviews will only be conducted with representatives of civic organizations (I), health care professionals (II), and environmental agencies (III). In order to achieve this goal, there will be an examination carried out to determine the level of knowledge had by these organizations about the administration of solid waste and the potential risks to one's health that are related to the inappropriate disposal of garbage. This research will focus on solid waste and any potential adverse effects it may have on human health; environmental problems will be addressed when they become apparent.

Brief background of Somalia

Somalia has been delayed by brutal conflicts and instability for more than three decades, requiring the development of a functioning central government, flooding seasonal rivers continue to wreak havoc on the region's livestock and agricultural land, claiming lives and wreaking havoc on residents' livelihoods. Additionally, over a million Somalis left the nation in search of food, water, and shelter (UNHCR, 2012). The environment has a significant effect on global politics, the global economy, and human life. Environmental deterioration has now reached global dimensions, necessitating a worldwide response on all fronts: ecological,

economic, and political. As a result, the word "environment" has grown to include "all that surrounds the planet, alive and nonliving." The most prominent aspect of an organism's shape with which it interacts or is influenced to comprehend how organisms interact with one another and with their environment, it is critical to differentiate between biological and non-biological variables. Investigating the environment entails examining the interactions between all of these many components. Elliott and colleagues conducted research in 2010 Global climate change, which is a source of climate change, is similarly one of the world's most significant environmental challenges today.

Figure 01

Map of Somalia showing study area selected developed in Geographic info system (GIS)
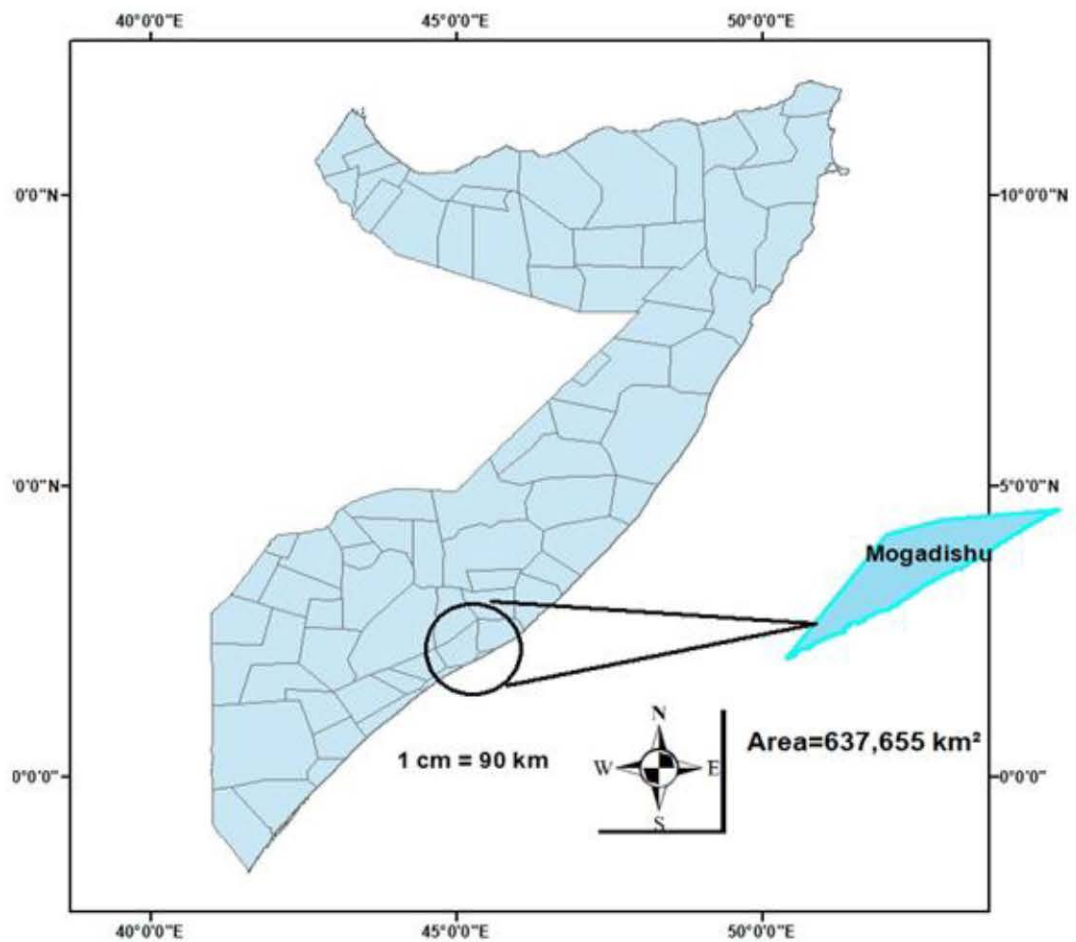
The Contamination has been related to a variety of adverse effects, including human health problems, ozone layer depletion, biodiversity loss, and a rise in industrial and urban garbage, to mention a few. Human activities and influence are causing unprecedented levels of environmental change, jeopardizing our good intentions. According to some analysts, environmental repercussions and the hierarchical structure are the fundamental sources of sustainability concerns. However, in order to ensure safety, the whole of a person's environment must be assessed (Graeber, 2015). Pollution is a significant contributor to the majority of illnesses in poor nations. Thus, a healthier environment results in improved public health, which helps in the fight against poverty. Ecosystems are increasingly stressed as a consequence of population increase, economic development, and rising disparity of income. Poverty and political upheaval have a destructive impact on the natural environment in the majority of developing nations. For whom already in poverty, environmental degradation exacerbates their predicament by increasing their reliance on the natural environment for existence (Elliott, et al, 2010). Numerous human activities, such as habitat destruction and illegal dumping of hazardous substances, are degrading the natural environment for future generations worldwide. Waste management and city planning are intricately intertwined when rubbish is collected. The city's architecture and its inhabitants are two sides of the same coin. Nonetheless, municipal planners' involvement in wastewater treatment has historically been restricted to environmental concerns, with a special emphasis on the location of the facility (Farhan and Murray, 2006). Waste production management is frequently referred to as the "tail end" of socioeconomic activity. Garbage management projects have been so focused on eliminating rubbish from the environment that they have neglected to investigate the underlying causes of trash creation and the whole life cycle of trash products and materials.

According to predictions, the world's population would top 7.2 billion people by 2015. 2005a, United Nations Environment Programme (UNEP). Urbanization is also a role, with two-thirds of the world's population anticipated to live in cities by 2025. Each day, around 150,000 people are added to the urban populations of emerging countries (UNDESA, 2005). Numerous environmental problems may occur as a result of unregulated and unplanned urbanization, including encroachment on public space and riverbanks, contamination of the air and water, and the

generation of rubbish (UNEP, 2001e). Municipal solid waste (MSW) is the most complicated waste stream, in comparison to the more homogenous waste streams generated by industry or agriculture (Wang and Nie, 2001). When people's spending patterns shift even little, communities find it more difficult to regulate waste types and amounts. For example, during the same time period, India's population grew by 49 percent, while MSW grew by 67 percent (UNEP, 2001c).

Growing Waste in Productions

According to the World Bank, the amount of garbage that is produced around the globe is growing. In 2016, urban areas all over the globe generated 2.01 billion tonnes of solid trash, which is equivalent to 0.74 kilogram of garbage per person, every single day. As a consequence of fast population growth and increased industrialization, it is anticipated that annual waste output would increase by 70 percent from the levels seen in 2016, reaching 3.40 billion tonnes by the year 2050. The urban poor in developing nations are hit harder by unsustainable waste management than the rich in developed countries are. This is especially true in emerging countries. In nations with low per capita wealth, the great majority of garbage is either dumped in landfills that are inadequately managed or burnt in the open air. They have a sizeable bearing on matters pertaining to health and safety, as well as the environment. Garbage that has not been cleaned in any way provides a breeding ground for disease vectors, contributes to anthropogenic climate change via the emission of methane, and may even lead to urban violence.

Growing waste levels would not be a problem if rubbish were considered a resource and disposed of in an appropriate manner" (UNEP, 2001e) (UNEP, 2001e). There are several ecologically superior alternatives to burying solid waste, such as incineration with the creation of electricity, composting of organic waste, and material recovery via recycling. One of the most common ways that people dispose of solid garbage is by burying it. Composting is being researched in many parts of the world, the majority of which are developing nations (especially in the tourist and agricultural sectors) where waste streams include at least 55% organic matter. Furthermore, incineration for the purpose of energy recovery may be a costly capital investment for the majority of communities in developing nations, may pose social and environmental health risks when improperly used (for instance, burning

hazardous wastes produces harmful air pollution), and may have a negative energy balance that is lower than what is achieved through recycling (Oliveira and Rosa, 2003). (Oliveira and Rosa, 2003). This study focuses on recycling as a long-term strategy for diverting the most municipal solid waste (MSW) from landfills. It places more of an emphasis on urban and peri-urban regions in developing countries as opposed to rural areas, and it draws parallels with MSW from wealthy nations. Recycling is seen as an effective strategy for diverting the most MSW from landfills.

In addition, sustainable MSWM would not result in a decline in living quality as a consequence of lost economic possibilities or adverse effects on society, health, or the environment (Mihelcic et al., 2003). The following is a list of the specific goals that the research aims to achieve: Consideration is given to previously conducted research on recycling practises and attitudes in both the first and third worlds, as well as the following steps: assessing MSWM in developing countries by identifying recycling barriers and incentives, as well as key factors affecting sustainable MSWM; and establishing relationships between factors to comprehend the collaborative nature of sustainable MSW recycling and recuperation. quantifying the generation, composition, and recovery of municipal solid waste; assessing MSWM in developing countries by identifying key factors affecting sustainable MSWM; and The fact that such research is being carried out in such poor nations as Mexico and China is all the more remarkable when one considers that both of these countries are now undergoing economic and social advancements that are not often connected with underdeveloped nations. It's possible that the more developed parts of China, like Hong Kong and the other cities along the coast will have a positive impact on the country's more rural interior. Mexico is considered a developing country by the International Monetary Fund (IMF), despite the fact that its GDP points to a mature economy (CIA, 2004). (CIA, 2004), According to the forecasts, developing countries like China and Mexico are doing research on a level comparable to that of more industrialized nations.

On the other hand, identifying waste issues and their causes, defining rubbish, and evaluating waste operations are all practical aspects that have a direct impact on MSWM institutions and components. In Nairobi, Kenya, for instance, a study was done to investigate public knowledge and attitudes about the causes of ineffective

waste management and possible solutions to these problems. Ninety-three percent of respondents named solid waste as a source of concern, however fewer than thirty percent mentioned the lack of recycling. Forty percent of respondents advocated standardizing and promoting recycling, as well as encouraging businesses to invest in

Recycling (Mwanthi et al, 1997)

Figure 02

Open dumpsite showing animals feeding waste (https://dlca.logcluster.org/)

Disposal Techniques

It is hazardous to the environment and for human health to dispose of municipal solid waste (MSW) in ways that do not conform to rules. Surface and underground water systems are polluted when rubbish is disposed of inappropriately. During the rainy season, MSW clogs public drains, causing an insect outbreak. City pollution is exacerbated by inefficient incineration and uncontrolled municipal solid waste burning. Landfill leachate pollutes the soil and nearby waterways when organic waste decomposes. People's health and safety might be jeopardized if MSW management is not done correctly. Poisonous insects and rodents are drawn to the waste because of its foul stench. A person's health might be jeopardized if they use dirty water for drinking, irrigating their lawn, or bathing. According to the USPHS, MSWM deficiency has been linked to the development of twenty-two distinct human diseases and syndromes. Garbage collectors and other labourers in developing

nations are particularly vulnerable to the harmful health effects that may come from exposure to hazardous trash and medical waste. In waste zones, three health dangers are present: exhaust from pickup trucks, dust from landfills, and open trash burning. Many individuals are ready to contribute towards environmental improvements in low- and middle-income nations where sanitation is an issue (Rathi, 2006; Sharholy et al. 2005; Ray et al. 2005; 2003; and many others stated that accurate information in these areas is required to monitor and oversee current waste management systems and make regulatory or financial decisions). In low- and middle-income nations, many citizens are ready to pay for environmental improvements (Rathi, 2006).

Solid Waste and Healthcare

In contrast, hospital waste management is a significant worldwide concern. When medical waste is improperly disposed of, it poses a threat to the local population and the environment. Inappropriate clinical waste management has been connected to the spread of dangerous diseases such as hepatitis B, C, and HIV. There is strong doubt that inappropriate healthcare waste control poses a serious health risk. Due to patient treatments, vaccinations, and diagnostics, hospitals create this trash. The medical waste stream may include both common garbage and infectious waste. Seventy-five to ninety percent of healthcare institutes' waste is nonhazardous, according to a 2013 research by the World Health Organization. In industrialized countries, disposable medical equipment is employed more often than in underdeveloped nations due to the growing usage of innovative and high-tech pharmaceuticals and safety concerns. Due to the availability of resources, industrialized nations have created sophisticated technology and data management systems, as well as effective waste management rules and legislation. Numerous studies have identified inadequate healthcare waste management systems in developing countries as a problem. In 2000, Akter emphasized that "the vast majority of developing countries lack an appropriate waste management system." Municipal trash collectors in developing countries lack the necessary knowledge and processes for managing medical waste. According to academics in India, prevalent hospital waste management techniques include improper segmentation and hazardous collection and transportation. The typical operating practice is to dump rubbish from these facilities in the common container designated specifically for residential waste. According to a study, many healthcare facilities in Bangladesh lack proper waste

management, and few private hospitals meet acceptable criteria. According to the same research, hospital waste management employees illegally remove and reuse sharps, saline bags, and blood bags. Numerous healthcare institutes dispose of garbage by incinerating, burying, and reusing it. Similar discoveries have been found in resource-poor nations including Brazil, Jordan, Iran, and Ghana.

Historically, research has concentrated on major healthcare institutions, mentioning minor clinics only in passing. We probed further, delving into unknown territory in terms of the handling of medical waste. While big hospitals manage their waste well, the majority of these institutions is either government-funded or privately owned, and so lack the financial resources required to dispose of trash properly. Smaller clinics around the nation violate fundamental waste disposal rules in a variety of ways, despite their size. Small clinics are just as important as large ones since they serve a huge number of patients in several places and create a substantial quantity of medical waste. Therefore, little clinics are as important as big ones.

The researchers went into an area of hospital waste management that had never been addressed before. There are enough hospitals in this country that get government subsidies or private investment to keep their waste under control because of this. For a number of reasons, many small clinics fail to follow basic trash disposal guidelines. Many small clinics around the country see a large number of patients and generate a large amount of medical waste, despite their small physical footprints. To ensure the safety of hospitals' waste disposal, governments throughout the globe have implemented legislation. The effective disposal of garbage from healthcare facilities is a must. Regulations for hospital waste management were written and put into effect by the federal Ministry for the Environment in 2005. Clinics, pharmacies, health units, dispensaries, and nursing homes must follow these guidelines. Autopsies, blood banks, and other biological facilities are also covered. Waste management at healthcare institutions of all sizes, including tiny clinics, is thus critical for the sake of both patient health and the health of our planet. Pakistan's 2005 hospital waste management guidelines are mandatory for three of the fifteen waste management divisions in the International Journal of Environmental Research, volume 16, issue 4044, and all Public Health Research publications. Clinical waste management may have a positive impact on health and safety. The goal of this study

was to find out how tiny clinics handle garbage. Waste production data analysis, identification of small clinics' waste management practices with regard to applicable legislation, assessment of existing staff knowledge and awareness, and investigation of the motivating reasons for successful waste management were among the procedures carried out in this investigation.

Classification of Waste as General

Depending on where it comes from, solid waste might be classified as municipal garbage, hazardous waste, biological waste, or medical waste. Other than liquid or semi-liquid, solid trash may come from a wide variety of places, including waste treatment plants, water purification facilities, and air pollution control plants (US Law-Solid Waste Act 2, 1999). When garbage, hazardous waste, or any part of it, enters the environment, it is referred to as "disposal." To put it another way, "disposal" refers to the act of releasing substances into the environment. An paper addressing environmental issues may be published in the African Journal of Sustainable Development. Environmental and human health is threatened by the proliferation of harmful flies, mosquitoes, and rats at garbage disposal sites on the outskirts of cities. The organism's biological defences are still forming and developing and are still in their early stages. Infectious diseases of the gastrointestinal, dermatological, respiratory, and genetic types are all a consequence of this scenario. Dumping sites have a significant impact on public health but have not been quantified by governments, corporations, or people. The breeding of disease-carrying flies, mosquitoes, and rats at garbage disposal sites on the outskirts of cities is a substantial source of pollution. The body's biological defenses are now in a creative and developmental phase. Infections of the gastrointestinal tract, skin, respiratory system, and genes are all possible outcomes of this illness. A significant impact on public health is toxic waste dumps, although it is difficult to quantify their social and financial costs.

Ways of Dumping Wastes

The most popular methods of solid waste disposal in the United States, according to Medina, are land filling or dumping and incineration (2002). Instead of dropping your garbage near your house, place it in an area where it may be collected in the coming years There is hope that European governments have committed to

enhancing solid waste (including sludge) land disposal technologies, which may help mitigate the adverse environmental effects of these and other components of solid waste land disposal. This activity includes repairing regions harmed by previous or existing landfills, making landfills development-safe, and creating novel systems for recovering materials and energy from landfills, but in Somalia and many African countries landfill is not fully practiced its normal to see open dumpsites and water sources being used as disposal areas.

Impacts of waste on the Environment

Developing countries must priorities the construction of sanitary landfills and the abolition of open dumping. Despite the existence of more environmentally friendly options like composting and incineration, landfills remain an important part of waste management (waste to energy facilities). Given that environmental damages and benefits frequently seep into surrounding cities and regions and into underlying groundwater sources, matching incentives targeted at enhancing landfill investment and sustainability may be an interesting instrument to examine (Daniel, 1999). Since poorly disposed of waste might create environmental problems, this is correct. Media also aids the Environmental Protection Agency (EPA) (2002). The only way for dangerous substances to go from the soil to humans, according to him, is by dust or direct touch. Contaminated crops, animals, food, or water may introduce soil pollutants into a person's system. When land is polluted, it may have devastating effects on terrestrial ecosystems, both in terms of conservation and aesthetics.

Impacts on Residents

According to Wrensh, volatile organic compounds have also been detected in the odorous air surrounding waste operations (1990). Throughout the years, several community health surveys have recorded a variety of health ailments, including respiratory issues, skin, nose, and eye irritation, digestive difficulties, mental health concerns, and allergies. In response to public concerns over VOC-emitted nuisances, many researchers have been done. According to Dolk, there is a continual supply of food for pets (1997). Rats spread illnesses to surrounding residences. 67 According to the United Nations Environment Programme, improperly managed wastes, such as excreta and other liquid and solid wastes generated by families and communities, pose a major health concern and may spread illness (2006). According to the study,

abandoned rubbish attracts flies, rats, and other disease-carrying animals. The stench of decomposition and decaying rubbish may have a detrimental influence on nearby residents, indicating that landfills have negative impacts. Pollution from agriculture and industry may be hazardous to one's health. In addition, combining industrial waste with municipal waste may expose persons to chemical and radiological hazards. Combined trash management In addition, solid trash that is not collected may hamper the drainage of storm water, resulting in stagnant bodies of water that can act as breeding grounds for disease.

Solid Waste and Municipal

It is challenging to make decisions on the disposal of municipal rubbish in any country, but the challenge is amplified significantly in less developed nations. It is essential that waste disposal be carried out in a manner that is kind to the environment. This will need a considerable commitment from national governments, whose finances are already constrained as a result of other high-priority expenditures (Pokhrel & Viraraghavan, 2005). Viraraghavan and Pokhrel (2005) conducted the research that is referenced here. The majority of developing countries rank the management of municipal solid waste third behind the provision of clean water and sanitation as their top municipal priority. It's mind-boggling how much trash many communities have buried down below the surface of the ground. This has been the primary method for getting rid of garbage ever since the beginning of society (Medina, 2011). It is now the year 2011. (Medina). Since the late nineteenth century, there has been a steady increase in both the quantity and variety of wastes produced. As a result, it has become more vital to dispose of trash on land that has been specifically designated for that use. Recycling, land filling, and burning rubbish all contribute to pollution, which has a negative impact on the surrounding ecosystem. People are put in danger as a result of waste facilities that are not properly managed, the dumping of rubbish that is not under control, and the poisoning of groundwater by leachate from landfills. Health issues are more prevalent across the board in less developed countries, which often have less developed systems for waste disposal (Jha, Singh, Singh, & Gupta, 2011), When it came to: (Jha, Singh, Singh, & Gupta).

CHAPTER II

Literature Review

Sustainable Recycling Of Municipal Waste

The researchers came to the conclusion that a web of cooperation reveals the linkages between all 12 criteria that have an impact on environmentally responsible recycling in developing countries. The institutions are in charge of directing how each component goes about its business. The institutions that are essential to the continuation of recycling are denoted by lines with solid fill, whilst the lines with dotted fill indicate that the cumulative effect of one component's interactions with other components results in a higher impact. The participation of stakeholders is emphasized by the arrows, which depict the flow of information amongst the entities that make up MSWM. The way in which components interact with one another to change the color and shape of nodes is illustrative of the way in which MSWM institutions are driven by concerns over environmental sustainability. According to A.M. Troschinetz and J.R. Mihelcic / Waste Management 29 (2009) 915–923 921 on Environment and Development, in 1992, 178 governments in Rio de Janeiro, Brazil, unanimously agreed on the need for more sustainable municipal solid waste management in industrialised and developing nations. This was discussed at the United Nations Conference on Environment and Development (UNCCD). This topic was examined in great depth during the 921 unit on the environment and development. The management of solid wastes in a manner that is compatible with ecological integrity is one of the goals outlined in Chapter 21 of Agenda 21, which also incorporates the Rio Declaration on the Environment and Development. This chapter emphasises the significance of fostering the reuse and recycling of garbage in a manner that is environmentally friendly. This study, which was both quantitative and qualitative, looked at 23 different case studies that took place in less developed nations. Every day, people produce 0.77 kg of municipal solid waste, and recovery rates might range anywhere from 5% to 40%. In 19 of the case studies, the percentage of recyclables and organic materials in the waste stream ranged from 0 to 70 percent. This wide range was due to the fact that the studies were conducted under varying conditions. According to the findings of this study, there are twelve factors that influence the efficient recycling of municipal solid waste in developing countries. These include government policy, government finances, waste

characterization, waste collection and segregation, household education, household economics, municipal solid waste management administration, municipal solid waste management personnel education, municipal solid waste management plan, local market for recycled materials, availability of technological and human resources, and land.

By using these 12 criteria, the research demonstrates the importance of teamwork when it comes to the sustainable operation of MSWM over the long run. A link between stakeholder participation and sustainability is indicated by the fact that the only three variables that were driven by all three dimensions of sustainability (waste collection and segregation, MSWM strategy, and local recycled-material market) also required the greatest cooperation with other variables. The results of this study indicate that each of the three pillars of sustainability social, environmental, and economic has an impact on the institutional responsibilities connected with the twelve elements that have an influence on recycling in developing nations.

The Impact Measure of Solid Waste Management on Health

The researchers came to the conclusion that a web of cooperation reveals

The linkages between all 12 criteria that have an impact on environmentally responsible recycling in developing countries, the institutions are in charge of directing how each component goes about its business. The institutions that are essential to the continuation of recycling are denoted by lines with solid fill, whilst the lines with dotted fill indicate that the cumulative effect of one component's interactions with other components results in a higher impact. The participation of stakeholders is emphasized by the arrows, which depict the flow of information amongst the entities that make up MSWM. The way in which components interact with one another to change the color and shape of nodes is illustrative of the way in which MSWM institutions are driven by concerns over environmental sustainability. According to A.M. Troschinetz and J.R. Mihelcic / Waste Management 29 (2009) 915–923 921 on Environment and Development, in 1992, 178 governments in Rio de Janeiro, Brazil, unanimously agreed on the need for more sustainable municipal solid waste management in industrialised and developing nations. This was extensively explored in 921 on Environment and Development. Chapter 21 of Agenda 21, which includes the Rio Declaration on the Environment and Development, calls for the

ecologically appropriate handling of solid wastes. This chapter underlines the need of promoting ecologically responsible waste reuse and recycling. This quantitative and qualitative research examined 23 case studies that took occurred in underdeveloped countries. People generate 0.77 kg of municipal solid garbage each day, with recovery rates varying from 5 to 40 percent. In 19 of the case studies, the proportion of recyclables and organic materials in the waste stream varied from 0% to 70%. This research identified twelve elements that impact the effective recycling of municipal solid waste in developing nations. These factors include government policy, government finances, waste characterization, waste collection and segregation, household education, household economics, MSWM administration, MSWM personnel education, MSWM plan, local market for recycled materials, technological and human resources, and land availability. Using these 12 criteria, this research underlines the necessity for teamwork when it comes to the long-term sustainability of MSWM. The fact that the only three variables that were influenced by all three dimensions of sustainability (waste collection and segregation, MSWM strategy, and local recycled-material market) also required the most cooperation with other variables suggests a connection between stakeholder participation and sustainability. According to the results of this study, each of the three pillars of sustainability (social, environmental, and economic) has an impact on the institutional responsibilities associated with the twelve elements that influence recycling in developing nations.

Footprint of Solid Waste Disposal at Dumpsites of a given Area

Using a case study research methodology, Salam Abul researched the effects of solid waste disposal at the Mangwaneni dumpsite in Manzini, Swaziland. Multiple sources of information were consulted in order to offer an accurate depiction of what respondents witnessed or experienced. Among the instruments used were a questionnaire, an interview, and a field observation guide. Due of the proximity of Mangwaneni communities to the landfill, primary data was acquired from Mangwaneni residents who responded to an open-ended questionnaire at a Manzini golf club. Residents of Mangwaneni served as data sources for the study. Included among the secondary data sources were the National Census, the Library, the internet, and garbage collection and recycling. The study area is home to 850 people, who are dispersed among 121 dwellings (Swaziland Statistical Office, 2007).

Stratified-simple random sampling was used. 78 out of 121 households were selected to participate in the research. The findings were accurate and easy to comprehend despite the small sample size of 66%. In this method, a future research might choose a representative sample from a representative population. To evaluate the effect of the dump, two groups of individuals were required: those who lived nearby and those who were far away. Using stratified-simple random selection, this study was able to recruit participants from all throughout the area. We investigated the data using descriptive statistics. In addition to bar graphs, pie charts, and tables, the data was also presented using line graphs. Additionally, narratives were used to make the data more engaging.

According to their findings, respondents' socioeconomic status was a significant factor. 62.8 percent of the 78 respondents were female, while just 37.2 percent were male. This indicates that there are more women than males in Mangwaneni. 33 percent of individuals questioned were shockingly illiterate. In terms of education, just 8 percent attended college; 26 percent completed elementary school, 23 percent completed secondary school, and 10 percent completed high school. The unemployment rate was 48.7%, self-employment was 32.1%, and employment was a pathetic 19%. Many of those questioned are unemployed, making it hard for them to survive without dumping at landfills, the opinions of adjacent residents on the waste dump and its immediate surroundings. The majority of the populace is upset with the site of the landfill, especially those who live nearby. Residents have alleged that the proximity of the landfill to their houses has caused them to get unwell. They strongly disagree with the notion that the facility is unclean and revolting. In addition, they stated that their yard is contaminated by waste from the landfill. What do the residents of the area think about their surroundings? According to anecdotal evidence, 18 percent of individuals living close or far from the dumpsite feel their surroundings are dirty. However, 52 percent of those living near the dumpsite and 46 percent of those living distant from the dumpsite say they live in a smelly environment. The health effects of the proximity of the landfill to the neighbourhood. 82% of those who live nearby and 58% of those who live farther away believe the placement of the landfill has an influence on their health. 18 percent of those who live nearby and 43 percent of those who live farther away say the placement of the landfill has no effect on their health. Malaria has affected 36%

of nearby residents and 13% of those who live farther away, according to this poll. Neighbours have claimed chest pains, diarrhoea, and cholera, while faraway residents have also reported the same symptoms. When disposing of trash, just 5.1% of individuals use skips provided by the local government near the landfill, whereas 20% use skips provided by the landfill itself. 51.3 percent of local residents and 28.2 percent of distant residents use the landfill. 43.6 percent of those who live near a dumpsite and 51.3% of those who live distant from a dump have pits in their backyards. According to the results of the poll, 46.2% of local residents and 41% of distant residents are aware of the dangers posed by a proposed dumpsite in their neighbourhood. While 71.8 percent of those who live nearby and 59 percent of those who live further away are unaware of the implications, it is important to note that 10 percent of those who live nearby and 24 percent of those who live further away received information from school, 56 percent of those who live nearby and 50 percent of those who live further away received information from the media, and 22 percent of those who live nearby and 22 percent of those who live further away received information from the media.

In the course of the study, health, geography, and the environment were all investigated. In order to achieve the project's objectives, a cross-sectional comparison of local and distant individuals was necessary. According to the study, the proximity of the dump to human populations affected both local and distant populations. There seems to be a link between proximity to a landfill and the degree of environmental harm. Additionally, it has been discovered that people who reside within 200 metres of the landfill are the most negatively impacted. There have been incidences of malaria, pneumonia, cholera, and diarrhoea at the dumpsite. If the wind is blowing in their direction, even those who reside more than 200 metres distant from the dump are impacted by its foul odours, On the contrary. As a result, they began to have chest problems. One of the disadvantages of development and civilization is the land, air, and water pollution it creates. Each household's daily waste output has increased in tandem with the worldwide population growth and the rising need for food and other basic necessities. Local governments collect and dispose of this garbage in landfills and dumps at municipal trash collection sites. Due to insufficient infrastructure and/or resources, not all of this waste is collected and transported to landfills. The environment and human health are now at danger if

waste management and disposal are inefficient. People who improperly dispose of their body waste and other liquid and solid wastes from their homes and communities constitute a significant threat to public health.

Environmental and Health Impacts of Household Solid Waste Handling and Disposal Practices in Third World Cities:

According to Mr. Markku Kuitunen, Ph.D. and Mr. Rwasi Owusu Boadi, M.S., who conducted another review titled Environmental and Health Impacts of Household Solid Waste Handling and Disposal Practices in Third World Cities: The Case of Ghana's Accra Metropolitan Area, for this study, researchers interviewed 960 Accra-based female household heads? During the months of June through August of 2003, the research was conducted. During the interviews, the two indigenous languages used were Ga and Twi. Random sampling was employed to choose the sample of the population. The primary benefit of this methodology is the random sampling of the study area's population, since field team members have no subjective biases or preconceptions to consider. A lottery was used to choose the names of new communities. In each of the communities where interviews were done, houses were selected at random. Because they have access to a common living space and other facilities, individuals who dwell in the same house are referred to as a "community." Since they are responsible for preserving and regulating the home's environment, it was determined to target female household heads. There were no exclusions for people above the age of twenty. Utilizing a well-structured questionnaire, information about the management and disposal of household solid waste, as well as garbage burning and trash burial, was acquired. It was discovered that 489 children under the age of six who participated in the study had insect infestations, respiratory health problems, and diarrhoea. Three or more loose, watery, or bloody stools in a 24-hour period constitutes diarrhea (Martines, Phillips, & Feachem, 1993). Dysentery has been defined as a severe type of diarrhea characterized by the passage of bloody stools. The respirator was tormented with a sore throat, dry cough, and wet cough (Songsore et al., 1998).

The interviewers for this research were female students from the University of Ghana, Legon, since all of the respondents were female. Every data collector conducted a minimum of one interview survey. The data collectors received a two-

day theoretical and practical orientation; it took between 25 and 30 minutes to complete each questionnaire. There was a high degree of candour among survey respondents. Before entering the data into the system, the principal investigator double-checked all questionnaires for correctness and completeness. Once inputted, the Excel spreadsheet data was imported into SPSS 11.0 for Windows. Using the Kruskal-Wallis test and Spearman's rank correlation, the connection between the dependent and independent variables was evaluated. Multivariate analyses of variance were used to analyse the significance of the relationships between factors and the prevalence of respiratory diseases and infantile diarrhoea shown by the varieties analysis. Considered statistically significant is a probability value less than or equal to.05.0.

Despite the fact that the great majority of households dispose of solid waste at home, just 22.6% of households choose to dispose of their garbage outside the home. It has been shown that the presence of houseflies in the kitchen while cooking is connected with solid waste management techniques, particularly at home (r=0.17). Furthermore, it has been shown that the manner in which food waste is discarded corresponds positively with the prevalence of flies in the kitchen. More over 33.6% of those surveyed claimed they used authorised trash collection facilities, while 32.4% said they dumped trash in empty yards. 44.4 percent of individuals who throw trash in rivers have constant fly infestations in their kitchens. This research indicates that solid garbage is often placed near residential areas. Composting households had more flies in the toilets ($r = 40.03$, 3 days per week, p 0.0001). There is a significant relationship between bathroom flies and kitchen flies ($r = .28$, $p = 0.0001$) Approximately 51.0% of individuals who reported seeing flies in the bathroom daily reported seeing flies in their bathroom daily. The majority of respondents (51.0%, n = 153) who saw flies in the lavatory also observed flies during food preparation in the kitchen. Multivariate analyses of variance revealed a tight connection between the prevalence of flies in the bathroom and kitchen (p.0001). Before the investigation, 19% (n = 94) of the children who participated in the research were diagnosed with diarrhoea. Infantile diarrhoea was shown to be more prevalent when houseflies were present in the kitchen when food was being prepared ($r = 0.3$, p 0.0001). Higher incidence of diarrhoea has been associated to fly infestations in the eating area. According to the mothers of children with dysentery, their households

have persistent houseflies in the kitchen. Even with multivariate analysis, there was a substantial association between a fly infestation in the kitchen and a greater incidence of diarrhea. p =.002 in the 95 percent confidence interval in addition, children with diarrhea had a higher incidence of flies in their home toilets (r =.35, p .0001); this correlation was statistically significant. The multivariate test revealed a correlation between the presence of flies in the bathroom and the occurrence of diarrhea (p =.006; 95% CI). Approximately 71.4% (n = 20) of dysentery patients lived in households where the illness was persistently evident in the toilet. As of the date of this writing, just 14.5% of homes have curbside solid trash collection, with the remainder disposing of garbage at community collection facilities, parks, or waterways. The enormous amount of garbage created by families is done so carelessly.

Environmental Impact of Solid Waste Treatment Methods

Mr. Yongwoo Hwang, Ms. Toshiya Aramaki, and Mr. Keisuke Hanaki released a remarkable study titled Environmental Impact of Solid Waste Treatment Methods in Korea that used the LCIA methodology! This approach was used to analyse and compare the environmental implications of different solid waste treatment procedures. A functional unit is known as a f.u.! For the 1997 fiscal year, SETAC 1997 allocated one tonne of solid waste disposed of following source separation of recyclables to each treatment method. 77.1 percent of solid trash is composed of combustible rubbish, of which 26.7 percent is food waste, 32.3% is paper waste, 3.5% is wood waste, 2.9% is rubber waste, 4.5% is plastic waste, and 6.2% is miscellaneous waste. In 1998, a staggering 22,9 percent of non-combustible garbage was created, according to estimates from the Ministry of the Environment! Korea has effectively adopted land filling, incineration, composting, and anaerobic digestion of organic waste. Figure 1 depicts the system architecture used in this research of Korean solid waste treatment plants. It is necessary to transport collected solid waste to a treatment plant, where it undergoes a series of procedures before being transferred to a landfill. In contrast, no attempt was made in this research to evaluate the effect of waste collection and transportation. Regardless of treatment technique, the environmental impact of different collecting systems or transfer stations is likely to be comparable. Herein are offered level-by-level explanations of LCIA calculations. Approaches to Landfill Emissions' Environmental Impact It are

the practise of putting solid waste into the ground as soon as it is collected. It is expected that one tonne of solid waste is land filled, despite the fact that Korea disposes of around 60 percent of its rubbish in this way. Although incineration may be used as a means of intermediate treatment, land filling is often utilised as the ultimate disposal option. The majority of landfill pollution is created by the equipment and environmental protection measures, such as leachate treatment facilities, that need energy! Moreover, the decomposition of organic waste in landfills causes unpleasant smells. Figures 2 through 5 illustrate the environmental effect of each treatment method. Except for land filling, all treatment procedures emit CO_2 as their primary gas. Composting, for example, creates up to 209,8 kg/f.u. more CO_2 than other processes due to its larger energy use, which includes higher quantities of carbon-rich diesel oil. Decomposition of organic waste in a landfill creates the most greenhouse gas CH_4 (28,1 kg CH_4 /f.u.), one of the major contributors to global warming. The most important bulk water outputs are chemical oxygen demand (CO_2), biochemical oxygen demand (BOD), sulphate, and total nitrogen (TN!). Other chemicals, such as cyanide, toluene, and phenol, have substantially lower leakage rates. Compared to other treatment procedures, the quantity of TN created by the landfill approach (0.24 kg/f.u.!) is large (1.6–2.7 times higher). Compared to other methods, incineration generates around 630 times more waste. This is because this approach emits incineration ash (0.0136 tonnes of ash per tonne of combustible waste)! Environmental Effects of Various Treatment Techniques Figure 6 depicts the environmental impact of different treatment procedures based on the f.u. value. The landfill approach has the greatest effect on the environment, as measured by its impact KI! point/f.u. Compared to anaerobic digestion, which yields just 0.006 KI point/feu, incineration has the greatest effect on the environment. It has been shown that the environmental impact of composting is 2,4 times larger than that of incineration. This is likely attributable to the rising use of diesel oil in the composting process and the energy recovery from the incineration method, both of which contribute more to global warming. At 0.06 Ki-points/f.u.!, the first phase of treatment accounted for 93.8% of the entire impact.

Create a graph depicting the environmental emissions produced by each treatment method. All treatment systems recognise CO_2 as the major mass-emitted gas, with the exception of landfills. Composting, for instance, creates 209.8 kg/f.u. of

CO2 due to its high energy consumption, which includes the use of diesel oil that is carbon-intensive. The breakdown of organic wastes in landfills generates the most methane (28,1 kilogrammes of CH4 per landfill unit). Most water emissions consist of carbon dioxide, methane, and ammonia. Some harmful chemicals (such as cyanide and phenol) seem to be emitting less. There is a high concentration of TN (0.24 kg/f.u.), which is about 1.6–2.7 times the quantity produced by other treatment techniques. In contrast, incineration produces 630 times as much waste as other processes. Ash from incineration (0.0135 tonnes of ash per tonne of combustible waste) adds to this. Different Treatment Methods' Environmental Impacts Environmental impact is computed for each treatment option and for each environmental impact per f.u. The landfill approach has the biggest environmental effect, with a KI!-point/f.u. score of 0.064. KI point/f.u. for anaerobic digestion is 0.007, but KI point/f.u. for incineration is 0.006 or less. Composting has been demonstrated to have an environmental effect that is 2.4 times bigger than that of incineration. Composting procedures use more diesel oil and incineration processes consume more energy, which significantly contributes to global warming. The primary treatment stage was responsible for 93.8 percent (0.06 KI-point/f.u!), 73.3 percent (0.004 KI-point/f.u!), 75.5 percent (0.011 KI-point/f.u!), and 45.6 percent (0.003 KI-point/f.u!) of the overall effect of the land fill strategy. We were able to achieve 6,2 percent 0.004 KI point/f.u!, 0.2 percent using the landfill approach. 0.00001 KI point/f.u!, 4.1 percent . 0.0006 KI point/f.u!, and 9.0 percent . 0.0006 KI point/f.u! One of the most essential responsibilities of LCIA is to determine the most significant environmental effect of a product or service across its lifecycle. It is conceivable to identify significant pathways for minimising the environmental effect of present practises (Curran, 1996!). Figure 6b depicts the percent contribution of each environmental category to the overall environmental effect for each of the four treatment methods. As it turned out, global warming was the source of all environmental issues. In most processes, global warming contributes more than 30 percent of the entire environmental effect. Global warming resulting from CO2 and CH4 emissions from anaerobic digestion accounted for just 10.8% of total environmental damage. After acidification (4.8–21.3%), ototoxicity to water (3.1–20.2%), and human toxicity to air (2.8–16.2%), eutrophication (11.6–32.7%) had the second-largest impact range. Even though Korea's low domestic resources and high relative significance factor imply that ARD contributes considerably to the defined

environmental impact categories, its influence on other environmental impact categories is minimal. CO2 and CH4 are the principal components in the majority of GW treatment methods. Incineration, composting, and anaerobic digestion all considerably contributed to CO2 emissions, although landfills accounted for just 0.7% of total emissions. CH4 emissions from wastewater treatment plants account for just 0.1% of landfill emissions, but anaerobic garbage decomposition accounts for 99.2% of total landfill emissions. NOx, SOx, and NH3 emissions are the most significant contributors to acidification, with NH3 emissions from landfills accounting for up to 99 percent of the total. NOx, SOx, and TN emissions were the most significant causes of eutrophication. Additional Environmental Impact Assessment Techniques Results 1994 saw the release of Baumann and Rydberg's first album. Comparing the ECO! Method, ET! Method, and environmental priority projects. The EPS! Method has shown that a single LCIA method is no longer sufficient. In the end, each LCIA method differs in its anthropocentric and biocentric worldviews, resulting in a vast array of ways for investigating environmental issues and a broad range of resource use and emission indices. Methods of environmental impact assessment differ based on the objective of the research and the region where it is done. Due to the extensive variety of consequences presently evaluated, the outcomes of an EIA may also vary depending on the technique used to conduct the evaluation. Baumann and Rydberg (1994!) analyse the environmental repercussions of the different LCIA approaches by comparing three separate LCIA procedures using emission data from selected treatment processes. In this study, Baumann and Rydberg (1994!), Powell et al. (1997), and the US Environmental Protection Agency (1995b!) offer detailed explanations of each LCIA approach. According to Table 3, the various treatment approaches employ the environmental load indices of specific chemicals to determine the environmental effect of each treatment operation. The measurements of each method are expressed in carbon dioxide equivalents. As seen in the above figure, the values of indicators used by various methodologies may vary greatly. However, each approach does not account for every consequence. For instance, resource depletion is a component of KI but not ECO or ET. As shown by land filling, however, all treatments had the greatest impact. In addition, it was discovered that incineration and anaerobic digestion were the most eco-friendly processes. The overall benefits of each technique are comparable, although the projected considerable contributions vary (see Table 4) However, when the KI

method was used, CH4 became the second largest donor after NH3 gas. In this instance, the landfill technique had no influence on the location of CH4. According to the Eco point idea, the production of trash has a significant effect on the global environmental impact. The KI and EPS techniques did not address waste creation, whereas the ET methodology did. Although the Eco point and ET techniques disregarded it and the KI method merely gave it a cursory examination, the EPS approach determined that resource depletion was a key problem for all strategies excluding land disposal. Compared to other types of influence, the production of chemical oxidants had less of an effect. Despite significant variations in indices, the outcomes of three distinct LCIA methods were equal. Researchers may now utilise the findings of this study to evaluate the environmental effects of each waste treatment technique in order to get a better understanding of how each affects the ecosystem. In addition, the findings will give crucial information and a picture of the environmental consequences of solid waste management plan options. This study focuses only on solid waste remediation techniques in Korea. In Korea, researchers are examining the recovery of ferrous metal from cremated trash, the recovery of landfill gas, and the improvement of incineration to minimise emissions.

This research demonstrates that the "End-of-Pipe" concept has been the driving force for solid waste management systems in Korea. In view of increased public concern about the environmental effect of waste management systems, however, it is now more crucial than ever to evaluate the environmental impact of a solid waste treatment operation by considering its whole life cycle. An evaluation of the environmental implications of different solid waste treatment systems in Korea was conducted using a life cycle impact assessment. To assess the environmental effect of the production process of a product, based on the findings, LCIA may be used as a very effective planning tool for the management of solid waste. This research suggests that LCIA may be used to assess the environmental effect of various treatment approaches on a society's infrastructure. In order to compare environmental emissions data from the aforementioned treatment methods, three distinct LCIA methodologies were used. These procedures were shown to be the most eco-friendly of the several evaluated solid waste treatment solutions. In general, composting is believed to have a less impact on the environment than incineration. However, the environmental effect of transporting inorganic waste to its final

treatment site is larger than that of incineration for processing one tonne of solid waste. Global warming, eutrophication, and acidification were determined to be the most significant environmental effects of the majority of treatment methods, despite the fact that these environmental issues were deemed less significant in Korea and assigned low relative significance factors. Due to the scarcity of resources at home, environmental concerns such as the depletion of natural resources and the extinction of species such as the Phoenix received considerable attention.

CHAPTER III
Methodology

Briefly introduction

250 individuals of leaders and health workers from Mogadishu participated in interviews between February and April of 2022. The English interviews of a random sample of the community members were then translated into Somali and Bantu. The major benefit of this technique is that research participants are chosen at random without any subjectivity or prejudice from field staff. Using a lottery, the residential communities were selected at random. Within each neighbourhood, random houses were chosen for interviews. A household is a collection of individuals who share a living space and, often, food and other facilities. Due to the familiarity of families with municipal solid waste production and basic home environmental management, the target audience comprised of household heads living near a landfill. The research comprised all participants older than twenty. The collection of data on the storage and disposal of domestic solid waste, the burning of trash, and the burial of garbage was conducted using a thorough, structured questionnaire. Insect infestation, the prevalence of respiratory health symptoms, and the incidence of diarrheas' were also studied among 100 children under the age of six who had illnesses caused mostly by waste production and inadequate sanitation. Within 24 hours, three or more loose, watery, or bloody stools were deemed diarrheas'. Bloody stools indicated dysentery, a severe type of diarrheas'. Concerns about respiratory health included sore throat, dry cough, and wet cough, Due to the fact that the interviewees were of varying genders, despite the fact that women played an important role in reporting the health of entire families, especially those vulnerable to environmental degradations and outbreaks caused by improperly disposed of waste, in order to increase cooperation and willingness to provide information. Every data collector has at least one year of experience conducting interviews for surveys. For the aim of this research, the data collectors received a two-day theoretical and practical training. The administration of each questionnaire took between 25 and 30 minutes. In general, respondents were highly willing in supplying information. Before questionnaires were included into the database, the lead investigator verified their completeness and correctness. The data were input into an Excel spreadsheet before being imported into SPSS 11.0 for Windows and significance of connections

found in the analysis between variables, and graphs and charts were generated to display the findings of the research.

Deep Interviews

Data was gathered via in-depth interviews. It is a more effective way for identifying attitudes and opinions than focus group interviews, which have been used to generate new ideas (Trost, 2010). Another advantage of in-depth interviews is that the subjects remain anonymous and are not affected by the opinions of others, which might have a detrimental impact. When conducting focus group interviews, the interviewer must act as a moderator and ensure that everyone has an equal chance to speak; this may be difficult when using an interpreter. All of the questions were read in the same order or in the same room during the interviews since it was necessary for the study. However, when it came to the topics of interest, such as trash and health issues, the interviews were pre-planned. Individuals with at least some awareness of solid waste and environmental degradations were targeted. Because there would be no alternative possibilities for responses, the questions were extremely well-organized. Instead, open-ended questions were used. According to Dr. Fidan, there are established rules for how many respondents should be interviewed in order to achieve a scientific level; you should interview as many as are believed necessary to cover your objectives, with a minimum of 250 people. Three groups of individuals were selected for this study: those who work in the environment, those who live near dumpsites, and three people who work in local health care. Because the conclusions of those three studies may be more appropriate to the study's specific educated groups than non-educated groups.

Selection criteria

Participants in this study were required to either be residents of Mogadishu or to be employed in the city's healthcare or environmental businesses. They need to be older than 20 in orders for them to have the opportunity to graduate high school, and preferably elementary and secondary school as well.

Recruitment of the Interviewees

Convenience sampling was the approach that was used to conduct the interviews for this project. The point of contact for the town was in responsibility of recruiting test participants from the environmental zone that was around the town. Establishing the first contact in this location was made considerably simpler by the fact that the person in question already has a connection web in the city. We recruited subjects from the city as well as the areas immediately around it by going door to door with an interpreter. In addition, a worker at the hospital made arrangements for the interview room and contacted others working in the health care industry.

Materials

Figure 03

The interface of SPSS software before data was imported
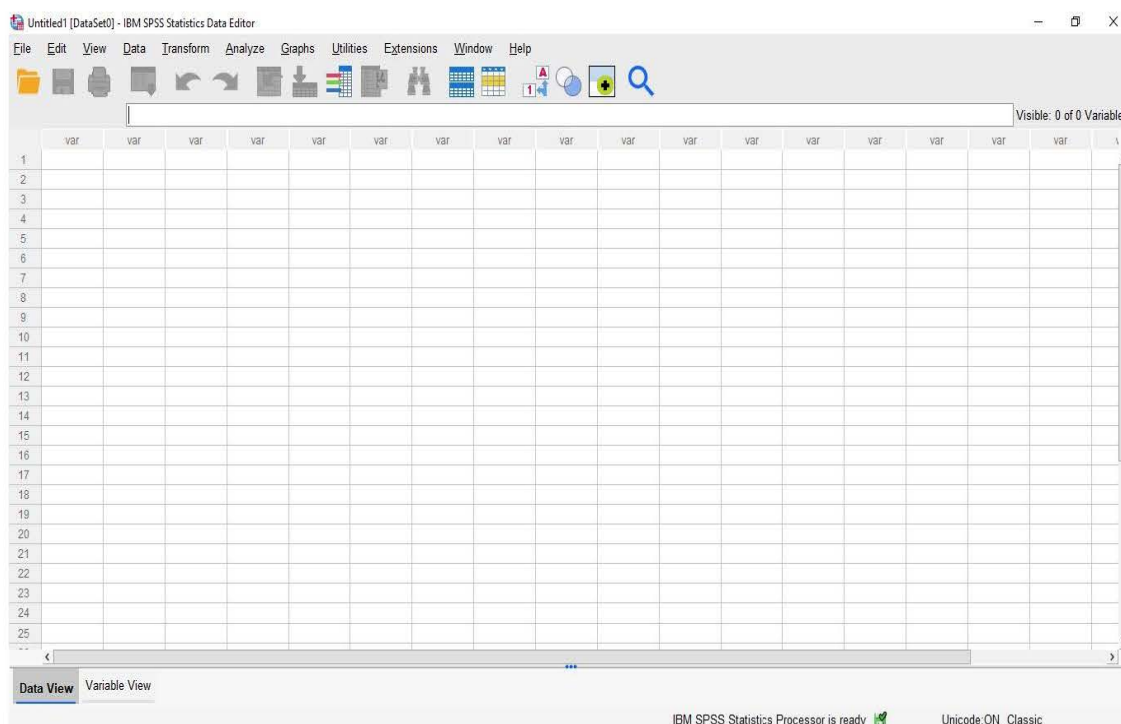
The interface of SPSS software before data was imported

Interviews were conducted with around 250 members of the local community in order to acquire information for this inquiry. A study of the relevant literature was carried out in order to provide context for the interviews that were conducted. You should not draught any questions in English in preparation for an in-depth interview;

rather, you should have them translated into (the local language), and then organized in a precise order of inquiry. You also have the option of writing a handbook that comprises vital study topics and offers information on how to conduct interviews. The inclusion of particular proposal questions in an interview guide is something that Assoc.prof.Dr. Fidan suggested also Dr. Fidan informed me that the study will investigate whether or not the questions are asked in a planned order and whether or not the interviewer is allowed to seek alternate replies.

Execution method

In-depth interviews were conducted with 250 individuals, of which 46% (112) were women residing in Mogadishu or its surrounding suburbs and 54% (138) were males. We conducted one interview with Shifa Hospital employees and another with Wadajir District County Council environmental authorities. We also conducted one interview with a nurse from the Medina Health Centre. The interviews lasted between 30 and 90 minutes and included a study presentation, a review of the ethical consent form, information regarding anonymity and the free choice to participate, and the opportunity to ask project-related questions. Thanks to the assistance of locals, I had access to an interpreter for recruiting and interview translations from English to (local dialect) and back to English. All interviews were recorded, and notes were taken when a particular response was crucial to recall. The location of the interviews varied based on the participants: some respondents' houses since they were in rural areas, staff workplaces because they were unable to miss work for extended periods, and educational institutions.

Data Analysis

Figure 04

SPSS interface of SPSS software during data imported from excel sheet to analysis
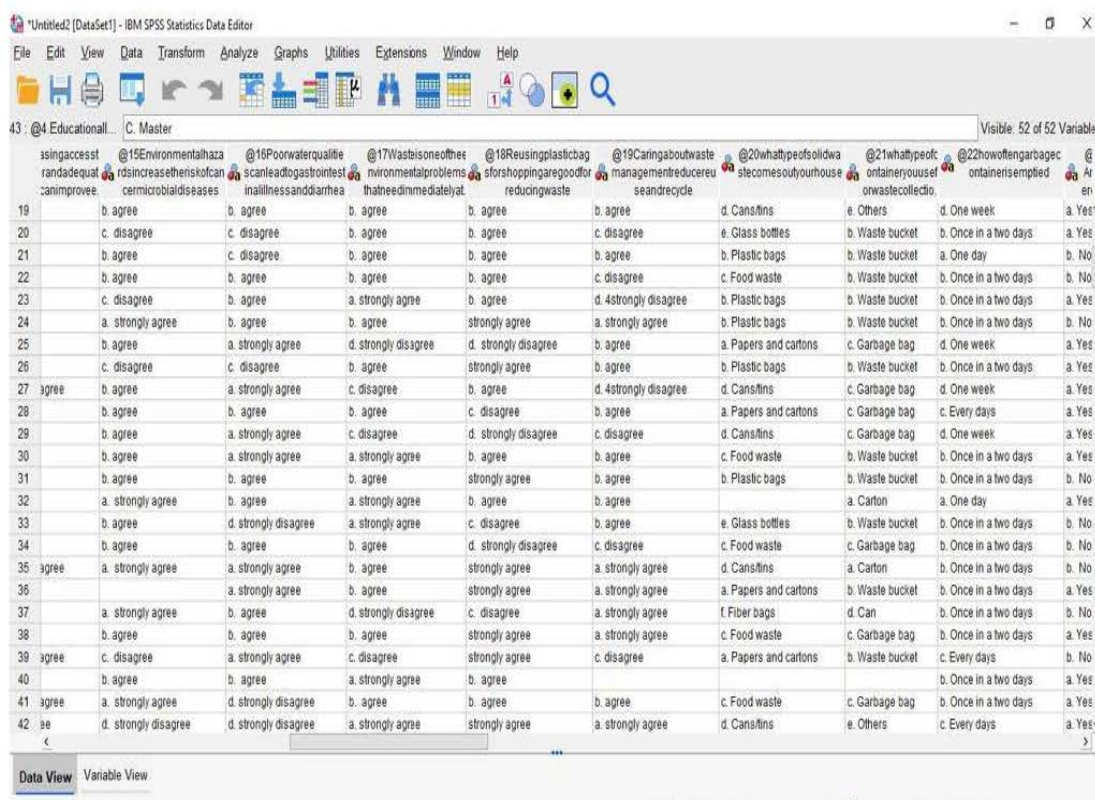
We imported data from excel sheet into SPSS statistical software to analysis the fed back of the participants which were consisted around 50 plus questions and survey questionnaires The interview appeared to be a focused study Endeavour but it was really just a conversation. A survey that was self-administered by 250 residents of Mogadishu city, as well as interviews with those residents, were conducted. The questionnaire for the survey was originally written in English; however, it was translated into Somali for those respondents who were unable to speak English or did not have the required level of education. The data were collected and transferred from excel sheet into SPSS statistical software special we used T-test, ANOVA Cropach Alpha, test to analysed the data then exported into word afterwards analysed with the assistance of graphs and tables. the reliability of the results and feedback of the respondents was excellent as anticipated based on the level of the education and experience towards the field I believe that the result is well reliable up to (95%) and can be really use for future references, where p-values is less than (< 0.05).

Ethical Consideration and Conducts

When carrying out a qualitative study, it is very necessary to provide participants with information on the research, including its purpose and the location where the results will be published. This only implies that participants are allowed to leave the interview at any point in time if they want to do, so their own will. In addition, since participant information will be kept anonymous, any information that may be used to identify a participant will be kept confidential. This includes any and all information that could be utilized (Wibeck, 2000). If genuine names are to be included in the report, then those identities will need to be changed to fictitious ones first. Following a review of the methodology of my research project, as well as any specific alterations that the reviewers felt required a more in-depth explanation; they gave their stamp of approval in compliance with the Somali research ethics code. Before doing any health study in Africa, this evaluation had to be completed, and it took some time, but authorization was ultimately obtained. Even if a few names were said and recorded while conducting the interviews, those identities will not be included in the report. In addition, no one will be present during the recording sessions, thus the names will continue to be kept a secret. Everyone was excited to take part in the research, and they were all given information on the study and the benefits of taking part in it.

CHAPTER IV

Findings and Discussion

Table 01

Well illustration of respondent's gender both female and male, marital status, job experiences, age and educational backgrounds

Gender of the respondents	Frequency	Percentage
Male	138	54
Female	112	46
Age		
a.20 – 24 years	108	43.4
b.25 – 34 years	89	35.7
c.35 – 44 years	37	14.9
d. Above 44 years	15	6
Marital status		
a. Single	116	46.7
b. married	106	42.7
c. divorced	16	6.5
d. widowed	10	4
Educational level of the respondents		
a. Secondary	33	13.3
b. Bachelor	98	39.5
c. Master	89	35.9
d.PHD	22	8.9
e. No formal education	6	2.4
5Occupation of the respondents		
a. Employed	107	43.1
b. Unemployed	100	40.3
c. self employed	41	16.5
6. Experience of the respondents		
a.1 – 2 years	101	40.9
b.3 – 4 years	67	27.1
c.5 – 6 years	33	13.4
d. above 6 years	25	10.1
e. No experience	21	8.5

In table 01, we present an overview of the gender of respondents, including females and males, as well as their marital status, age, job experiences, and educational backgrounds. There were 138 male respondents, which accounts for

54%, and 89 female respondents, which accounts for 35.7%. 108 respondents, or 43.4 percent of the total, were between the ages of 20 and 24 years old, and this was followed by 89 respondents (35.7 percent) who were between the ages of 25 and 34 years old. The remaining ages ranged from 35 to 44 years old, which accounted for 14.9 percent of the whole population, while those older than 44 years old made up 6.0 percent of the total population. When it comes to the marital status of the respondents, it was stated that 46.7 percent of the entire population was married. If we look at the educational backgrounds of our respondents, we discover that the vast majority of them have at least a high school diploma, with 70 percent of those 94 percent having college degrees in addition to their high school diplomas. Despite the fact that the employment rate was low, we are able to draw the conclusion that the reliability of the replies meets or surpasses the minimal criteria as a result of the information that has been provided to us. There were 92 percent of respondents who either had between one and five years of experience in the field or had participated in voluntary action to support clean environment initiatives. Of the respondents, 65 percent were employed, while 35 percent were self-employed.

Figure 05

Chart representing interviewee's gender
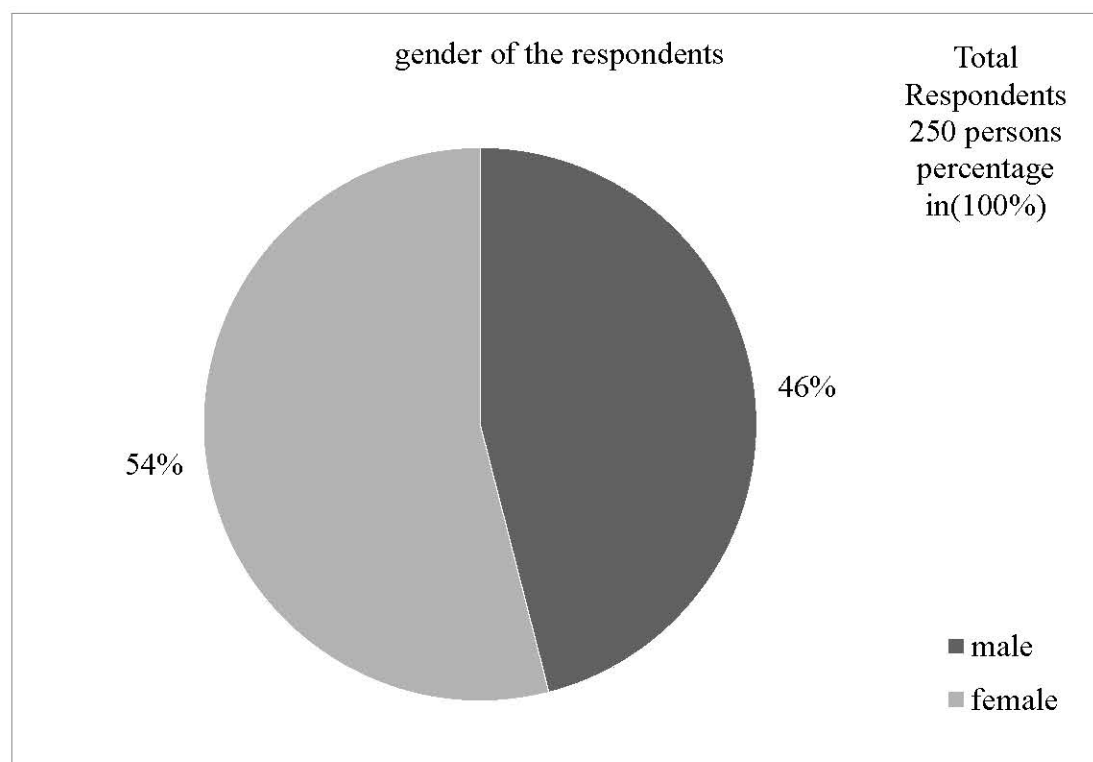
In this chart that helps illustrate the gender of the respondents, the feed of the respondents showed that approximately 54%of the participants were recorded as male, which may sum up around 138/250 were identify as male, while on the other hand, female also sum up approximately 46%which equivalent approximately 112/250 participants were identified as female respondents. This chart is an illustration of the gender of the respondents.

Figure 06

Marital status of the respondents
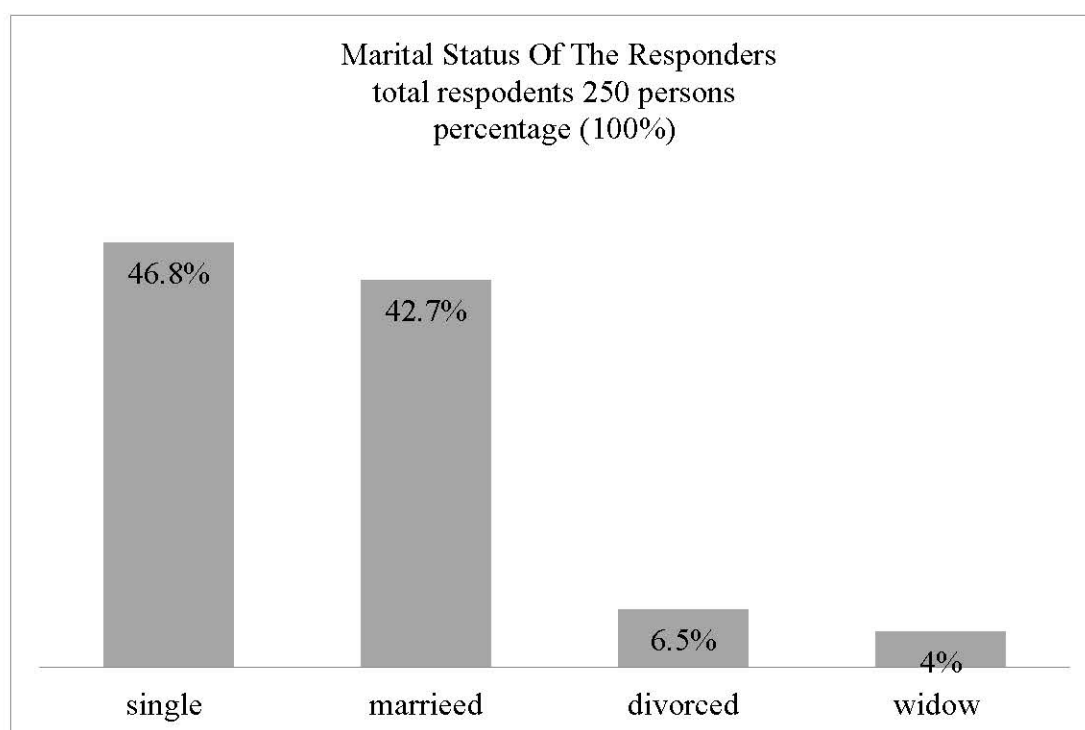
46.8% of those who participated in the survey, which is around 116/250 persons, answered that they were single in response to the question about their relationship status. This was closely followed by married individuals, who formed 42.7% of the total participants which equalled around 106 people of the 250 interviewed people who described themselves as married. Last but not least, those who had been divorced or were widowed made up the lowest number of respondents, accounting for 6.5% (16/250) and 4.0% (10/250) of respondents respectively.

Figure 07

Represents ages of the respondents
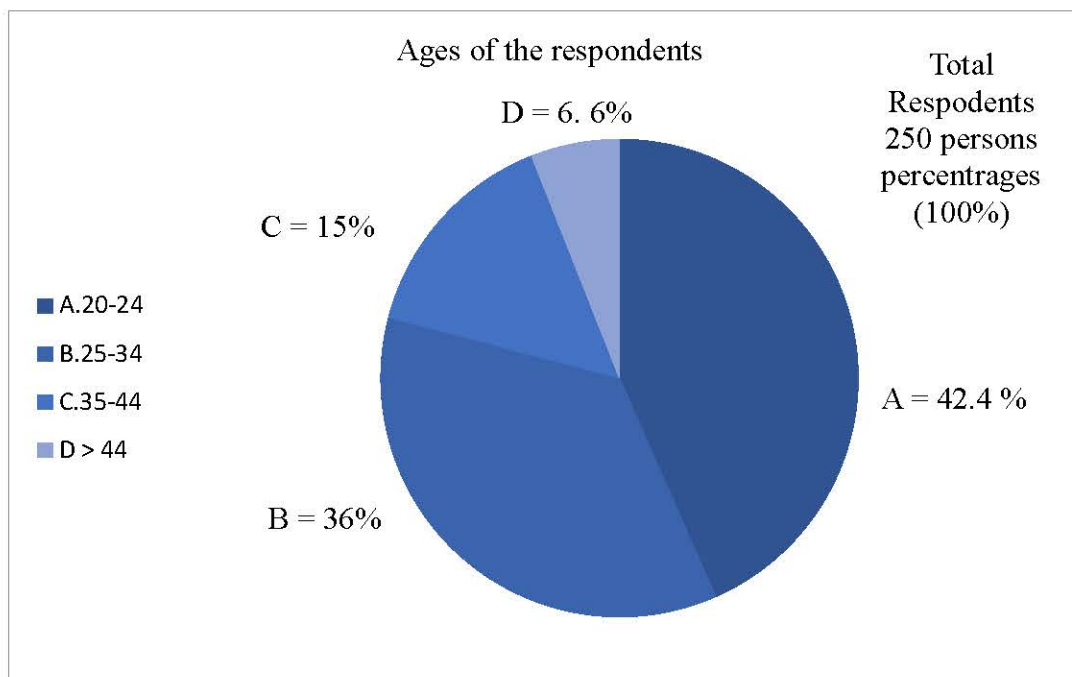
The chart displaying the ages of the participants and the responses from the respondents showed that the highest generation that responded was between the ages of 20 and 24 years old. This generation is primarily comprised of the younger members of the population, and it ranked in first place with a percentage of 42.4%/100 which is equivalent to 108 individuals out of the total respondents(250) The second highest generation was between the ages of 25 and 34, and it totalled 35.7/100% which corresponds to approximately 89 people out of the total 250 While then following by ages between 35 and 44 years, which resulted in 14.1 %(37/250), then the least age group were age over 44, which was 6.6 % of the 250 persons which is fewer when compared to youthful ages.
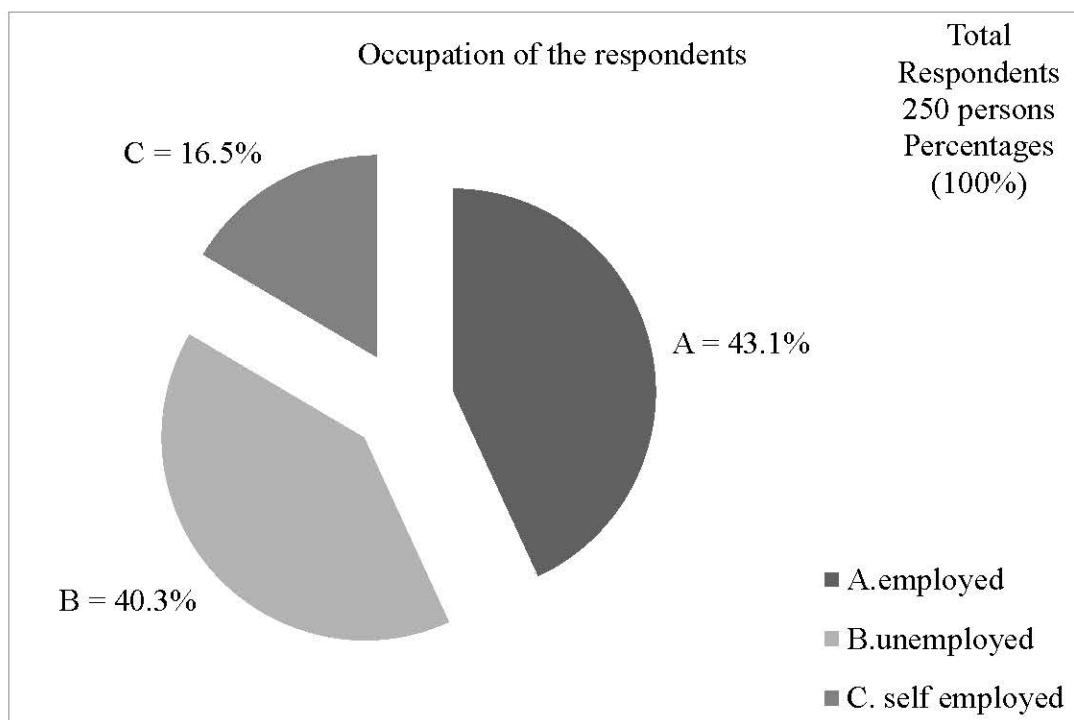
Figure 08

Explains educational backgrounds of the interviewed people
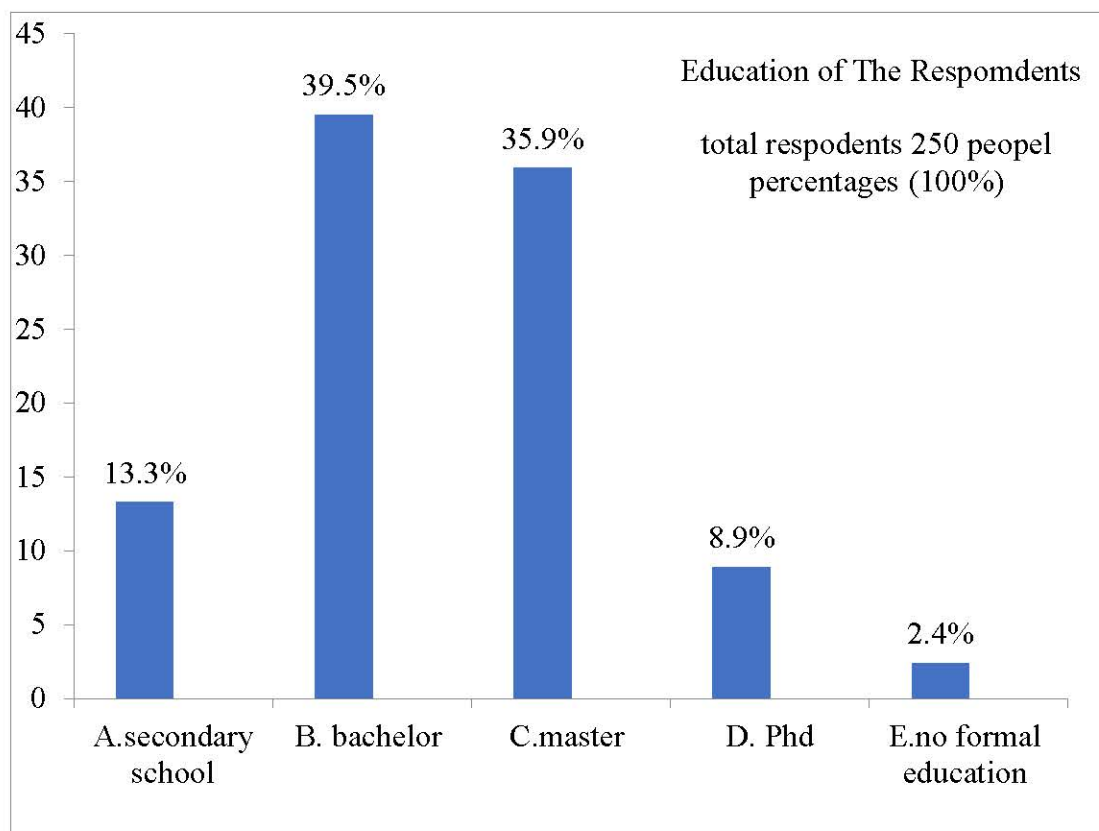
Educational levels of the respondents the majority of the participants graduated college school and master degree which sums up around 84% out of total (250) equivalent around 210 individuals of total respondents were at least graduated undergraduate school or high whether its graduate or even post-graduate programs with that said it gives un great hope that the vast majority of the respondents are well educated people which create a good level of confidence for their feedback and contribute great value into our research topic, while 15.5% (22/250) at least had high school certificate then followed by high degree holders which accumulates around 8.9 percent of the total population then finally none- formal education which was recorded as 2.4 % shown as minority of the respondents and can be considered as insignificant contribution although they showed enough experience towards the field.

Figure 09

Represents jobs of the selected respondents

Occupation of the respondents

Total Respondents 250 persons Percentages (100%)

C = 16.5%

A = 43.1%

B = 40.3%

- A.employed
- B.unemployed
- C. self employed

This chart provides an illustration of the participants' various occupations. The chart that can be found above represents the occupational representation of the respondents. It showed that 45 percent (107) of the individuals were employed in both the public and private sectors, whereas 40.3 percent, or approximately one hundred people, recorded themselves as unemployed people. In this case, we can see that both employed and unemployed people are almost equivalent to one another.

Figure 10

Illustrates years of experiences of the respondents
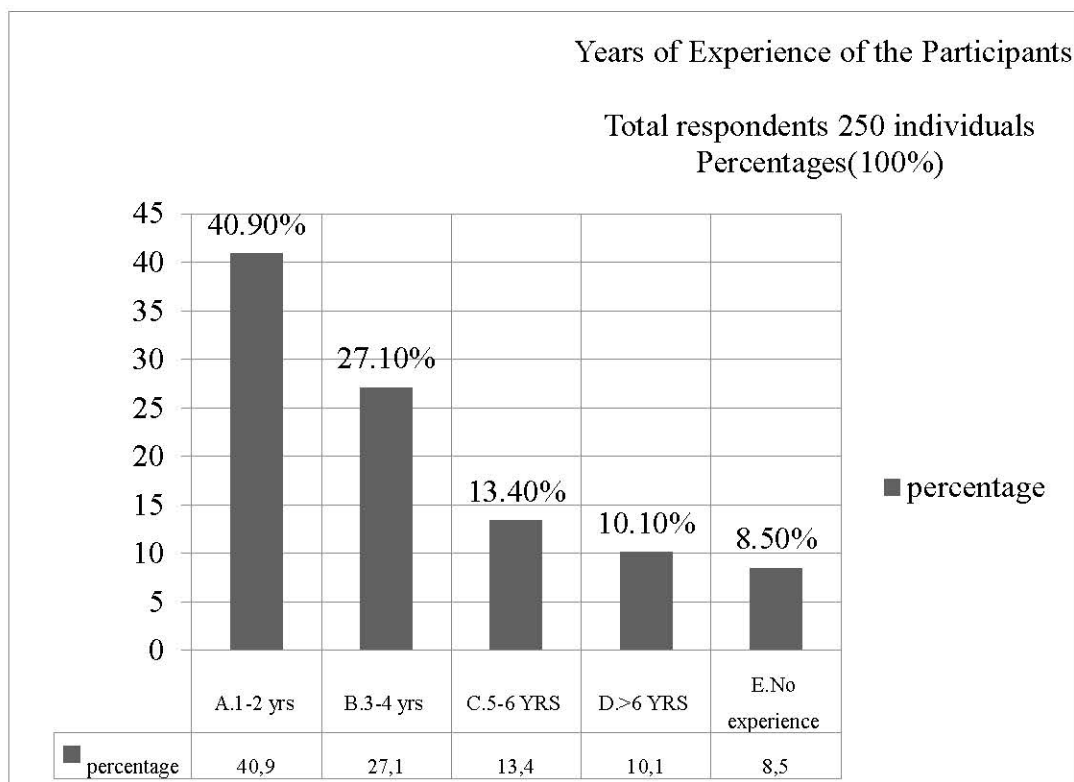
The chart illustrates the respondents' work experiences, showing that 40.9% (101/250) of respondents had experience between 1-2 years, which was followed by 27.1 percent (67 out of total 250 people) having work experience related to the field of 3- 4 years, followed by 15.4 percent (33/250) having good experience between of 5 to 6 years, and then 10% having work experience above 6 years. Those respondents who had no experience at all were accumulated as less than or equal to 8% of the total respondents.

Figure 11

Feedback of risks associates with solid waste
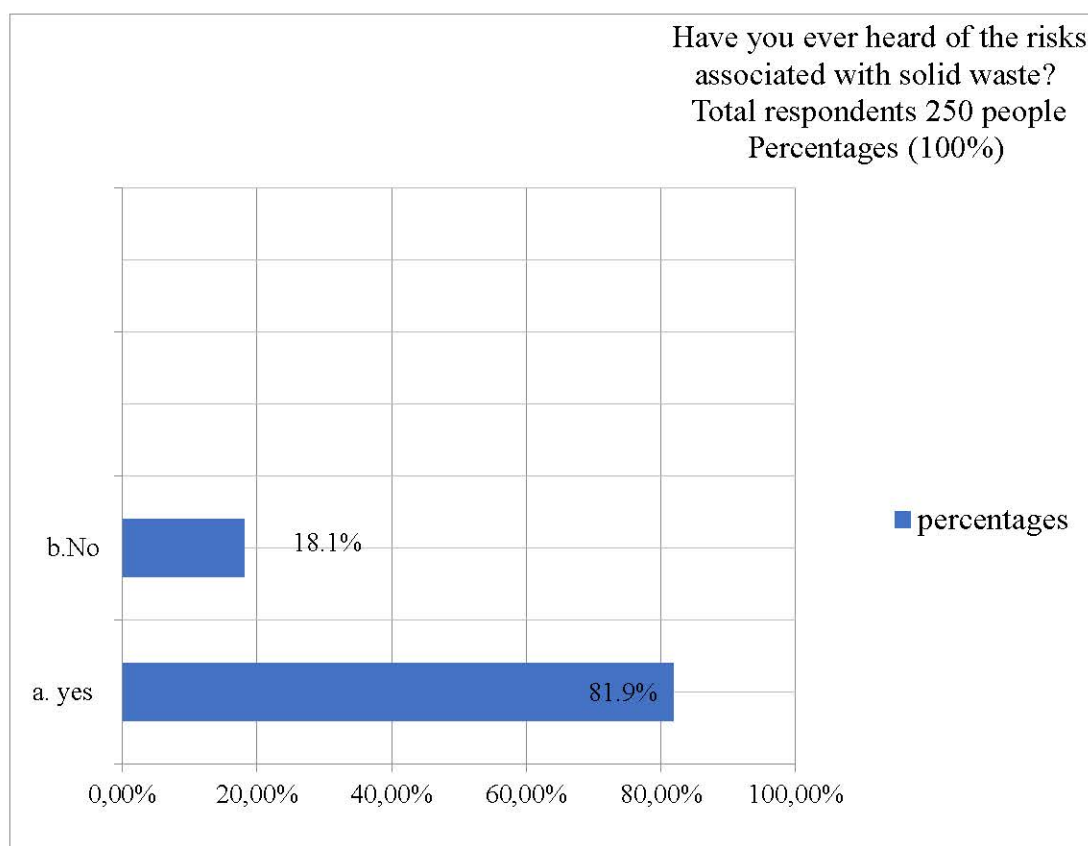
The graph explains that participates were asked if they heard the risks associated with solid waste and they answered well where above 81% which around 204 individuals of the participants responded positively which shows they have enough information about the health risks, environmental risk and social risks associated with solid wastes and dumpsites while the remaining number of the participated (45 persons) had no enough awareness of the risks related to solid waste although this feedback is less important compared to vast majority of the participants .

Figure 12

Represents feedback of the participants how they see solid waste pollution on environment

Does waste pollute the environment?

Total respondents was 250 people Percentages (100%)

b = 28.5%

a=71.5%

■ a.yes
■ b.no
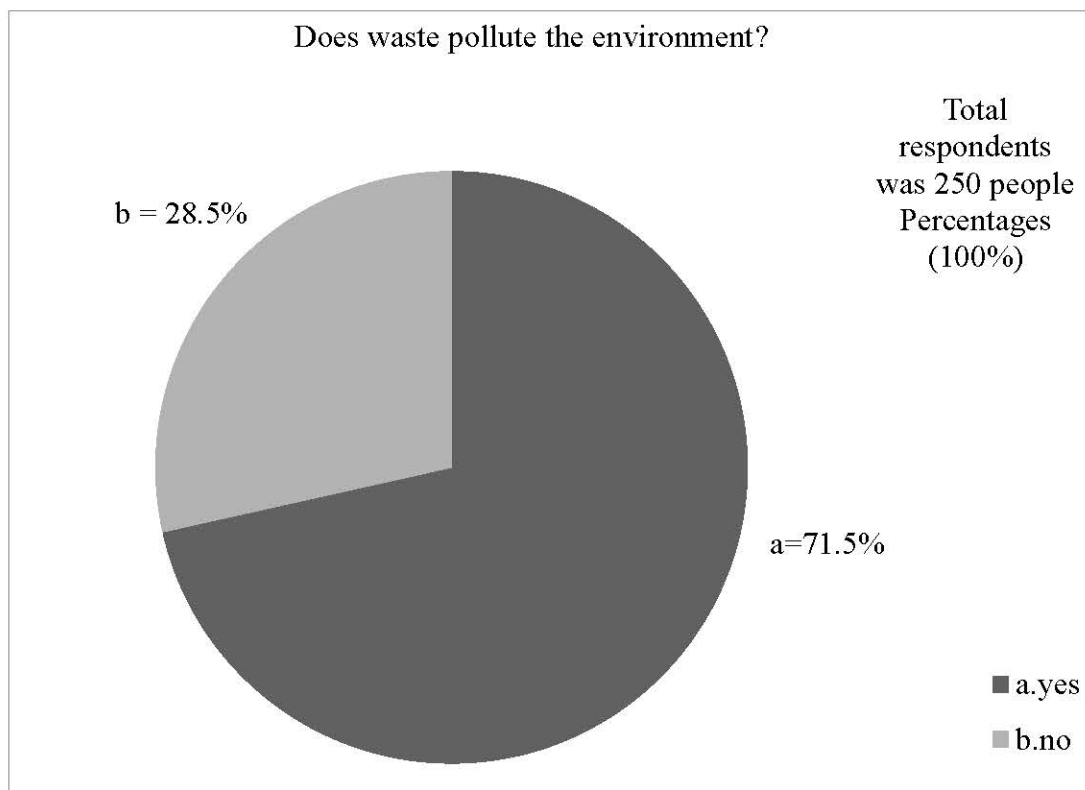
Here the chart represents the awareness of the interviewees about the pollution of the environment generally where they given good response of the how waste can pollute the environment at large where above 71% which equivalent 177 people of the total of 250 given feedback of positive answer which clarified that they had enough awareness the relationships between pollution and solid waste while the remaining respondents were around 28.5 % which sums up 71 people they had less information and awareness about the issues pollutions at all.

Figure 13

Evaluation of waste as resource
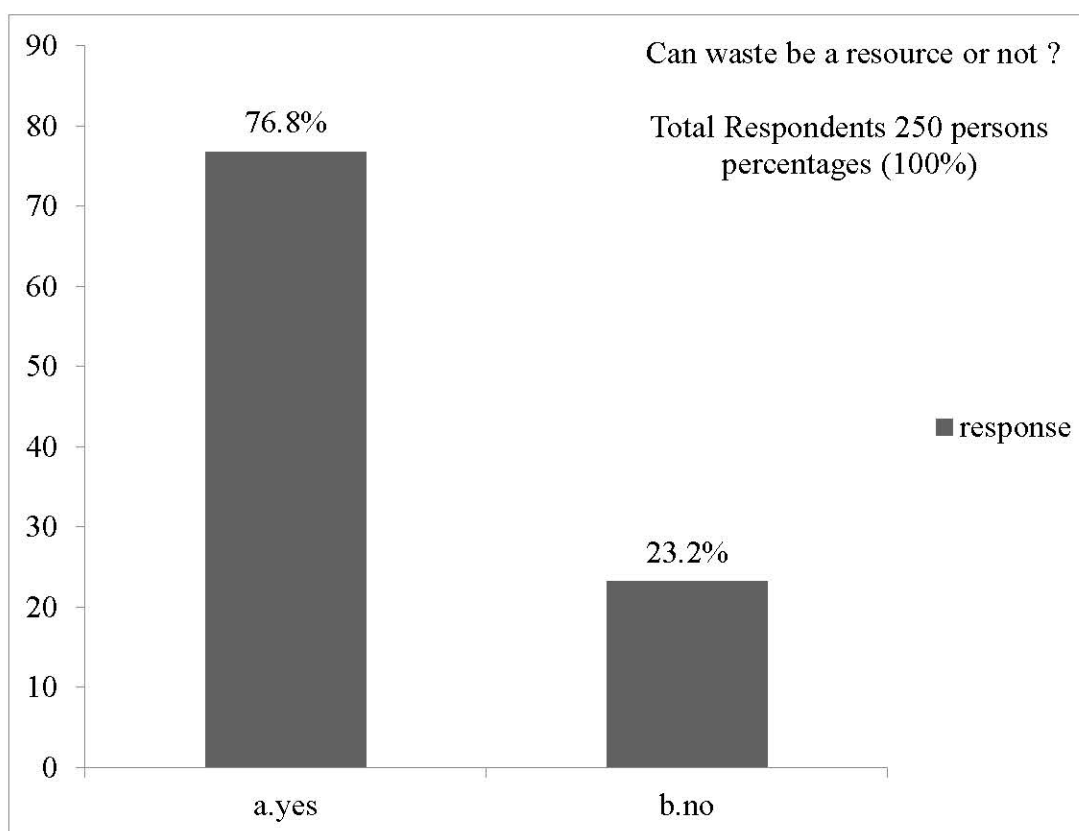
Here participants displayed the feedback of how participants evaluate if waste can be used as resource or not, on the question respondents given whether they have idea if waste can be used as resource or not and they responded well where around three quarter 76.8% around 192 people out of the total which 250 responded positively and showed that waste can be used as resource if we put technology on the use of it such biogas method to produce heat which may enhance good quality of electricity both domestic and commercial on the other hand 23% which is approximately 60 people of the total respondents had no idea or had any knowledge if waste is use full interns of resources.

Figure 14

Environmental pollution and respiratory diseases
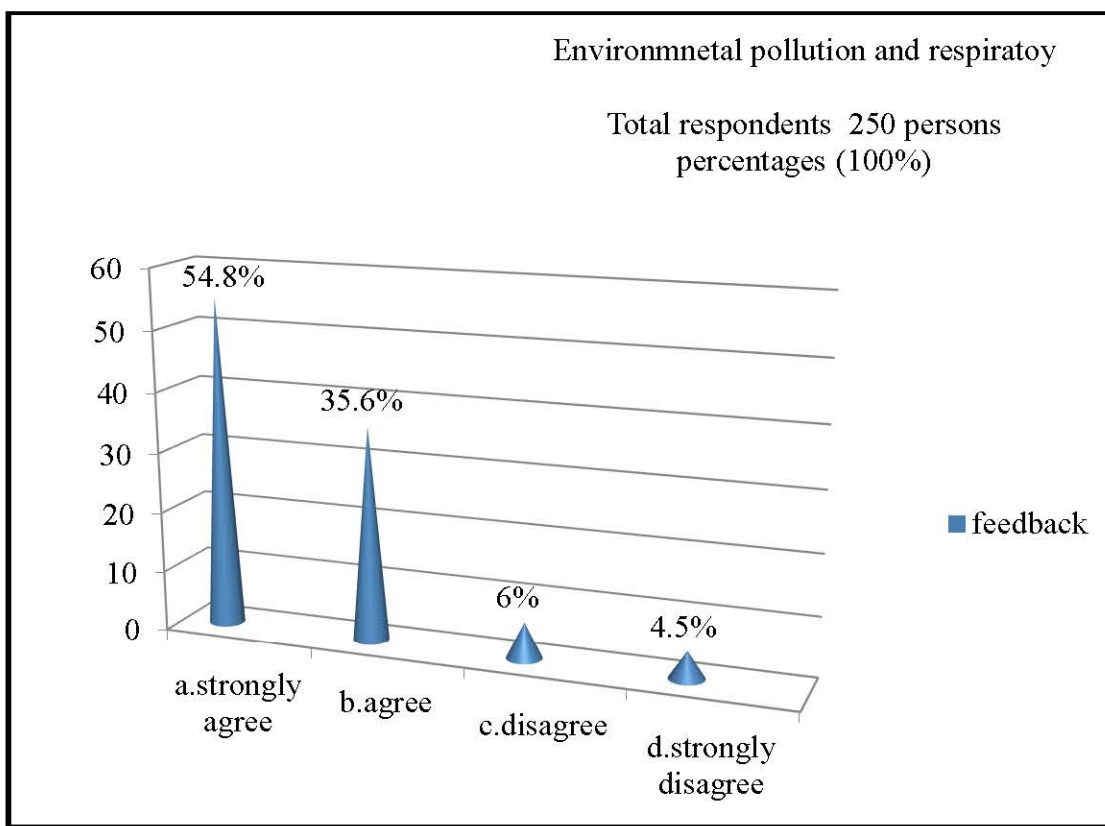
This graph illustrates whether the selected people have knowledge if pollution of solid waste can cause respiratory diseases such as asthma .and heart failures here people are been given four options in form of mutable choice questions (MCQS) (a. Strongly agreed b. agree, c. disagree and d. strongly disagree), As explained at the above graph 90% or around 225 people of the total participants (250) were positively agree or strongly agreed that pollution due to solid waste particles can either cause respiratory diseases or play I huge role to worsen the condition of individual who are suffering heart related diseases or even asthma and allergic conditions the remaining interviewees were less than 15 % or 25 people combined both who were disagree and strongly disagree so in this case majority of the participants have responded positively toward the survey question.

Figure 15

How poor water, chemicals and environmental health issues
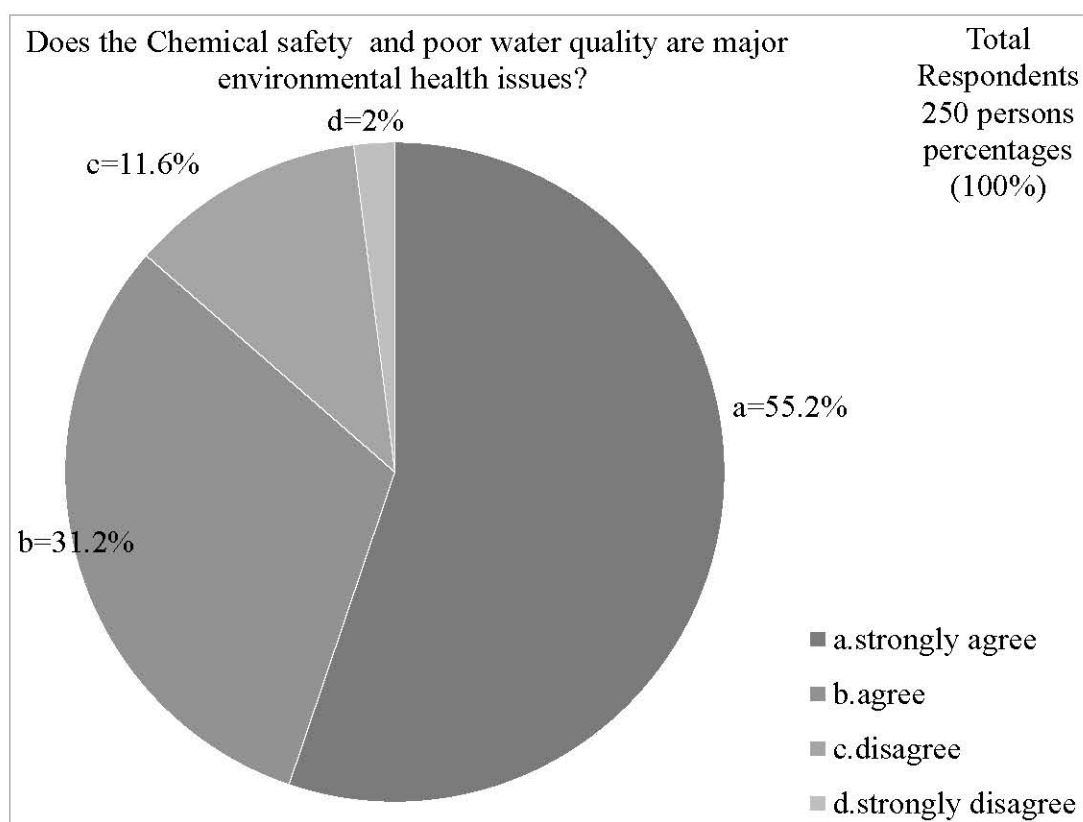
Chart 9 the interviewees were asked if (Does the Chemical safety and poor water quality are major environmental health issues?) with provided (MCQS) options where huge number around fifty five percent (137 /250 people) of the total populations of the interviewees were shown that they are strong agree with the question then followed by 32%t around 80 individuals whom were agreed so this case both agreed and strongly agreed number of the respondents were also above 2/3 of the total were those who did not agree were insignificant number (11.2 % and 2 % respectively.

Figure 16

How access of safety water can improve sanitations
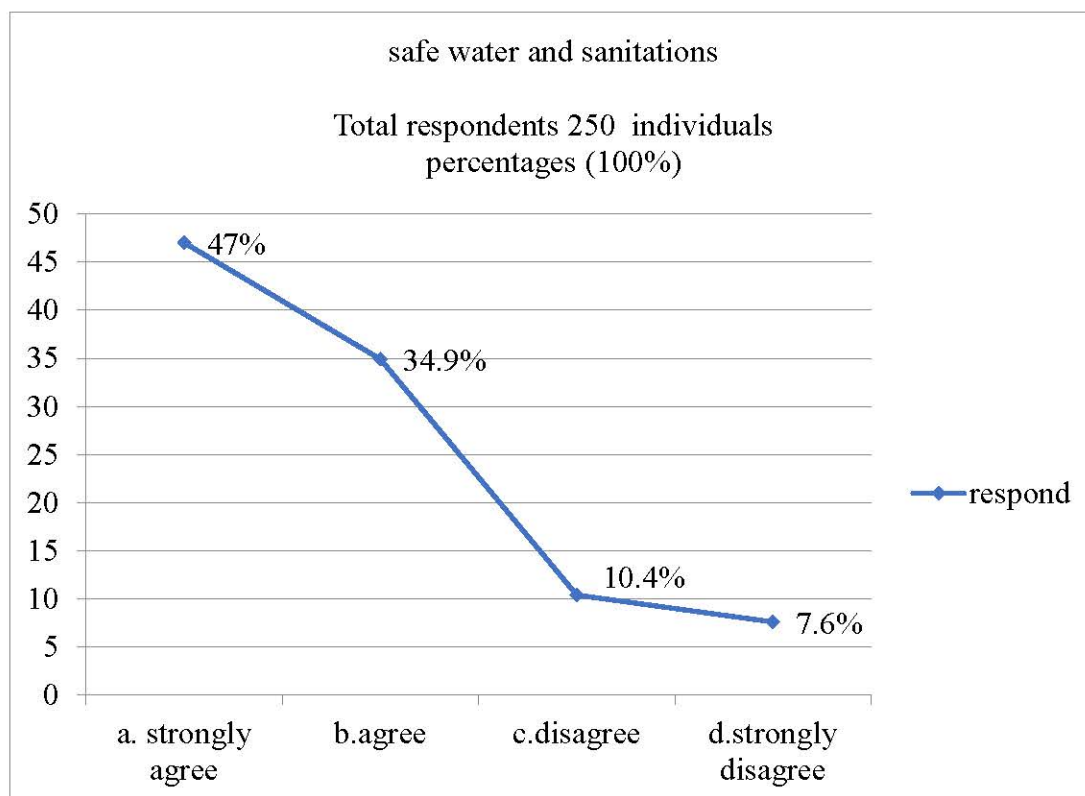
On this graph here selected were asked to answer the following question (increasing access to safe water and adequate sanitation can improve environmental health problems?) around 47 % or 117 people of the 250 total of the respondents were answered as strongly agree, followed by those had agreed which sums up 34.9% or 87 of the total of 250 interviewed people individuals of the total interviewees, then 10.4 % and 7.6 % where disagreed ones and strongly disagreed interviewees respectively.

Figure 17

How environmental hazards do increases some diseases
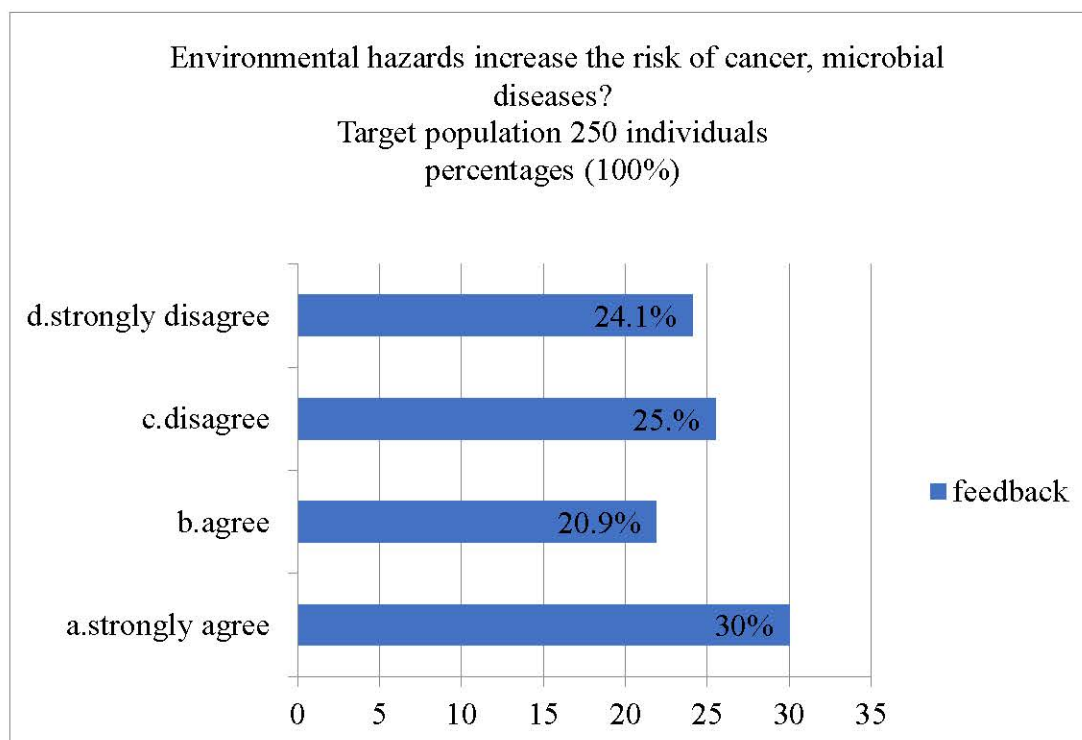
On this chart participants was stated that the respondents to answer the question which (Environmental hazards increase the risk of cancer, microbial diseases?) here participants responded almost closely to each other where the highest total respond was those were strong agree with the question as 30% which around 75 of the total interviewees(250 people) followed by 25 % or 62persons as disagreed one plus 24.1 percent of which strongly disagreed at all which sum up more those who were agreed so that in this question 49.1% which sums up approximately 122 people of the total number of 250 were totally against that Environmental hazards increase the risk of cancer, microbial diseases which showed how respondents in some aspects of the environmental problems are less awareness then others.

Figure 18

How poor water can lead gastrointestinal diseases
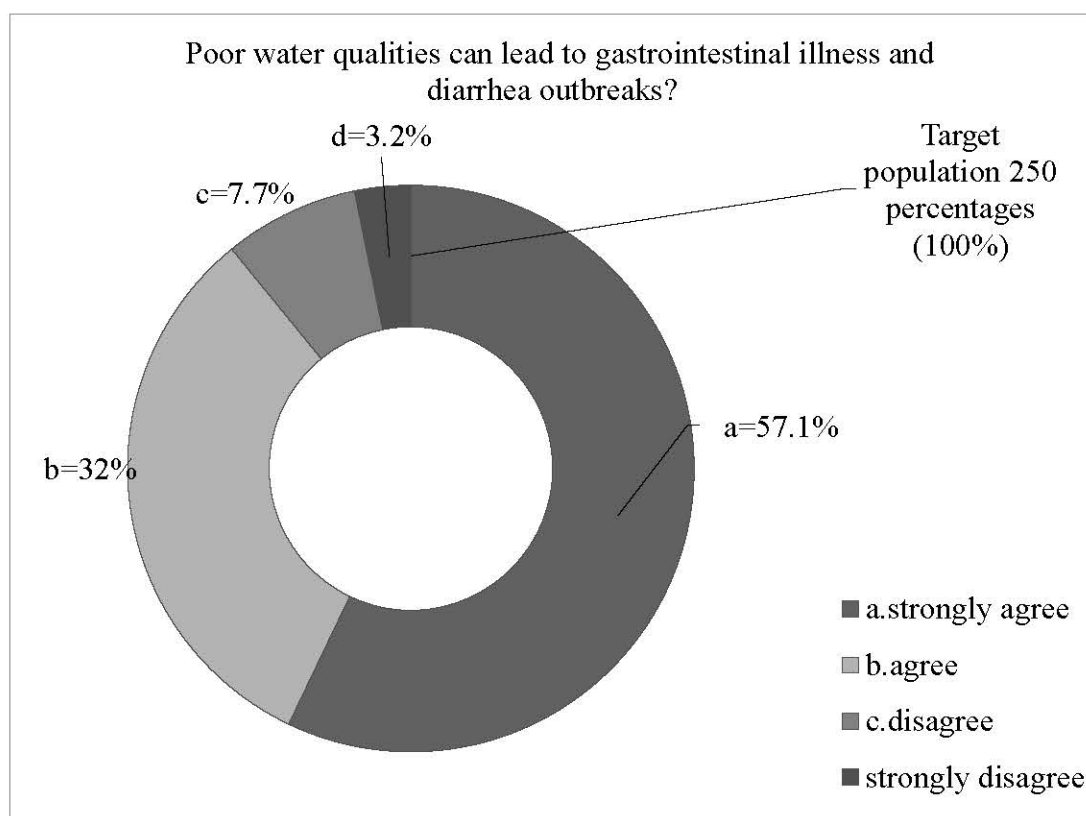
The chart above pie chart explains how participants given reaction the query which was (how does the Poor water qualities can lead to gastrointestinal illness and diarrhoea outbreaks?), given options were from strongly agree all the way to strongly disagree around 57%(142 individuals of the total of 250) were agreed the question where also 32% or around 80 persons of the total (250) interviewees given agreed respond which clearly shows here in this question participants had enough awareness how poor water quality can lead outbreak of diseases , only 10.9% were both disagreed and strongly disagreed which can be considered insignificant figure .

Figure 19

Explains if waste requires immediate action
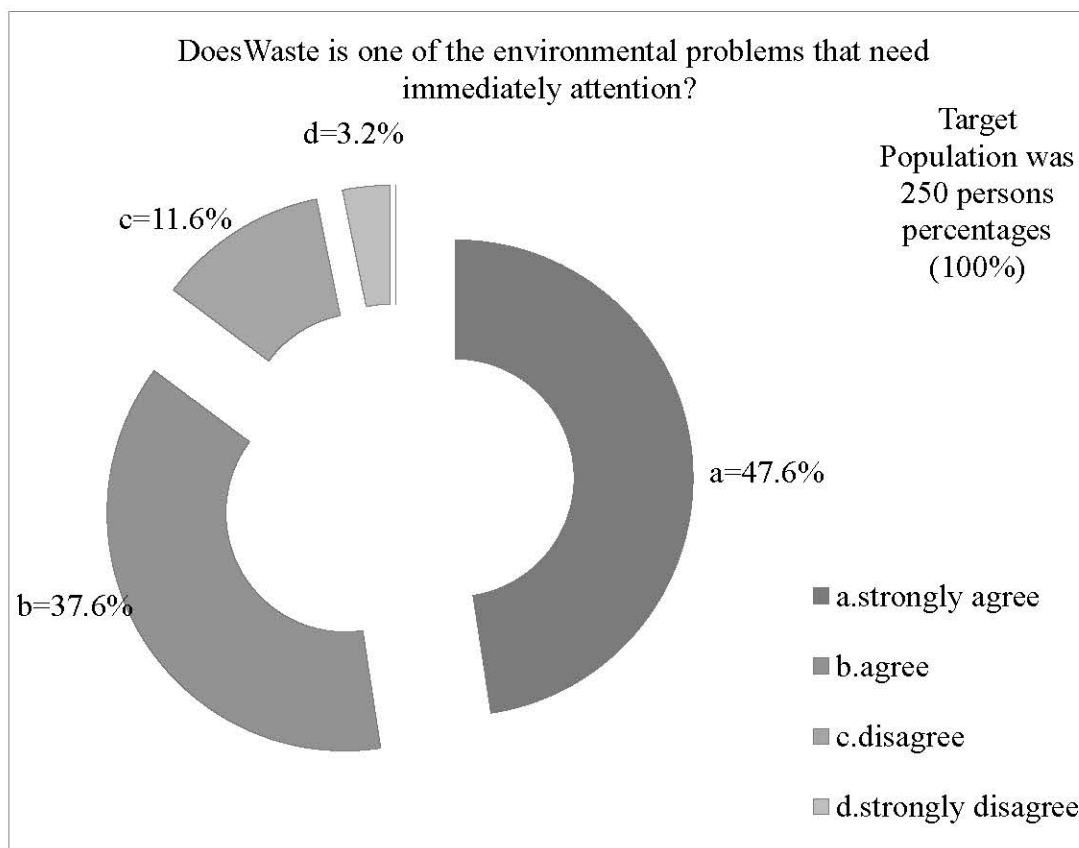
Here above figure represents the reaction of the participants on (Does Waste is one of the environmental problems that need immediately attention?) Where 47% 117 people out of 250 answered as strongly agreed upon the question while followed by 37.6% or 94 people of the 250 target population given also given positive reaction (agreed), While 11.6% disagreed and 3.2% strongly disagreed, here also interviewees had excellent awareness towards the query.

Figure 20

Here we focused if reusing plastic bags are playing role in reducing waste

Re-using of plastics and its importances
Total respondents 250 individuals
Perecentages (100%)
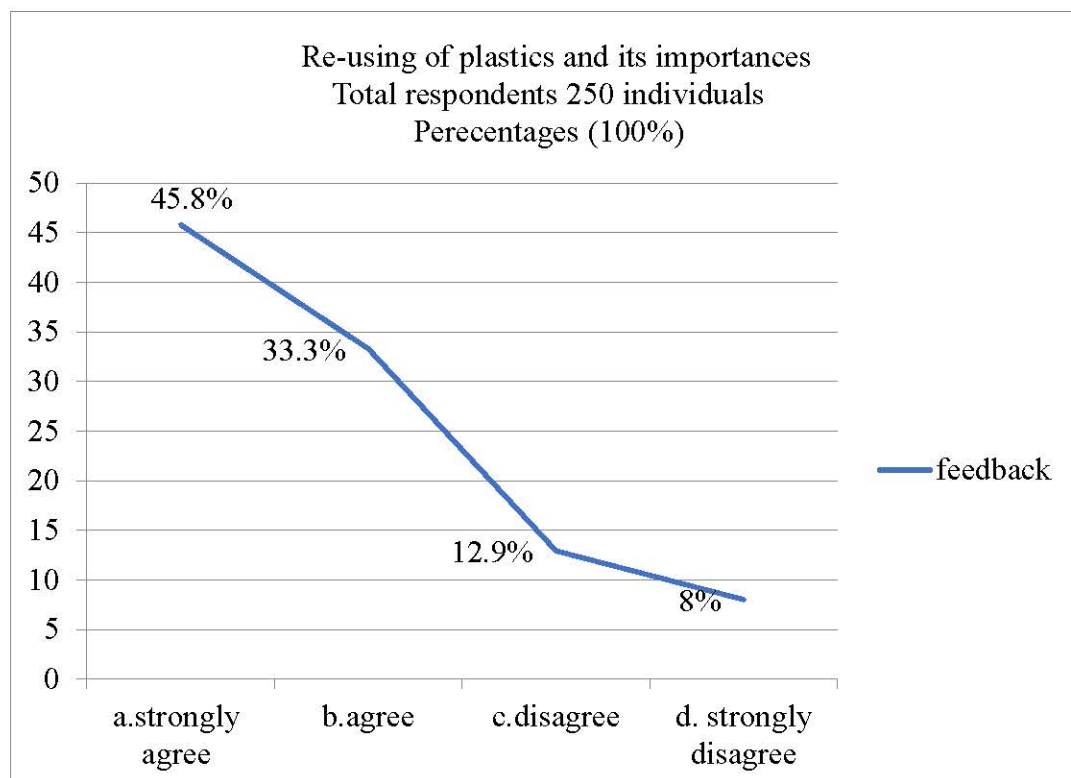
This Graph represents feedback of the above question (Reusing plastic bags for shopping are good for reducing waste?) option as usual was varying from strongly agree all the way to strongly disagree and feedback of their reaction was linear downward direction starting from strongly agree with 45% approximately around 113 people of the total 250 interviewed people and 33.3% 82 individuals of those 250 agreed the survey, then followed by 12 percent and 8 disagree and strongly disagree respectively, the overall feedback shows average health awareness of the participants.

Figure 21

Illustrates how participants cared about waste management
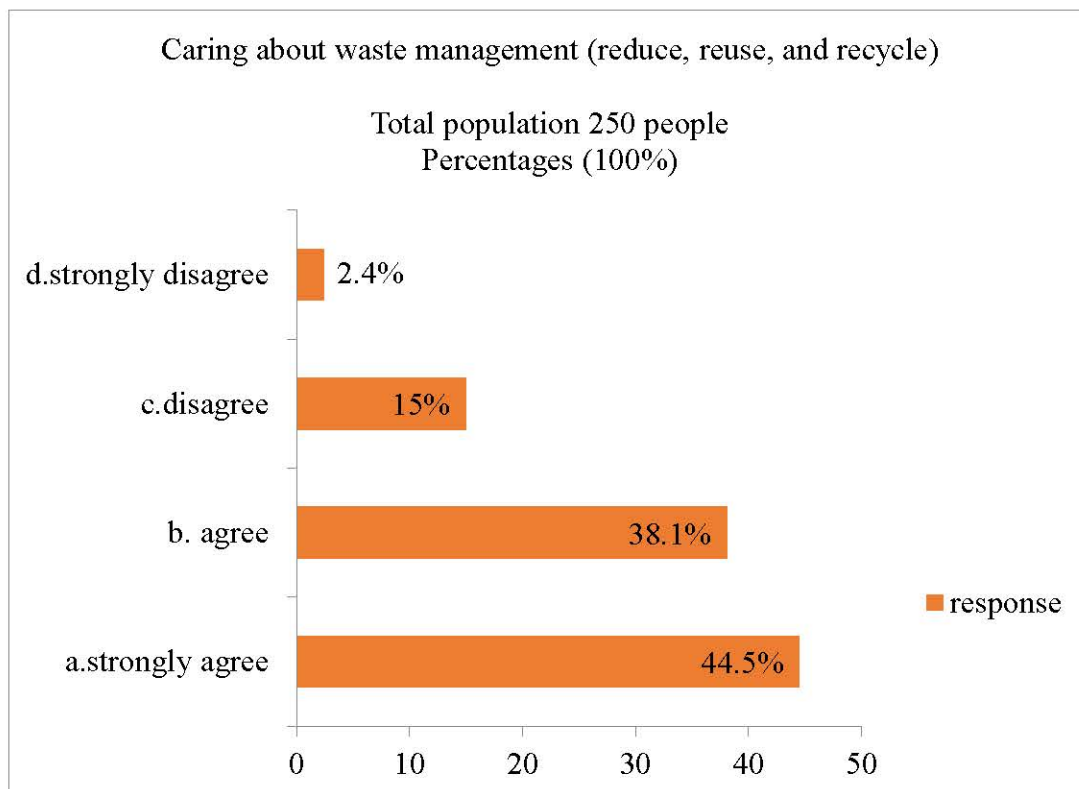
Chart represents feedback of the above question (Caring about waste management (reduce, reuse, and recycle)?) option as usual was varying from strongly agree all the way to strongly disagree and feedback of their reaction was linear downward direction starting from strongly agree with 44.5% or 112 people of the total of 250 then 38.1% or 95 people of the total agreed the survey, then followed by 15 percent and 2.4% disagree and strongly disagree respectively, the overall feedback shows average health awareness of the participants.

Figure 22

Different sorts of waste generated
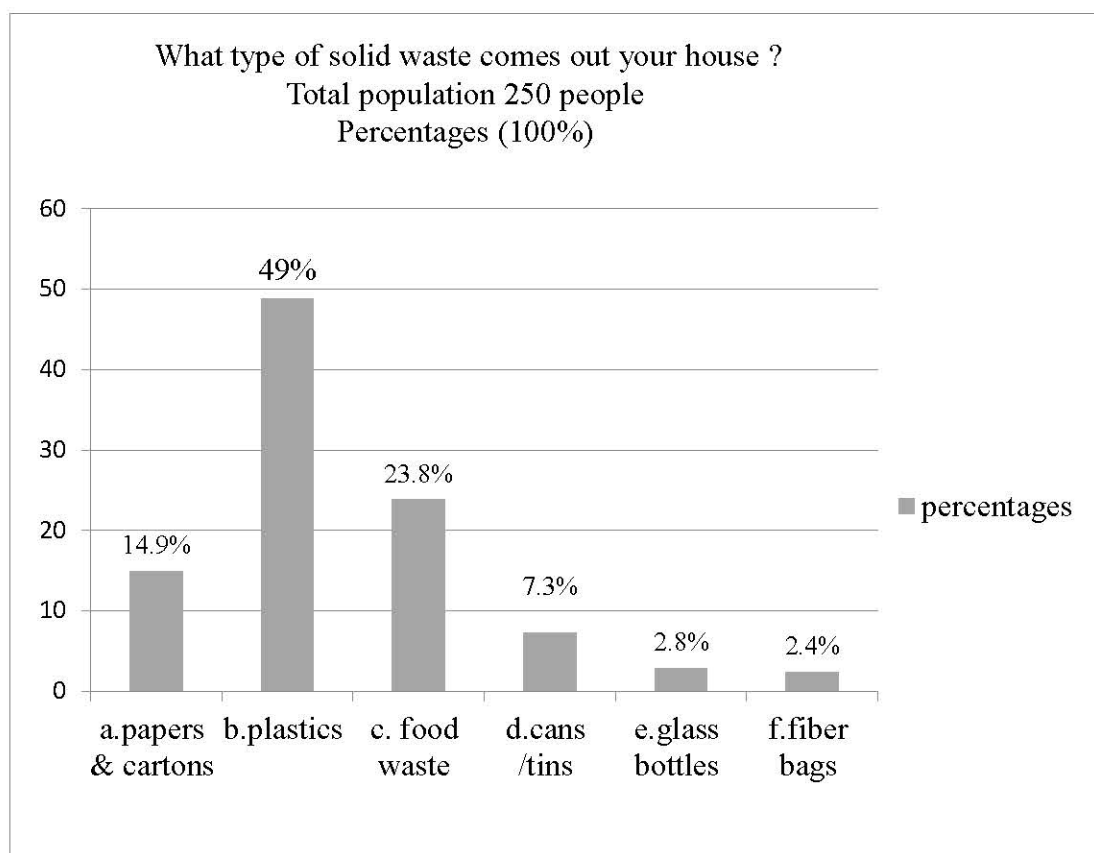
Here participants were asked to mention (what type of solid waste comes out your house?), with help of provided options available at the prepared survey questionnaires this respond showed that highest production of solid waste substances was number one is plastics which sum up an average of 49% or 123 people of the total of those 250, where food waste was second position 23.8% of the total of 250 participants followed by papers and cartons (14.9 percent) then lists goes down to Cans, Glass bottles and fiber bags which makes 7.3 ,2.8 and2.4 percents respectively, here we can clearly see that one number waste product of domestic household and municipal cities was plastics bags used widely .

Figure 23

Participants responded here what type of containers they use as home dustbin
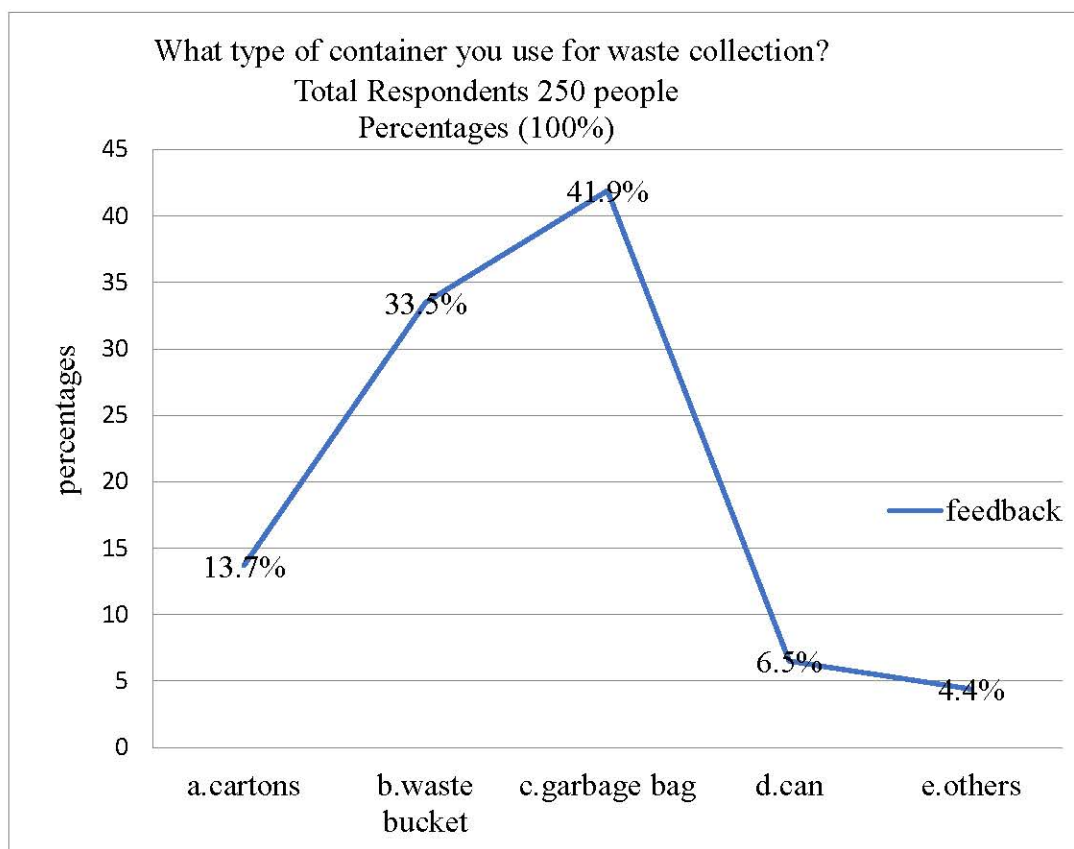
Graph illustrates how participants reacted (what type of container you use for waste collection?) which system of waste collections they used their homes with help of provided available options such cartons ,bucket ,garbage bags ,Cans and their respond was amazingly considered which showed mostly used collection container at the level of household with 41% which around 103 people reported that Garbage bags were used followed by waste bucket containers which was 35.5% or around 89 people of the total 250 used waste buckets at household level then cartons , cans , and others was mentioned with east numbers of round 13.7%,6.5% and 4.4% respectively .

Figure 24

We asked them how often they empty their dustbin containers
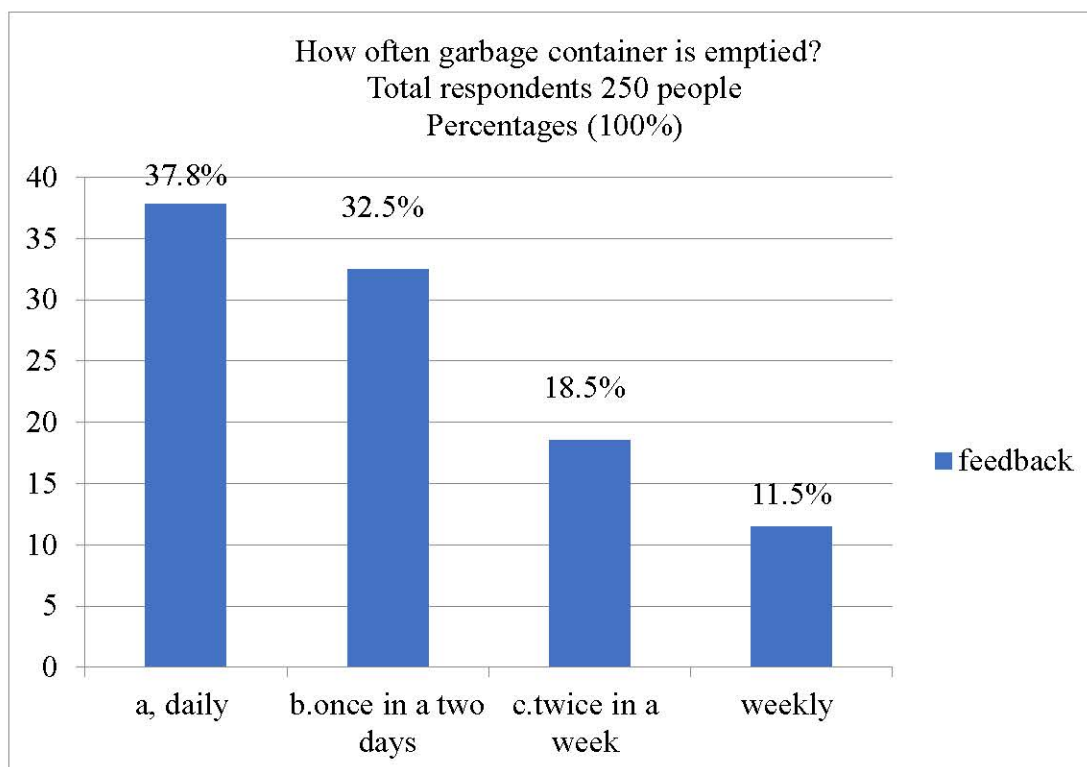
Participants were asked how often they empty the container they used as waste collection before disposing into dumpsites (how often garbage container is emptied?) with help of provided answers and their reaction was 37.8%or around 95 people out of 250 of the respondents they empty their waste containers on the daily basis while close number was also once in a two day was recorded as 32.5 % which is close to 81 individuals of the total (250) mentioned they empty while twice in a week and weekly 18.5 percent and 11.5 percent respectively here we can see that majority of the respondents were both empty their waste containers on daily basis and once in two days this is 70 percent .

Figure 25

Interviewees answer here if there are close public dust bin site near their areas
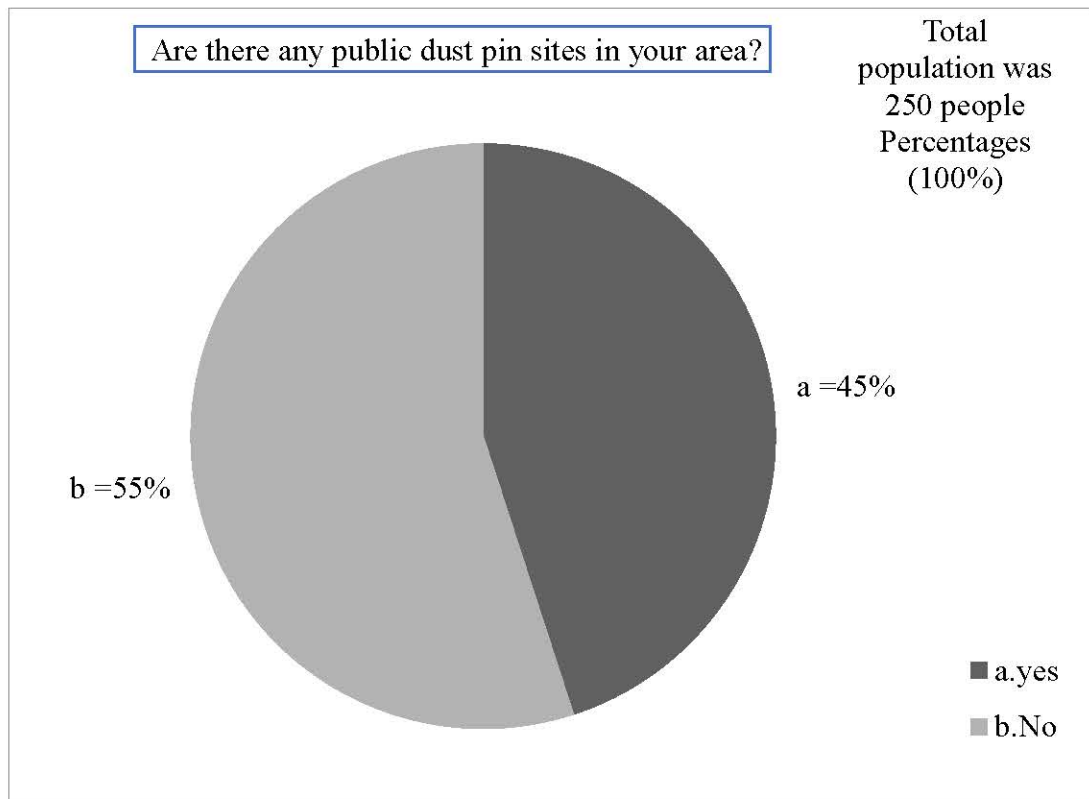
Here this chart participants were asked simple question which was if there is public bins near to the vicinities of the participants homes the available options was just yes or no answer where only 45 percent or 113 people of total participants (250) were response positively and remaining 55% of the 137 people of the interviewees were mentioned that the public bins are quite far from them which showed availability of the public bins is not fairly distributed in the selected areas therefore this issues encourages that people will not put themselves efforts to reach out distance of distributed garbage containers.

Figure 26

They discussed here for how long it will take to reach dumpsites
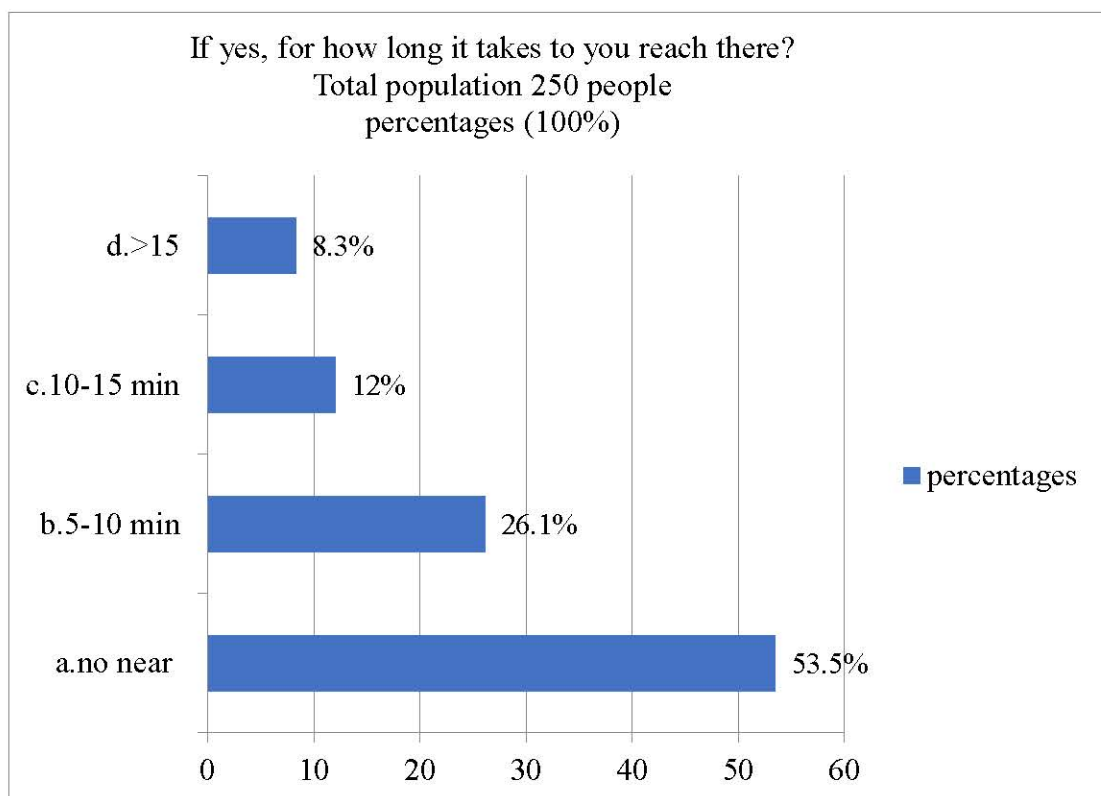
This chart depends on prior question if the participants agreed upon he /she had to answer this respond this also which said (If yes, for how long it takes to you reach there?) options varied from 1-5 min up to more than 15 minutes, the interviewees took part the survey and answered well where 53.5% around 134 people of the total 250 people were reported that they take them to take waste to the public dust bin quite long time which indicates that more than half of responded population has no access close to public bins provided by concerned which clear showed that local authorities hasn't played important role to provide containers equally to all towns , on the other hand 26% or 65 out (250 total) individuals of the respondents' narrated that takes them between 5-10 minutes to reach out the public bins ,followed by 12% and 8% for between 10-15 minutes and more than 15 minutes respectively therefore this respond showed that distribution management of the garbage bins are not given required attention which can lead dwellers to put solid waste inappropriate places such as roadsides bus stops and etc.

Figure 27

Interviewees answer here how often the public bins emptied by local authorities
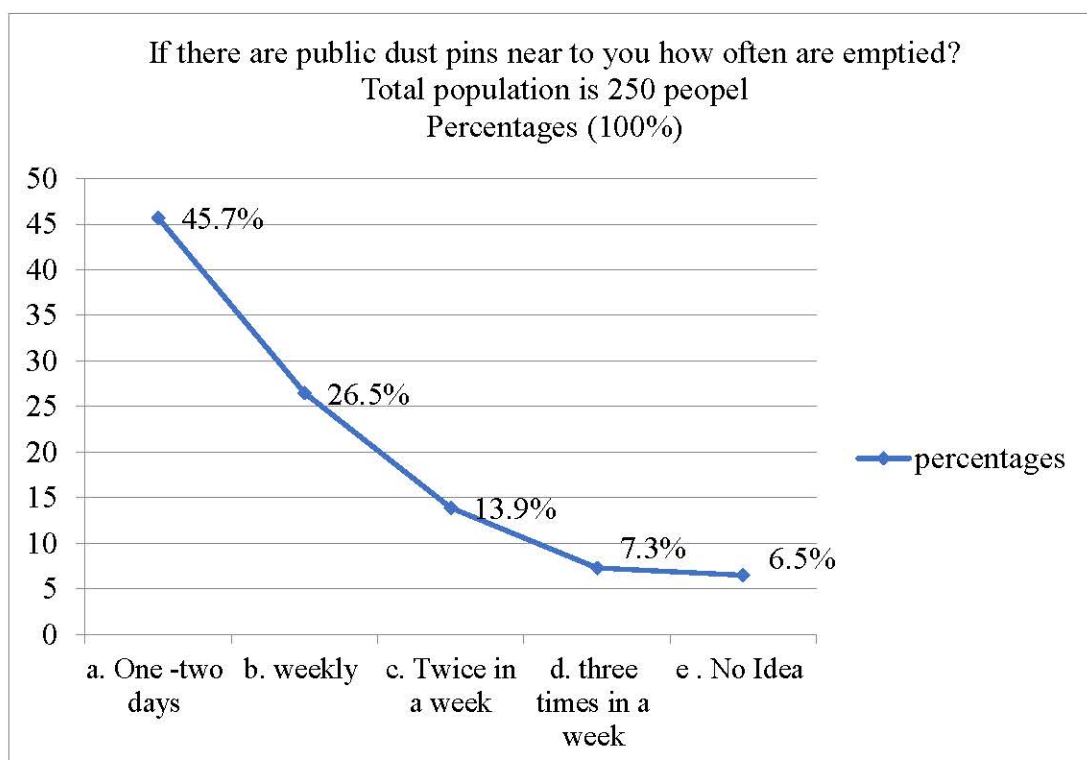
Chart here participants were been asked to report how the public bins are empted if they observed Highest vote recorded was that they reported that every one to two days public bins are empted which sum ups around 45% which equal to113 people of total respondents (250) then followed by 26.5% which is around 66 individuals reported that on weekly basis local authorities empted the public waste containers other options were accumulated 13.9 percent, 7.3 and 6.5 respectively which can be considered as insignificant report.

Figure 28

We asked them to describe the sanitary conditions of public containers they used

How can you describe the condition of the public pin you nearby you?
Total population = 250 individuals
Percentages (100%)
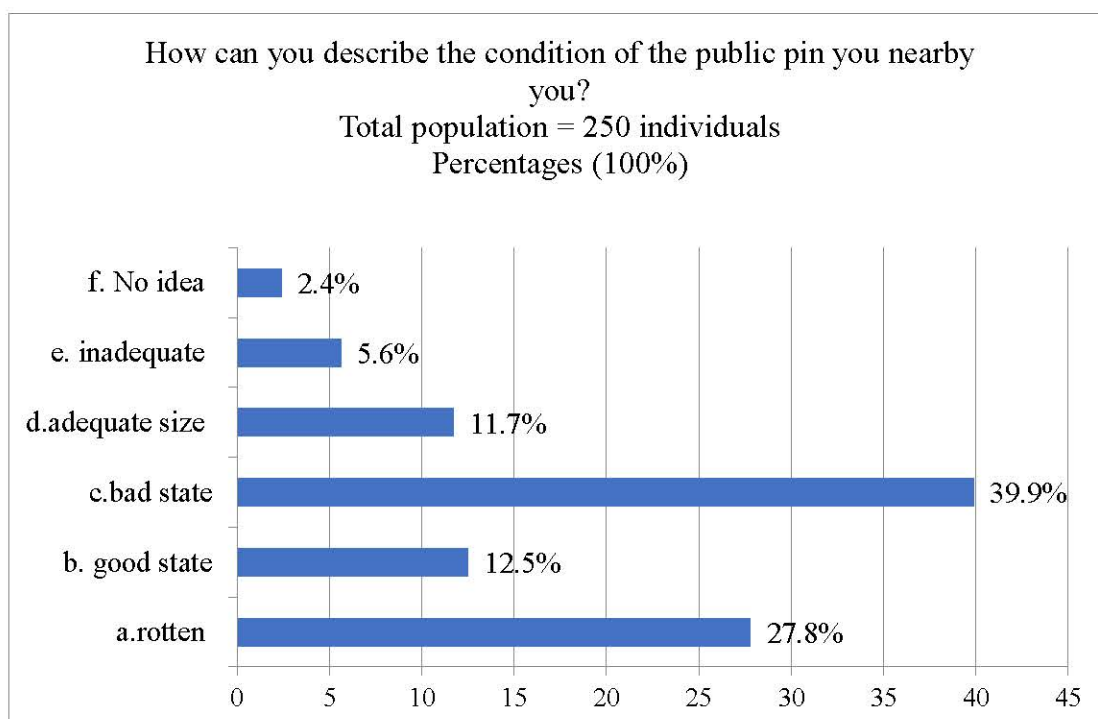
In this question interviewees were asked to give report about the health conditions of their public bins here participants reported mostly around 40% or 100 individuals of the total 250 reported that the condition of public bins were not at good state contaminated and smelling bad, while approximately 27.8 % of the total respondents (250) and 12.5%,11.7%5.6% and 2.4% were reported that good condition, adequate state ,inadequate and no idea at all respectively also reported the public bins were rotten condition if we analysis both this make around seventy percent of the total unfortunately this shows that general health of the public bins reported as deteriorated conditions ,Also other interviewees narrated that some areas had public containers which were less adequate in size .

Figure 29

They mention here if they know any waste management near their vicinity

Do you know if there is waste management in your vicinity area?

a =23%

Total population 250 individuals Percentages (100

b =77%

■ a.Yes
■ b.No
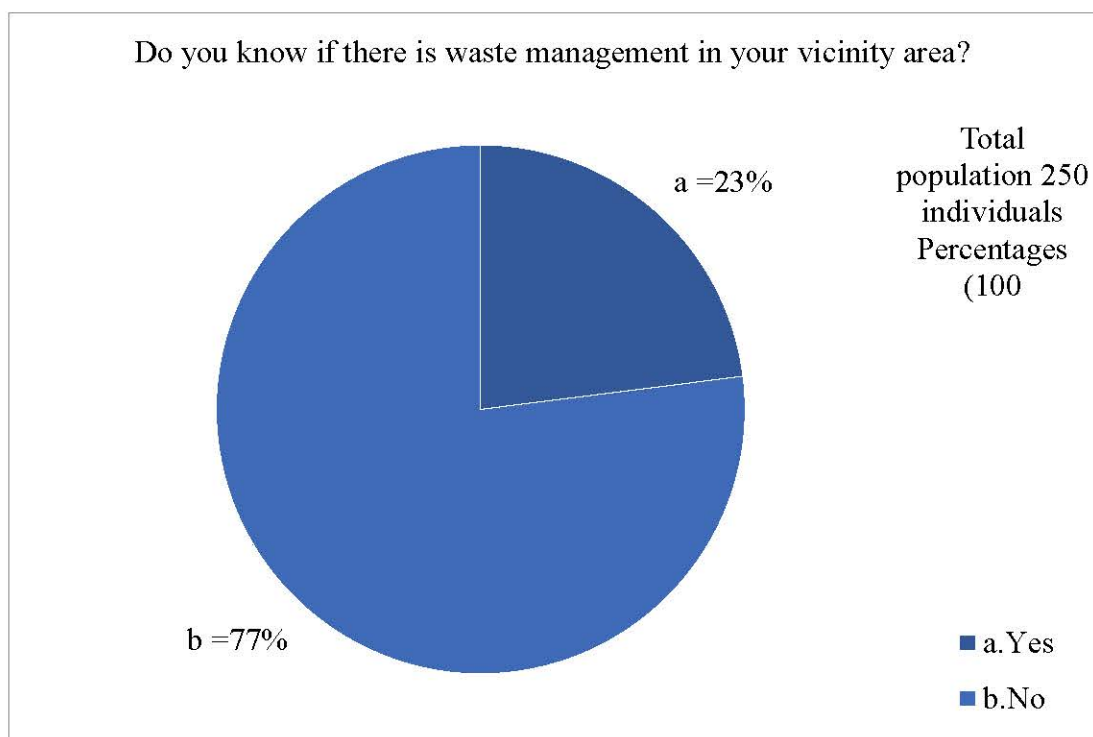
In this question interviewees were asked to react if they had come across any waste management centre in their surrounding vicinity they responded as 77% which is equivalent around 193 out of the total number of 250 people individuals of the respondents showed they haven't seen any management concerns about waste management while remaining 23% of the remaining had supported the question positively but majority of the interviewees hadn't come across any waste management, therefore we can see here majority haven't reported waste management centres and lack of waste management programs lead poor hygiene and also lack of public awareness towards importance of solid waste management's.

Figure 30

We suggested participants if they somehow felt satisfaction about waste management centres of their villages
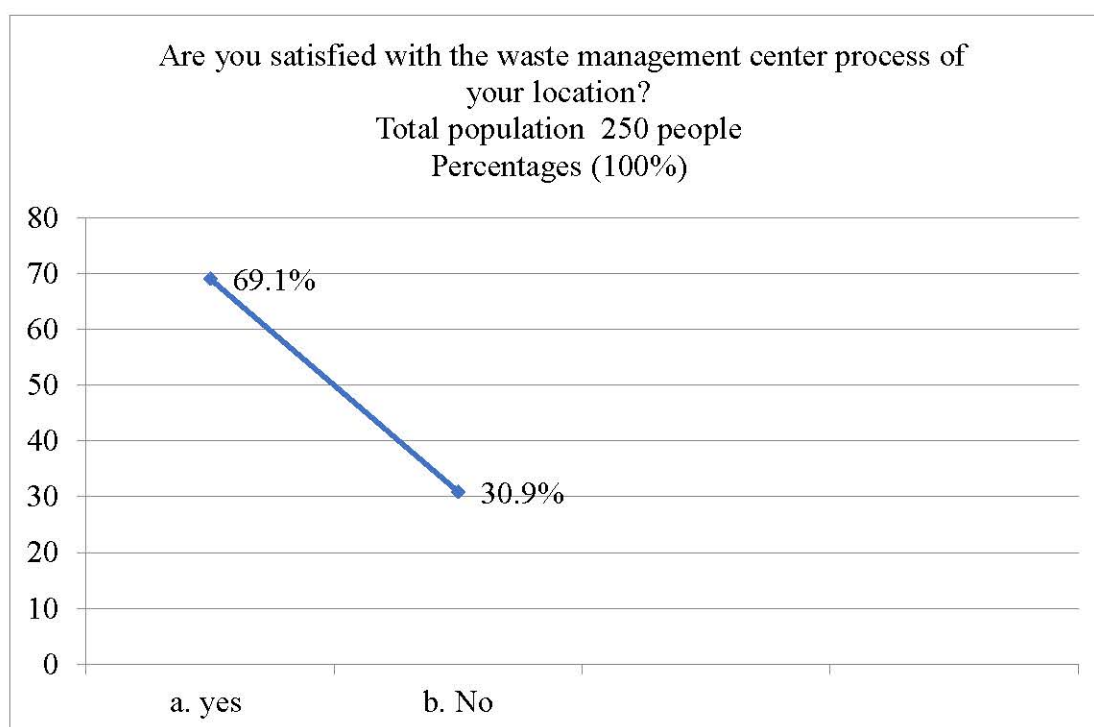
Participants have been asked the participants their level of satisfaction in case there is waste management centre in their villages and 69.1% which was around 173 people of the target population (250) have reported that they have well satisfied the service of the waste management centre, while remaining of 30.9% or around 77 persons of the participants didn't reported any satisfaction at all.

Figure 31

Selected people here discussed if they have good awareness of importance of recycling and here

Do you have any idea about the importance of recycling?

b =27.5%

a=72.5%

Total respondents Percentages (100%)

■ a.yes
■ b.No
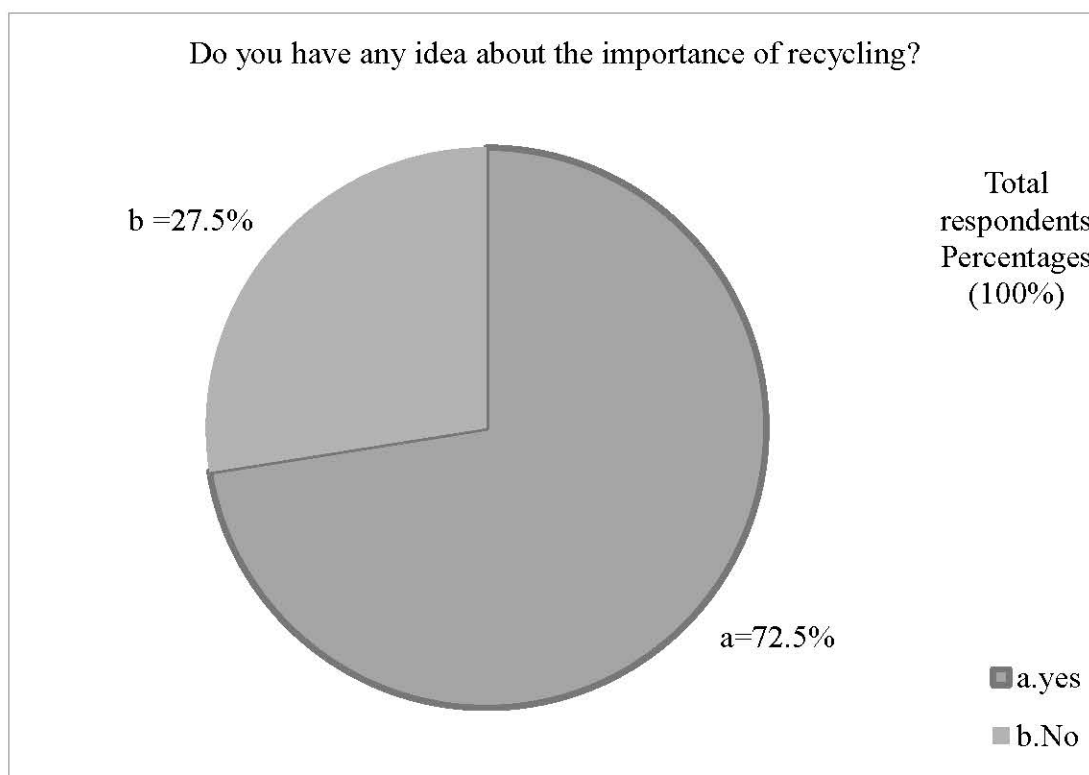
Respondents were asking if they had any idea about existence and importance of recycling system to reduce solid waste materials 72.5% which around 182 out of total of 250 target population individuals had answered that they have enough knowledge importance of recycling and 27.5% which sums up around 69 people said they don't, therefore majority of the participants had good awareness about importance of recycling.

Figure 32

We tasted what participants believe about the substantial of the solid waste recycling
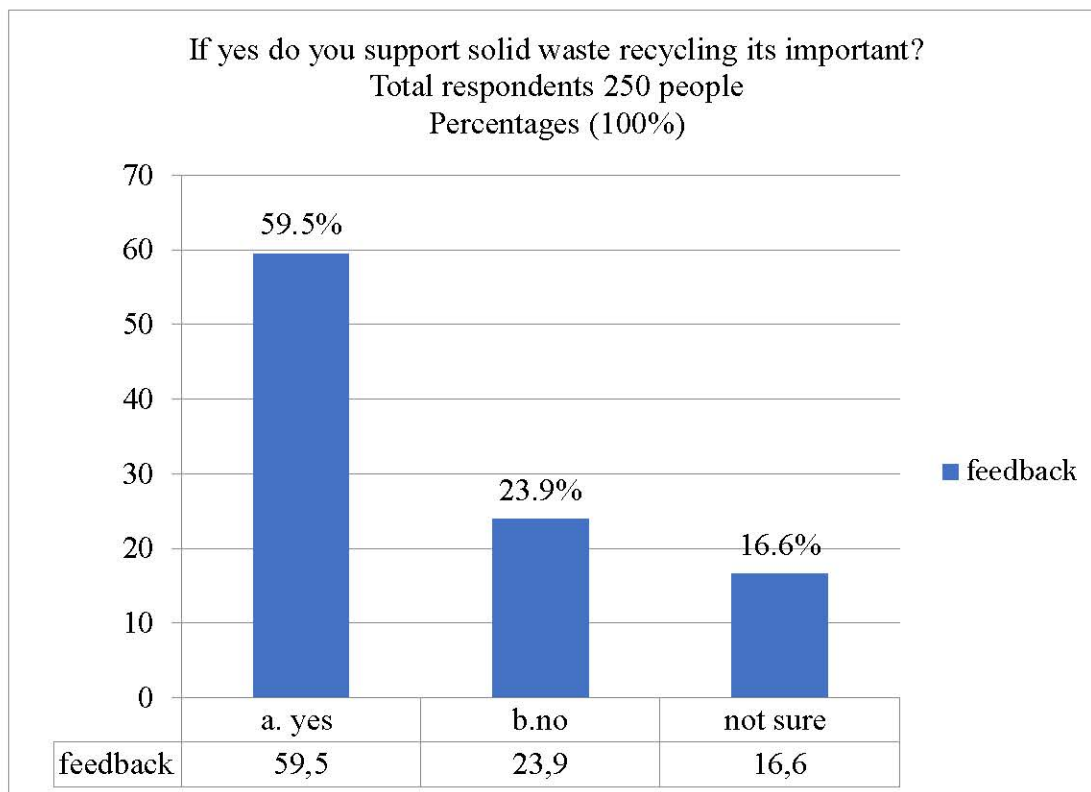
On this Chart after knowing the knowledge of the participants about recycling of the solid waste material then we asked them if they agree that recycling is solution for minimizing of the solid waste production and 59.5 % or 149 people out of the total two hundred and fifty (250) of them agreed on this while only 23.9 % or 60 individuals was against the importance of recycling of solid waste materials while 16.6 percent were stood in neutral position.

Figure 33

Interviewees discussed here if they believe disposal ways are problems sometimes

Do you believe the waste disposal ways is a problem in your neighborhoods?

b =19.8%

Total respomdents 250 people Percentages (100%)

a.yes ■ b.no ■

a =80.2%
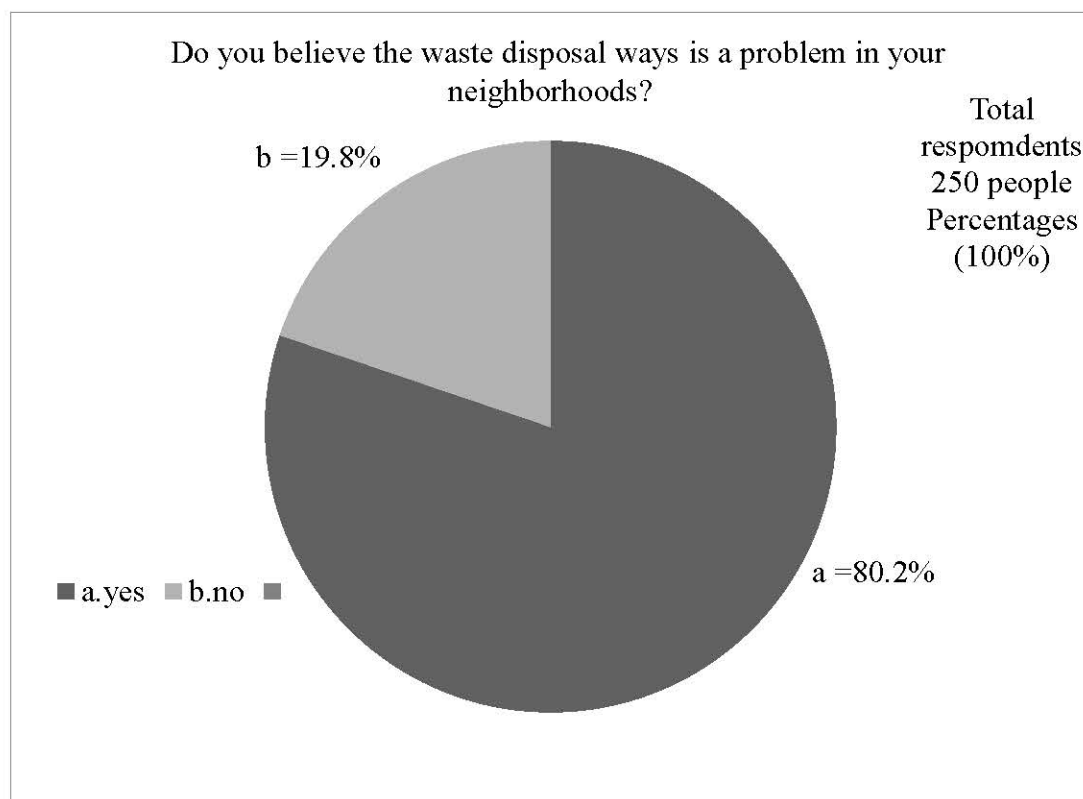
Here participants were asked to report how their neighbourhoods implement ways of the disposal of solid waste materials so they narrated that their neighbours had been using different ways of disposal but in general had enough awareness of ways of disposing waste into respected sites where above 80.2% which around 200 people of total of 250 people reported they used various containers to dispose then into public bins while the remaining 20% of the target population has not reported ways of their disposal methods .

Figure 34

We asked people if they are willing to sort wastes if they find recycling establishment near by
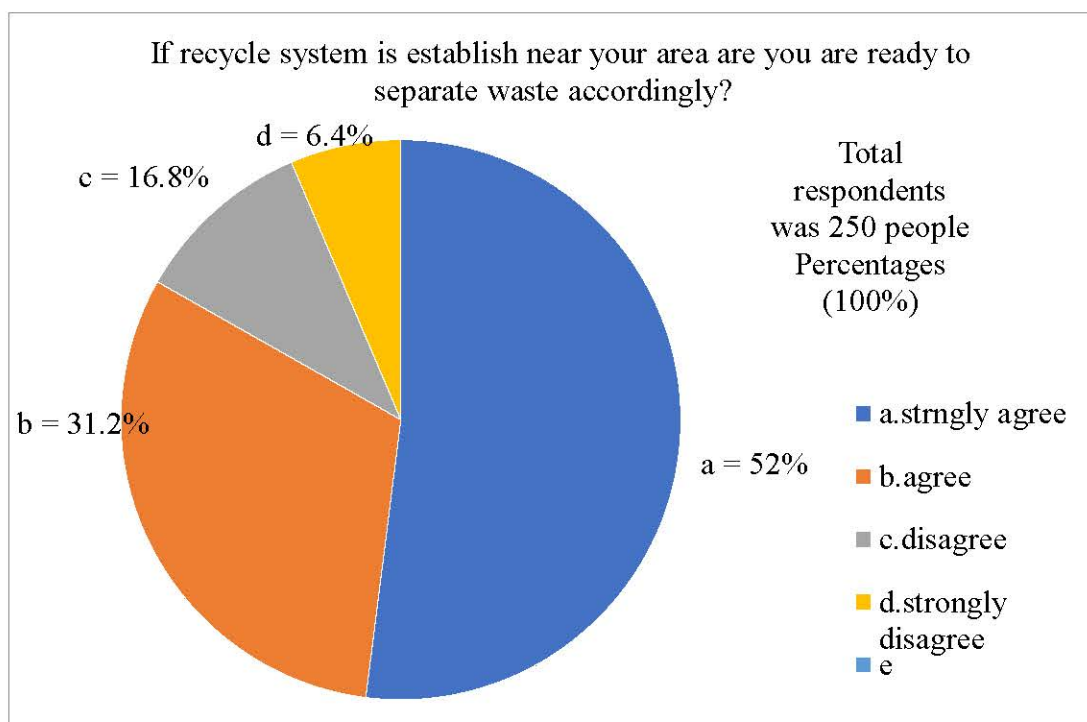
here we asked interviewees if recycling centre is ready close to their area if they are ready to sort out solid waste into their respective origin and then separate so that recycling become easy and accessible (If recycle system is establish near your area are you are ready to separate waste accordingly?) and 64% or 160/250 people agreed and showed that they are ready for this while around 24% or 60 individuals said they don't have time for this separation process because its time taking process and 11% of the remaining persons said they are not sure if they will be having time and commitment to do so.

Figure 35

Respondents discussed here current health awareness

What is the current health awareness status in the locality?
Total respondents 250 people
Percentages (100%)
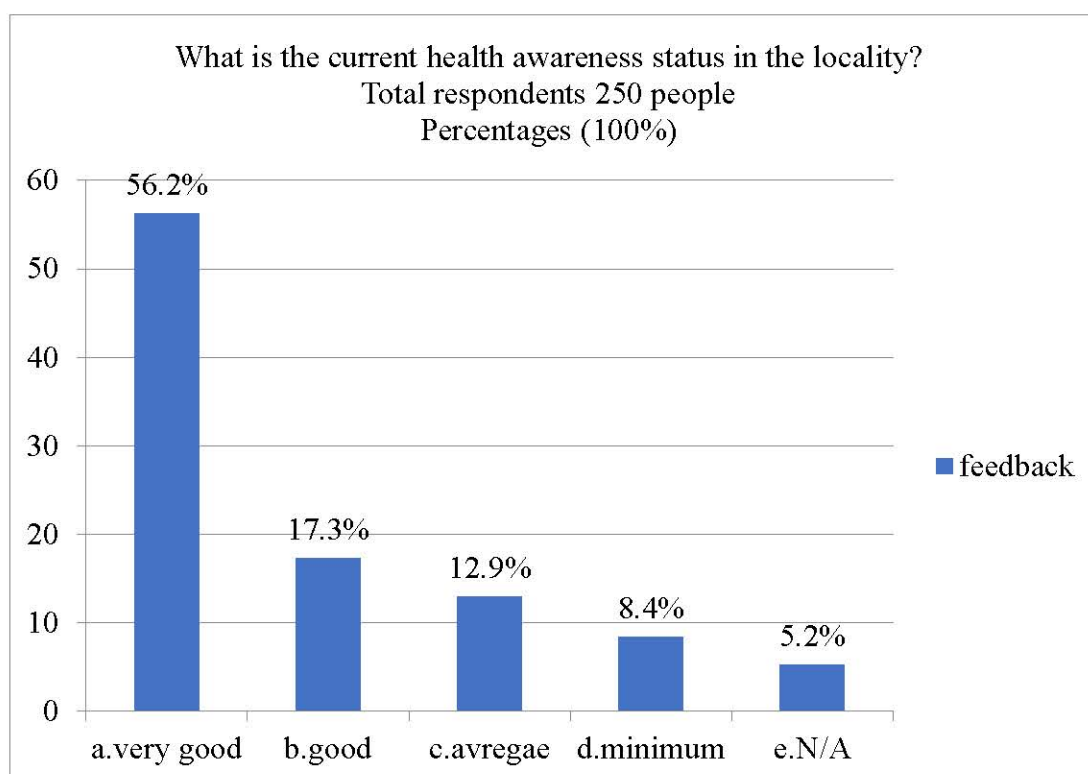
Here they responded the above mentioned question which says (What is the current health awareness status in the locality?) majority of the respondents 56% or around 140 people out of the general number (250) reported that the health condition awareness very good average this anticipated that majority of the selected villages had enough awareness towards local health conditions while 17.3 percent or approximately 43 persons said health awareness is up to the par, 12.9 percent reported as average condition and 8.4 percent argued that awareness is too low.

Figure 36

We interviewed the participants if they method of purification for domestic water
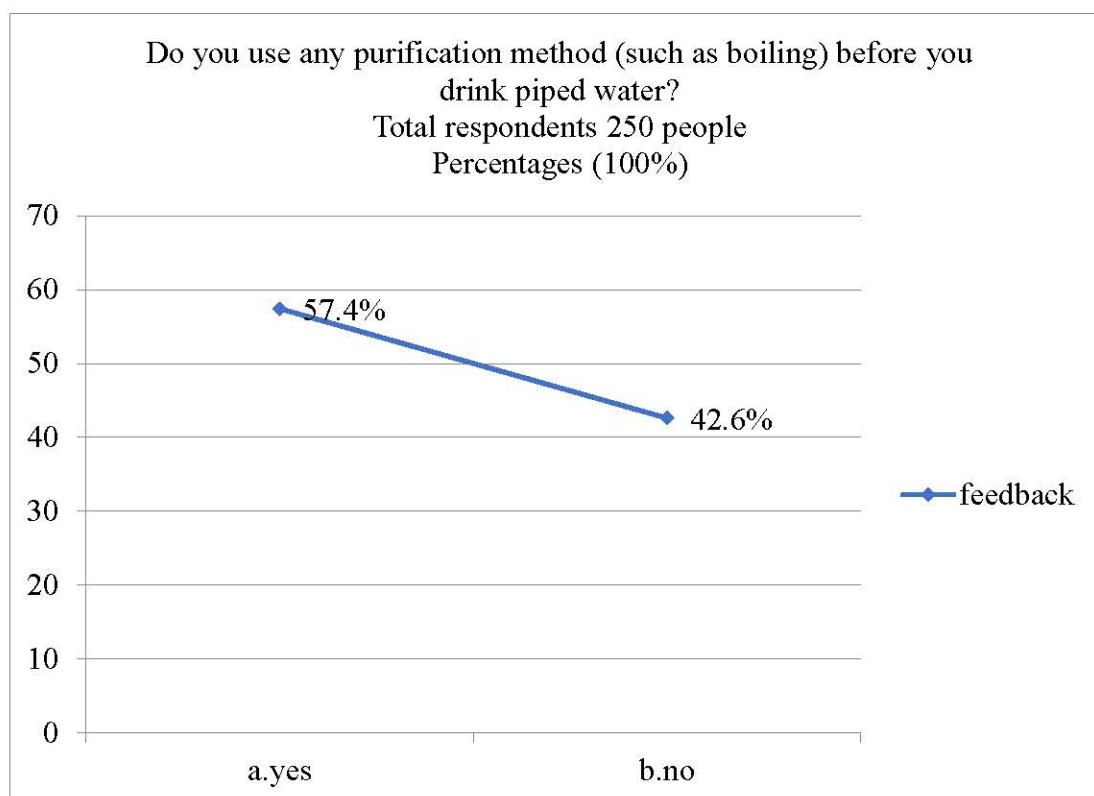
Do you use any purification method (such as boiling) before you
drink piped water?
Total respondents 250 people
Percentages (100%)

Here interview emphasized if the respondents use any method of purification for their drinking water and 57.4 or around 144 persons of the total 250 people of them responded positively and narrated they use a method of purification while huge number of them 42.6% report they just drink water without any purification/ filtration method .

Figure 37

We asked them which purification method they use for water
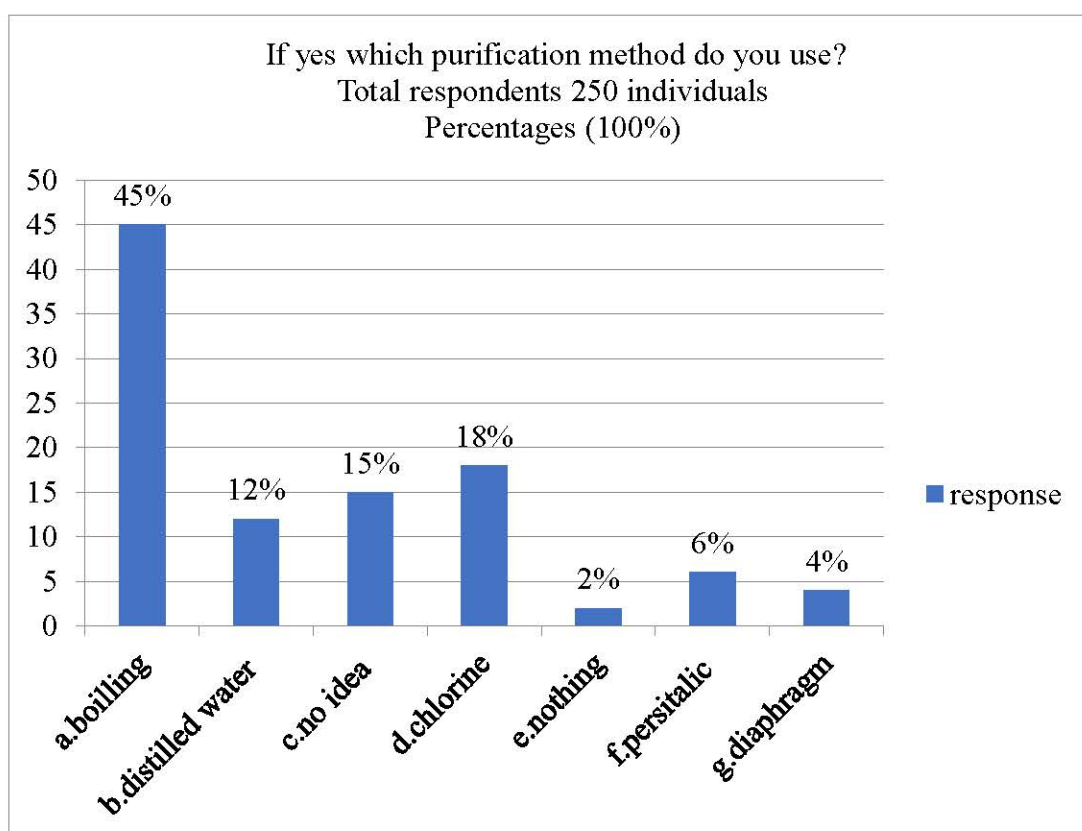
On this chart we been asked those who mentioned they use purification method to describe which method they used for their water for drinking and domestic use and 45% or around 113 persons of total of 250 people reported they used boiling to system to kill the bacteria and other microorganisms 12% or 30 individuals they mention use of filtration method which is old method to filter water until suspending material settle down and then water is ready for use 15% or 38 people they had no idea what system they used but insisted they use clean water while 1 percent they use chlorine disinfectant chemical to kill the pathogens and 18% they reported they used chlorine as disinfectants followed by 2% ,6% and 4% they used by nothing, f. peristaltic respectively.

Figure 38

We asked them if they took part any cleaning activities in last 12 months
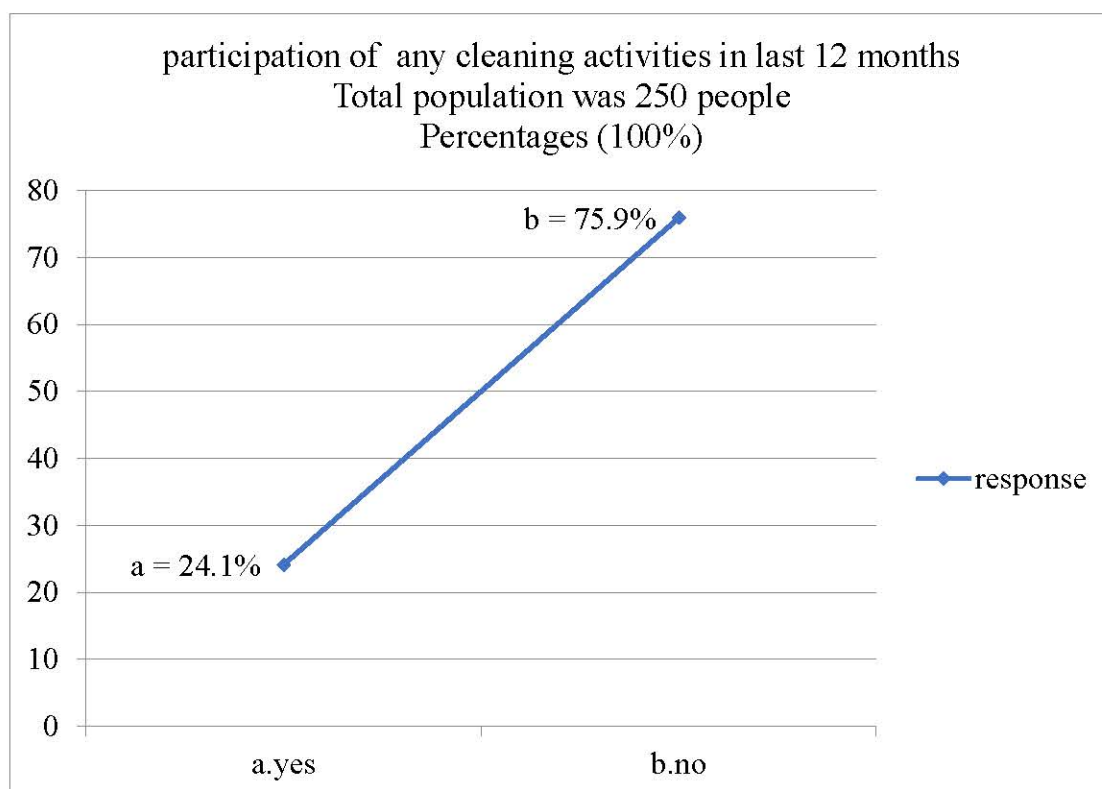
Above graph we asked them if they voluntarily participated cleanup activities in the last 12 months (This year, did you or any member of the family participate in any community cleanup activities or other voluntary cleanups?) the results showed that more than 75.9% or around 190 person out of the total of 250 people they didn't take part any activities so far While only 24.1% or 60 persons answered as yes and mentioned they did voluntary participation in the last twelve months.

Figure 39

On this above graph we asked them if waste management can be environmental problem

In your opinion is waste management an environmental problem?
Total respondents was 250 people
Percentages (100%)
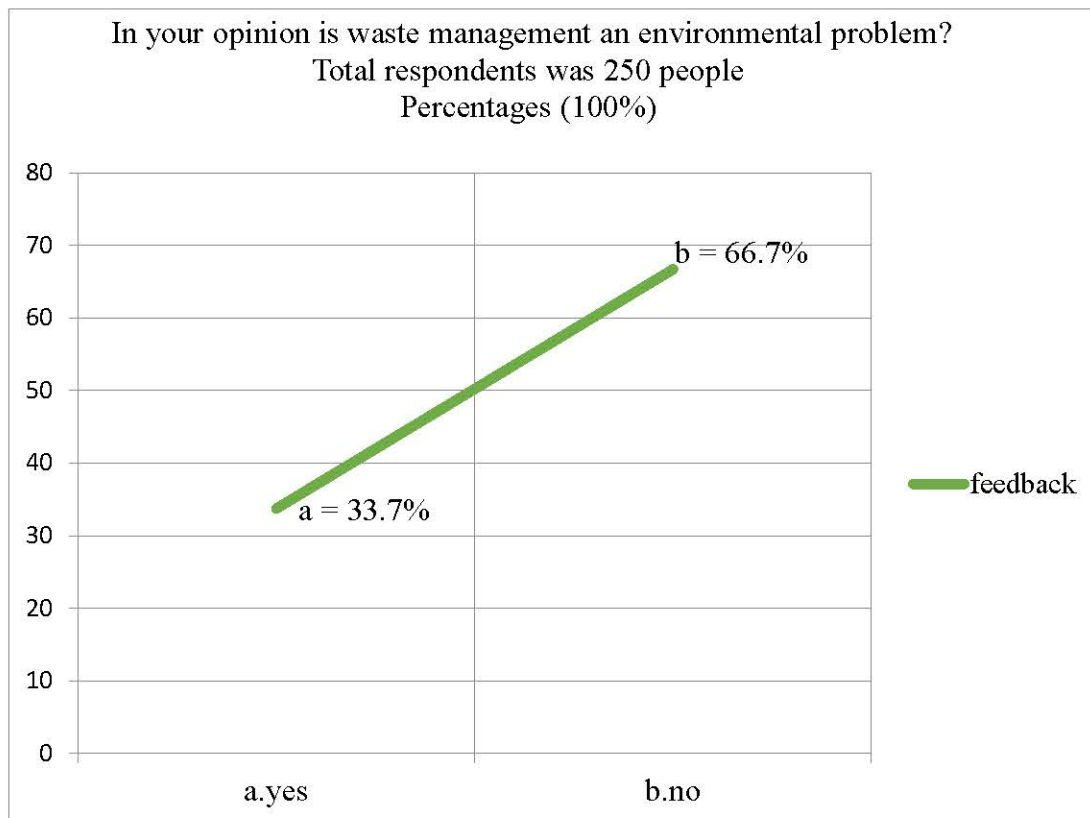
Participants answered (in your opinion is waste management an environmental problem?) 66.7% which is equal to 167 of the total (250) persons believe that waste manage management is friendly to the ecosystem and good for environment while 33.7% 83 people narrated negatively respond anyway awareness here is not bad enough participants agreed on the question.

Figure 40

We asked the participants if they have any idea how their service providers dispose the solid waste

Do you know how your service provider disposes your collected waste?
Total interviewees is 250 individuals
Percentages (100%)
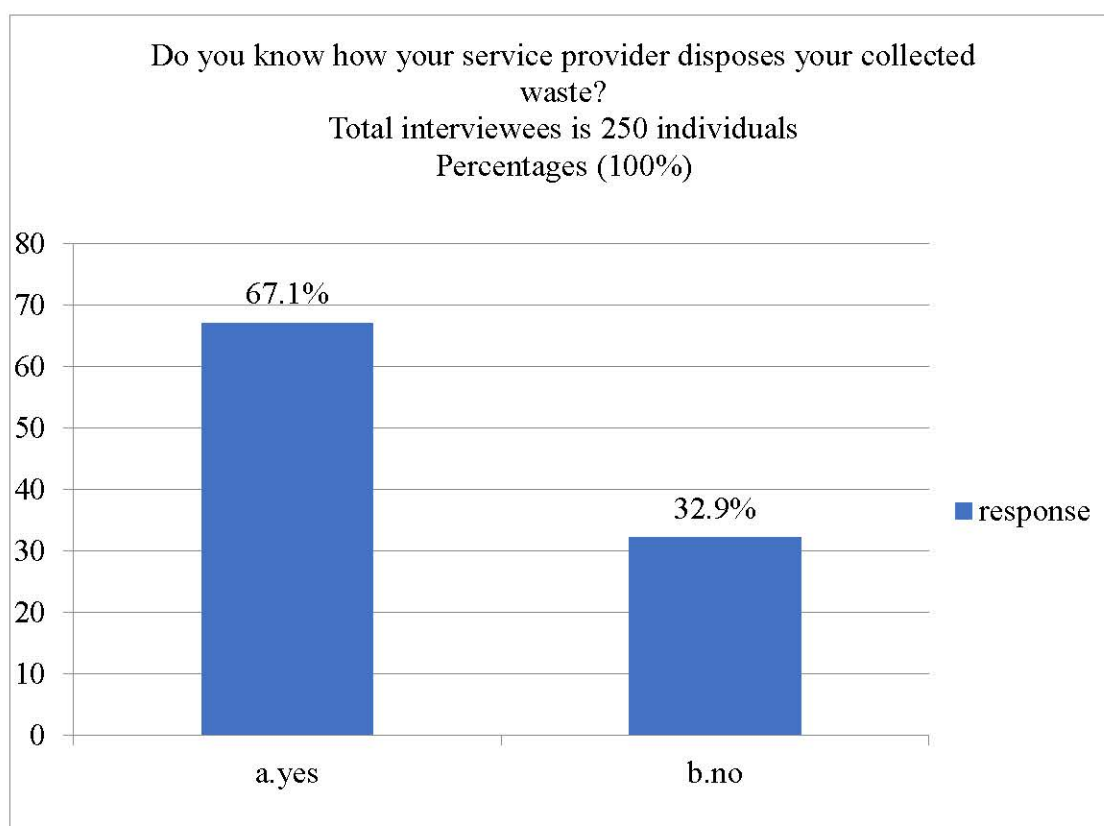
Participants were asked if they know the local municipal authorizes management and around 67.1 percent which is around 168 persons of the total responded yes while 32.9% 82 person of the remaining were reported that they do not have relation with those who management the waste they generated at all.

Figure 41

Above chart we asked participants if they have any concerns about the service of their service providers

Are you concerned about the disposal methods of the service provider?

b = 27.1%

a = 72.9

Total respondents was 250 people Percent(100%)

■ a.yes

■ b.no
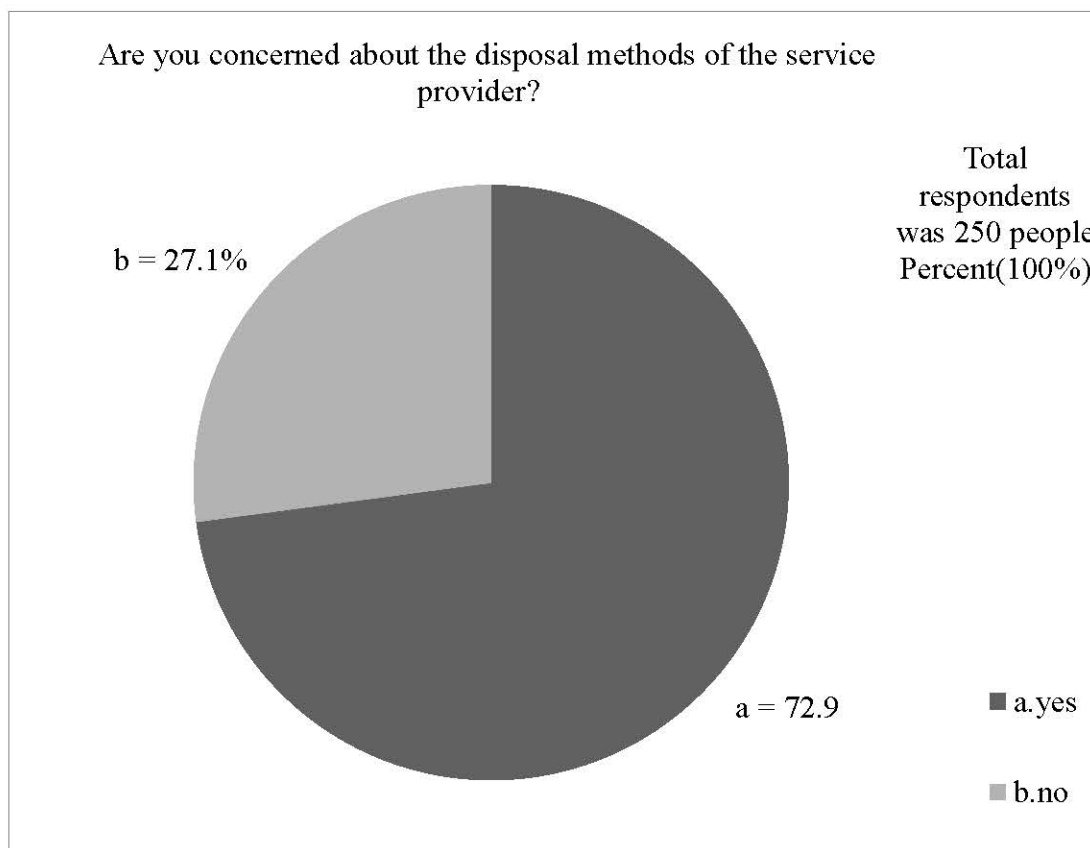
On this Chart we asked the selected individuals if they are concerned about how local authorities were handling from collection points to disposal point the generated solid waste particles approximately 73% or approximately around 183 people where showed positive response of how they were concerned how this those teams handle the issues While 27% (67/250) were happy with the service provided.

Figure 42

We asked the interviewees if environmental degradation has affected their surrounding

Do you consider that environmental degradation has negative effect on your area?

Total target population was 250 people Percentages (100%)

b = 29.8%

a = 70.2%

a.yes

b.no
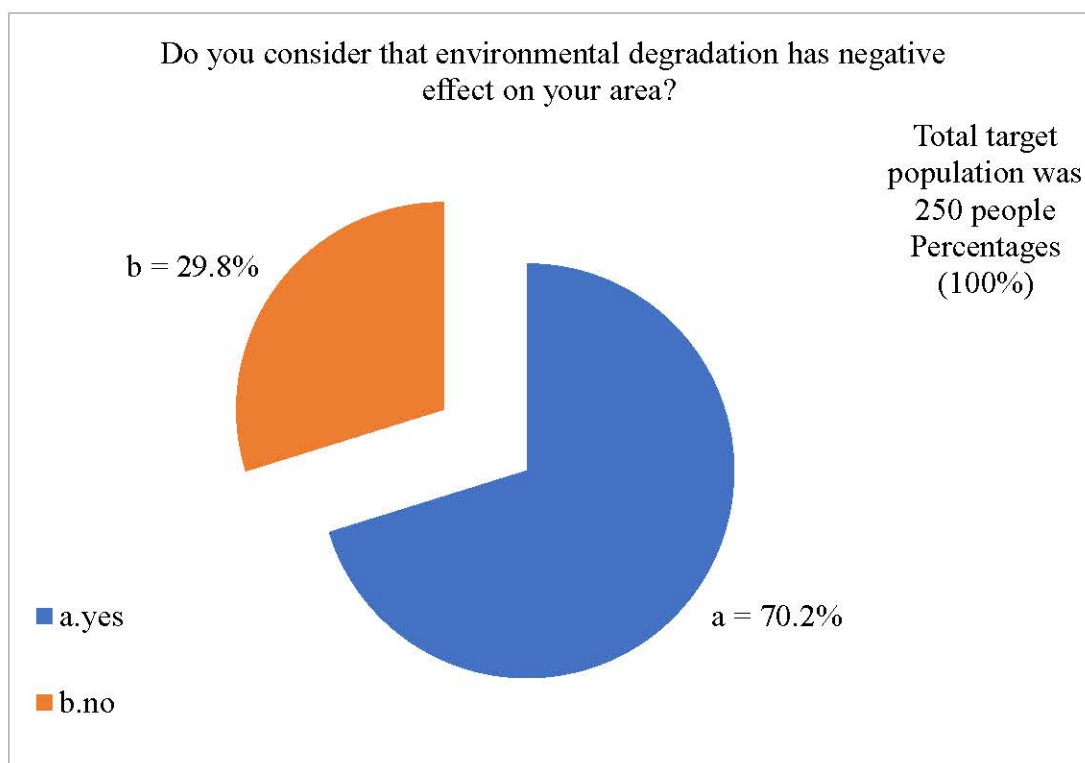
Is the result of in a chart form of question we asked the interviewees (Do you consider that environmental degradation has negative effect on your area?) were above 70% (175/250) considered environmental degradation as huge impact on environmental condition of their respected areas other remaining number of 30% or 75 persons of the total had no enough environmental awareness toward the environmental degradation at all.

Figure 43

Interviewees discussed here if better environmental can come tomorrow

The better future of environmnet
Total target population was 250 people
percentages (100%)
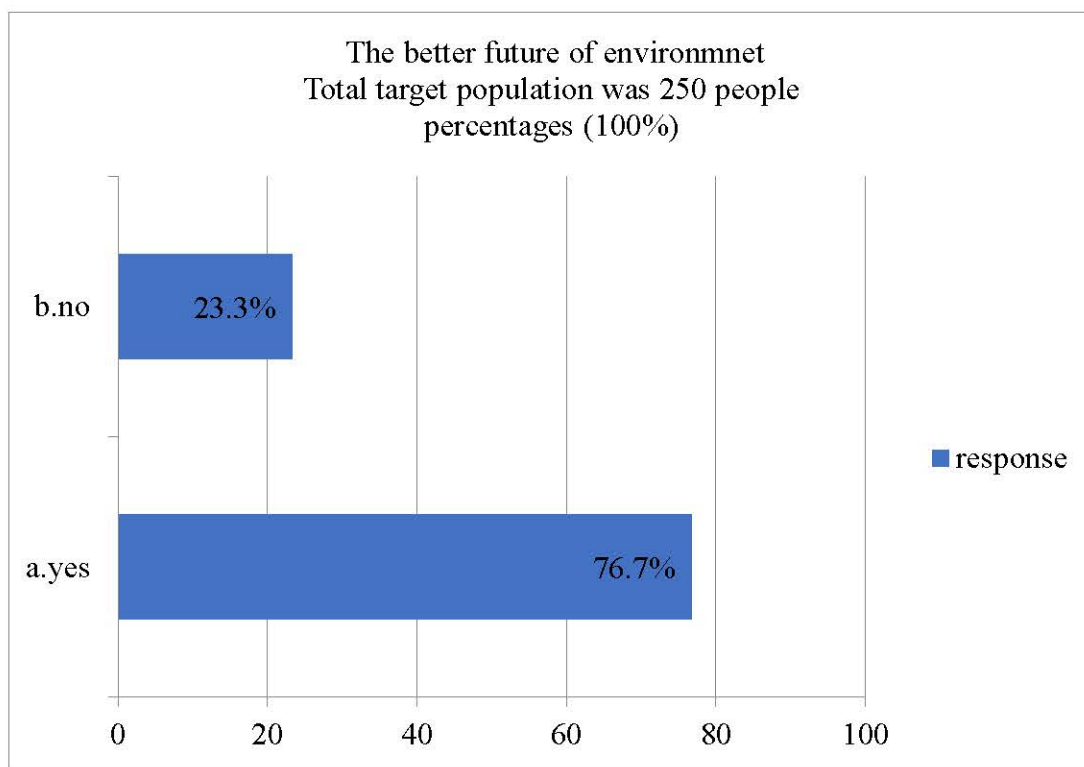
Around 76.7% or in figure of 192 people of the total number of the target populations agreed and hoped if the efforts continue that future of the better environmental is possible while 23.3% 58 persons had less hope and argued it's impossible for better future.

CHAPTER V

Discussion

An excellent representation of the gender of respondents, both female and male, as well as their marital status, job experiences, age, and educational background There were 138 male respondents, which accounts for 54%, and 89 female respondents, which accounts for 35.7%. 108 respondents, or 43.4 percent of the total, were between the ages of 20 and 24 years old. This age group was followed by 89 respondents, or 35.7 percent, who were between the ages of 25 and 34 years old. The remaining ages, those between 35 and 44 years old and those more than 44 years old, each accounted for 14.9% and 6.11% of the total population, respectively. When it comes to the marital status of the interviewees, 46.7 percent of the total respondents were reported to be single. This was followed by 42.7 percent of the total respondents who were married, 6.5 percent of the total respondents who were divorced, and 4 percent of the total respondents who were widowed. If we look at the educational backgrounds of our respondents, we discover that the vast majority of them have at least a high school diploma, with 70 percent of those 94 percent holding college degrees in addition to their high school diplomas. Despite the fact that the employment rate was low, we are able to draw the conclusion that the reliability of the replies meets or surpasses the minimal criteria as a result of the information that has been provided to us. There were 92 percent of respondents who either had between one and five years of experience in the field or had participated in voluntary action to support clean environment initiatives. Of the respondents, 65 percent were employed, while 35 percent were self-employed.

According to chart number 01 illustration of gender of the respondents the feed of the respondents showed that around 54 percent of the participants were recorded as male which may sum up around 138 were identify as male ,while on the other hand female also sum up around 46 percent which equivalent approximately 112 participants were identified as female respondents and Chart number 02 marital status of the respondents the greatest marital status of the respondents were responded was single which showed up 46.8 percent which summed up around 116 of the entire respondents then next by married individuals come up with 42.7 percent of the total participants which equivalent around 106 people were recorded themselves as

married individuals ,While the divorced personal and widow were bottomed least respondents as 6.5 percent (16) and 4 percent (10) were resulted respectively.

The feedback of the respondents showed that the highest generation responded were between the ages of 20-24, which are mainly the youth of the population, and the second highest generation was ages 25-34, which summed up to 35.7 percent and around 89 individuals of the entire respondents. This information is shown in Chart number 03, ages of participants. Those who were 35 to 44 years old made up 14.1% of the respondents (37), while those who were over 44 years old only made up 6.6% of the respondents (15 persons), which is a much smaller amount than the number of respondents who were in their younger years.

The respondents' average levels of educational attainment the majority of the participants graduated college school and master degree which sums up around 84 percent equivalent around 210 individuals of total respondents were at least graduated undergraduate school or high whether its graduate or even post-graduate programmes with that said it gives un great hope that the vast majority of the respondents are well educated people which create a good level of confidence for their feedback and contribute great value into our research topic, while 15.5 percent(22) at least had high school certificate then followed by high degree holders which accumulates around 8.9 percent of the total population then finally none- formal education which was recorded as 2.4 percent shown as minority of the respondents and can be considered as insignificant contribution although they showed enough experience towards the field , According to chart number 05, occupations of the participants the chart that was displayed above represented the occupational representation of the respondents, which showed that 45 percent of the individuals (107) were employed both in public and private sectors while 40.3 percent around hundred people were recorded themselves as unemployed people in that case, we can see that both employed and unemployed are almost equivalent to each other, then followed by self employed, which contributes around 1 percent of the total, and finally, self employed which contributes around 1 percent of the total.

As was mentioned in Chart number06, which represented the respondents' work experiences, 40.9 percent (101) of respondents had experience between 1-2 years, then followed by 27.1 percent (67) of respondents who had work experience

related to the field of 3- 4 years, then followed by 15.4 percent (33) of respondents who had good experience between of 5 to 6 years, and finally 10 percent of respondents who had work experience above 6 years, while those who had no experience at all were accumulated as less than or equal to 8 percent of the total. And also Graph number 01 participants were asked if they heard the risks associated with solid waste, and they answered well where above 80 percent of the participants responded positively which shows they have enough information about the health risks, environmental risks, and social risks associated with solid wastes and dumpsites while the remaining number of the participants had no enough awareness of the risks related to solid waste although this feedback is less impersonal. Graph number 02 participants were asked if they heard the risks associated with solid waste, and they answered well where above 80 percent of the

While the awareness of the interviewees regarding the pollution of the environment in general is represented by graph number 07, which shows that the interviewees gave a positive response to the question of how waste can pollute the environment in general, and more than 70 percent of respondents gave feedback in the form of a positive answer, indicating that they had sufficient awareness regarding the relationships between pollution and solid waste. On the other hand, approximately 28.5 percent of respondents had less information and awareness regarding the problems associated with pollution.

On Chart number08 the feedback of how participants evaluate if waste can be used as resource or not, on the question respondents given whether they have idea if waste can be used as resource or not and they responded well where around three quarter responded positively and showed that waste can be used as resource if we put technology on the use of it such biogas method to produce heat which may enhance good quality of electricity both domestic and commercial on the other hand 23 percent of the total respondents had no idea or had any knowledge if waste is use full interns of resources, Chart number09 the interviewees were asked if (Does the Chemical safety and poor water quality are major environmental health issues?) with provided (MCQS) options where huge number around fifty percent of the total populations of the interviewees were shown that they are strong agree with the question then followed by 32 percent whom were agreed so this case both agreed and

strongly agreed number of the respondents were also above 2/3 of the total were those who did not agree were insignificant number (11.2 percent and 2 percent) respectively.

On this particular graph, number 03, users were asked to respond to the following question: "Can improving access to clean water and proper sanitation help reduce environmental health issues?" It was indicated in chart number 11 that the responders to the question which (Environmental dangers raise the risk of cancer, microbiological diseases?) Those who strongly agreed with the question made up 30 percent of the total interviewees, followed by 25.5 percent of interviewees who disagreed with the question and 24.1 percent of interviewees who strongly disagreed with the question altogether. This summed up to more people who agreed with the statement, so 49.1 percent of respondents were totally against the idea that environmental hazards increase the risk of cancer and microbial diseases, which demonstrated how respondents felt.

On Chart number 12 pie chart explains how participants given reaction the query which was (how does the Poor water qualities can lead to gastrointestinal illness and diarrhoea outbreaks?), given options were from strongly agree all the way to strongly disagree around 57 percent (141 individuals) were agreed the question where also 32 percent of the interviewees given agreed respond which clearly shows here in this question participants had enough awareness how poor water quality can lead outbreak of diseases , only 10.9 percent were both disagreed and strongly disagreed which can be considered insignificant figure , and Chart number 13 the figure represents the reaction of the participants on (Does Waste is one of the environmental problems that need immediately attention?) Whereas 47 percent of respondents strongly agreed that the question was being asked, followed by 37.6 percent of respondents who also gave a positive reaction (agreed), while 11 percent disagreed and 3.2 percent strongly disagreed, here also interviewees had excellent awareness towards the query as well as an excellent understanding of what was being asked as well as what was being asked of them. The response to the question posed earlier is seen in graph number 04, which asks, "Is reusing plastic bags for shopping a good way to reduce waste?" option as usual was ranging from strongly agree all the way to strongly disagree, and feedback of their reaction was linear in a downward

direction starting from strongly agree with 45 percent, 33.3 percent agreed the survey, then followed by 12 percent and 8 disagree and strongly disagree respectively, the overall feedback shows an average level of health awareness among the participants, and Chart number 14 represents feedback of the question that was asked above (caring about waste management). option as usual was varying from strongly agree all the way to strongly disagree and feedback of their reaction was linear downward direction starting from strongly agree with 44.5 percent, 38.1 percent agreed the survey, then followed by 15 percent and 2.4 disagree and strongly disagree respectively, the overall feedback shows average health awareness of the participants and also Chart15 here participants were asked to mention (what type of solid waste comes out your house?), with help of provided options available at the prepared survey questionnaires this respond showed that highest production of solid waste substances was number one is plastics which sum up an average of 48.8 percent ,where food waste was second position(23.8 percent) followed by papers and cartons (14.9 percent) then lists goes down to Cans, Glass bottles and fibre bags which makes 7.3 ,2.8 and2.4 percents respectively, here we can clearly see that one number waste product of domestic household and municipal cities was plastics bags used widely and The responses of the participants are shown in graph number 05, which asks, "What kind of container do you use for garbage collection?" which method of waste collections they used in their homes with the assistance of provided available options such as cartons ,bucket ,garbage bags ,Cans and their respond was amazingly considered which showed the most commonly used collection container at the level of household was Garbage bags with 41percent of the total respond followed by waste bucket containers then cartons ,cans, and others was mentioned with east numbers.

Participants were questioned on figure number 16 how often they emptied the container they used as trash collection before disposing of it into dumpsites (how frequently does a rubbish container get emptied?) with help of provided answers and their reaction was 37.8 percent of the respondents they empty their waste containers on the daily basis while close number was also once in a two day was recorded as 32.5 percent mentioned they empty while twice in a week and weekly 18.5 percent and 11.5 percent respectively here we can see that majority of the respondents were both empty their waste containers on daily basis and once in two days this is 70

percent , and chart number 06 represents work experiences of the respondents where 40.9 percent (101) of respondents had experience between 1-2 years then followed by 27.1 percent (67) had work experience related to the field of 3- 4 years, then 15.4 percent (33) had good experience between of 5 to 6 years and 10 percent had work experience above 6 years while those who had no experience at all were accumulated as less than or equal 8 percent of the total respondents.

In this Chart number 17 here participants were asked simple question which was if there is public bins near to the vicinities of the participants homes the available options was just yes or no answer where only 45 percent of total participants were response positively and remaining 55 percent of the interviewees were mentioned that the public bins are quite far from them which showed availability of the public bins is not fairly distributed in the selected areas therefore this issues encourages that people will not put themselves efforts to reach out distance of distributed garbage containers, and Chart number 18 depends on prior question if the participants agreed upon he /she had to answer this respond this also which said (If yes, for how long it takes to you reach there?) options varied from 1-5 min up to more than 15 minutes, the interviewees took part the survey and answered well where 53.5 percent were reported that they take them to take waste to the public dust bin quite long time which indicates that more than half of responded population has no access close to public bins provided by concerned which clear showed that local authorities hasn't played important role to provide containers equally to all towns , on the other hand 26 percent of the respondents' narrated that takes them between 5-10 minutes to reach out the public bins ,followed by 12 percent and 8 percent for between 10-15 minutes and more than 15 minutes respectively therefore this respond showed that distribution management of the garbage bins are not given required attention which can lead dwellers to put solid waste inappropriate places such as roadsides bus stops and etc and Participants in this study were requested to report, on Graph Number Here, how the public dumpsters are emptied, if they saw this process. The option with the highest number of votes, which sums up to approximately 45 percent of total respondents, was that they reported that public bins are emptied once every one to two days. This was followed by the option with the highest number of votes, which sums up to approximately 26 percent, which reported that on weekly basis local authorities, emptied the public waste containers. Other options accumulated 13.9

percent, 7.3 percent, and 6.5 percent respectively, which can be considered to be insignificant reports.

Chart19 When it came to this topic, interviewers were questioned about the state of cleanliness of the public dumpsters in their areas. Participants indicated that roughly forty percent of public bins were polluted and smelt unpleasant, and approximately twenty-seven and a half percent of participants said that the public bins were in a rotten condition. When we add these two percentages together, we get an estimate that corresponds to around seventy percent of the whole. Chart and chart number 20 in this question interviewees were asked to respond if they had come across any waste management centre in their surrounding area, they responded as 77 percent of the respondents showed they haven't seen any management concerns about waste management while remaining 23 percent of the respondents had supported the question positively but the majority of interviewees had not come across any waste management, therefore we can see here that the majority of interviewees had not come across any waste management, therefore we can see that the majority of interviewee The majority of people have not reported any trash management facilities, and there are no recycling programmes in place, which leads to a lack of cleanliness and ignorance on the part of the general population about the relevance of solid waste management. Participants in Graph No. 7 were asked about the level of pleasure they experienced as a result of the presence of a centre for the management of waste in their communities. Sixty-nine point one percent of respondents stated that they were pleased with the services provided by the centre, while the remaining participants indicated that they did not experience any pleasure.

At the same time, respondents to Chart number 21 were asked whether they had any awareness of the existence of recycling systems and the need of doing so to minimize the amount of solid waste items. 72.5 percent of the respondents said that they have sufficient knowledge about the importance of recycling, while 27.7 percent said that they don't; consequently, the majority of the participants had good awareness about the importance of recycling; chart number 22 after knowing the knowledge of the participants about recycling of the solid waste material, we then asked them if they agree that recycling is a solution for minimizing the production of solid waste, and 59.5 percent of them agreed on this while only one participant

disagreed with this statement. Chart number 23 shows that participants were asked to report how their neighbourhoods implement methods of the disposal of solid waste materials. As a result, they related that their neighbours had been using various methods of disposal, but in general, they had enough awareness of ways of disposing waste into respected sites where more than 80 percent of them used various containers to dispose then into public bins.

To summarize, on Chart number 24 here, we asked interviewees if a recycling centre is ready close to their area if they are ready to sort out solid waste into their respective origin and then separate so that recycling becomes easy and accessible (If recycle system is established near your area, are you ready to separate waste accordingly?) 64 percent of respondents agreed with this statement and demonstrated that they are prepared for it, while approximately 24 percent stated that they do not have time for this separation process because it is a time-consuming process, and 11 percent stated that they are unsure as to whether or not they will have the time and commitment to carry it out. When asked the topic posed in the first chart, "What is the present health awareness status in the locality?" respondents gave the following chart number 25 as their answer. The vast majority of respondents (56 percent) said that their knowledge of their health status ranged from very excellent to mediocre. This anticipated that the majority of the selected villages would have sufficient awareness regarding the local health conditions, while 17.3 percent of respondents said health awareness is up to the par, 12.9 percent reported as an average condition, and 8.4 percent argued that awareness is too low according to Graph number 08 here interview emphasized if the respondents use any method of purification for their drinking water, and 57.4 percent of them responded positively and narrated that they use a method of purification.

In addition, as part of Graph 09, we inquired as to whether or not they had taken part in any community cleanup activities or other voluntary cleanups in the past year (During this past calendar year, did you or any member of your family take part in any community cleanup activities or other voluntary cleanups?). According to the findings, almost seventy-five percent of them had not participated in any activities up to this point. While only 24.1% of people gave a positive response and mentioned taking part in a voluntary activity in the past year, in chart number 26 we asked

people who mentioned using a purification method to describe which method they used for their water for drinking and domestic use, and 45% of those people said they used a boiling system to kill the bacteria and other microorganisms in the water. 12 percent of respondents said that they utilize the filtration method, which is an older technique for filtering water until the suspended particles settle down and the water is then ready to be used. 34 percent of them said they did not know what system they used but asserted that they utilized clean water. One percent of them said that they used a chlorine disinfection chemical to kill the germs, while 28 percent of them said that they did not use any of those things at all. As was mentioned in Graph Number 09, we inquired as to whether or not they had taken part in any community cleanup activities or other voluntary cleanups in the past 12 months. In particular, we inquired as to whether or not any member of their family had participated in any community cleanup activities or other voluntary cleanups in this year. According to the findings, almost seventy-five percent of them had not participated in any activities up to this point. Despite this, just 24.1% of people replied in the affirmative and indicated engaging in some kind of volunteer activity over the last year.

In addition, if we take a quick look at Graph number 10, participants responded to the question "in your view, is waste management an environmental problem?" 66.7 percent of participants think that waste management is beneficial to the environment and friendly to the ecosystem, while 33.7 percent gave a negative response nonetheless awareness here is not terrible enough individuals agreed on the subject. In the meantime, participants in the Chart number 27 were asked if they know the local municipal authorizes management, and approximately 67.1 percent of them responded yes. However, 32.9 percent of those participants reported that they do not have any relation with those who manage the waste that they generated at all. As a result of Chart number 28, we asked the selected people if they were concerned about how local authorities were handling the generated solid waste particles from collection points to disposal points. Approximately 73 percent of those individuals showed a positive response of how they were concerned about how this those teams handle the issues. While just 27 percent of customers were satisfied with the service that was given, chart 29 displays the results of a question that was posed to interviewees and presented in the form of a chart: "Do you believe that environmental deterioration has a negative influence on your area?" were over seventy percent of

respondents aware that environmental degradation has a significant impact on the environmental state of their respective regions; the remaining respondents either did not have sufficient environmental awareness toward environmental degradation at all or did not care enough about the issue.

CHAPTER VI
Conclusion and Recommendations

The state of the environment is rapidly becoming a more important problem in international politics, the economy of the whole globe, and the lives of people in their day-to-day activities. The deterioration of the environment has become a global problem that calls for an all-encompassing solution on all fronts (politically, economically, and environmentally). In actuality, the management of solid waste has major interactions with city planning, mainly at the sources of trash formation, which are people and the built environment. These connections are most prominent at the point where garbage is created. According to the statistics, the literacy rate among the Somali people seemed to be rather high. This may account for the participation of municipal planners in garbage management. The majority of people in Somalia now have a better understanding of the negative effects that improper management of solid waste may have on the environment and public health. Because of this raised level of knowledge, the population of Somalia has begun to take steps toward enhancing the health of their environment in the hopes of eradicating or considerably reducing the diseases that are associated with environmental dangers. In addition to this, the data indicate that the majority of people are worried about the environment and desire to reduce the quantity of waste that is detrimental to the ecological system's health. The inquiry led to the discovery that the issue of waste management in the rural areas of Somalia is one that demands urgent attention to be given to it. This is one of the findings that emerged from the investigation.

The most important questions that arose from the investigation included concerns of health, location, and the environment in the close neighbourhood. As a means of accomplishing its objectives, it was essential to conduct a study that contrasted those who lived in the immediate area with those who lived farther away. As a result of making the comparison, it became clear that the closeness of the dump to residential areas had an effect, and not only on those properties that were located in the near vicinity of the dump. According to the research, individuals who live farther away from the landfill are less likely to be negatively affected by it in contrast to those who live closer to it. This is because of the greater distance between the two populations. The results of the study indicate that people who live within a radius of

two hundred meters of the landfill are at the highest risk of being exposed to the harmful effects of the waste.

People who live in the area have an increased chance of catching illnesses including malaria, pneumonia, cholera, and diarrhoea as a result of the dumpsite. Even those who live more than 200 meters away from the dumpsite might perhaps be affected by the putrid aromas, particularly if the wind is blowing in the direction that they reside. In addition to this, it was brought to our notice. They complained of soreness in their chests as a direct result of this, which was caused by the situation. One of the most disconcerting unintended results of these processes is the pollution that is being generated all over the globe by modernity and progress, whether it is on land, in the air, or in the water. This pollution is a consequence of all three of these processes. There are risks involved in the process of modernization and expansion; this cannot be avoided.

The increase in the number of people living in the world, as well as the subsequent rise in the demand for food and other essentials, has resulted in an increase in the amount of waste that is produced by each home on a daily basis. This has led to an increase in the amount of garbage that is thrown away. Before it can be thrown away at landfills or dumping sites, it must first be collected by municipal trash collection agencies. This step is required before it can be done. These organizations also collect it so that it may be disposed of in these kinds of locations. However, since there are not enough resources or adequate infrastructures, not all of this rubbish gets collected and carried to the final dumpsites where it will be disposed of. This is because there is not enough of either. At this level, poor waste management and disposal may have the potential to have major detrimental consequences on the health of the ecosystem that is nearby. There is a potential for infectious diseases to spread throughout the community and put the lives of individuals as well as the lives of their families in jeopardy if their garbage, which includes human faces in addition to liquid and solid waste from homes and businesses, is not handled in an appropriate manner The data were collected and transferred from excel sheet into SPSS statistical software special we used T-test, ANOVA Cropach Alpha, test to analyzed the data then exported into word afterwards analyzed with the assistance of graphs and tables. the reliability of the

results and feedback of the respondents was excellent as anticipated based on the level of the education and experience towards the field I believe that the result is well reliable up to (95%) and can be really use for future references, where p-values is less than (< 0.05).

Recommendations

- Inclusiveness of community y members during decision taking towards of waste management and its control we must give chance the people to be a part of the process

- Secondly Communities should be given trains concerning on waste management and given the opportunity to handle their wastes on their own.

- Communities should seek to improve environmental health and eliminate or reduce environmental hazards.

- Both municipals and central authorities must take the responsibilities of implementing rules encouraging clean cities and provide required equipments, construct well planed dumpsites

- Finally, authorities must provide recycling facilities and establishments for solid waste and disposal sites, waste trucks and play them of role of public awareness

CHAPTER VII
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Appendices

Appendix A

YAKIN DOĞU ÜNİVERSİTESİ

BİLİMSEL ARAŞTIRMALAR ETİK KURULU

21.06.2022

Dear Ali Muse Abdi

Your application titled **"Environmental Health Applications on Solid Waste Management in Somalia"** with the application number NEU/AS/2022/152 has been evaluated by the Scientific Research Ethics Committee and granted approval. You can start your research on the condition that you will abide by the information provided in your application form.

Assoc. Prof. Dr. Direnç Kanol
Rapporteur of theScientificResearchEthicsCommittee

Note: If you need to provide an official letter to an institution with the signature of the Head of NEU Scientific Research Ethics Committee, please apply to the secretariat of the ethics committee by showing this document.

Appendix B

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