KINNAIRD COLLEGE FOR WOMEN

AN ASSESSMENT OF MUNICIPAL SOLID WASTE MANAGEMENT. A CASE STUDY OF ABU BAKAR ROAD TOWNSHIP, LAHORE.

MALIHA PERVAIZ

GEOGRAPHY
KINNAIRD COLLEGE FOR WOMEN,
LAHORE, PAKISTAN

2022

AN ASSESSMENT OF MUNICIPAL SOLID WASTE MANAGEMENT. A CASE STUDY OF ABU BAKAR ROAD TOWNSHIP, LAHORE.

A THESIS SUMBITTED TO KINNAIRD COLLEGE FOR WOMEN IN FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

BACHELOR OF SCIENCE
IN GEOGRAPHY

BY

MALIHA PERVAIZ

DEPARTMENT OF GEOGRAPHY
KINNAIRD COLLEGE FOR WOMEN, LAHORE
2022

RESEARCH COMPLETION CERTIFICATE

It is certified that **Ms. Maliha Pervaiz** of B.SC (session 2018 – 2022), Department of Geography has carried out research work entitled **"An assessment of municipal solid waste management: A case study of Abu Bakar Road Township, Lahore"** under my supervision.

It is assured that the research work is original and has not yet been published anywhere else.

Rabia Shahid
Signatures of Supervisor

Dated 16/6/22

Ms. Rabia Shahid
Designation of Supervisor

Assistant Professor

"All changes suggested by examiners during defense are incorporated to this final copy"
Rabia Shahid

Signatures Ambreena Javaid 16-6-2022
Head of Department

Dr. Ambreena Javaid

ANTI-PLAGIARISM DECLARATION

I certify that this is my own research work. The work has not, in whole or in part, been presented elsewhere for assessment. Where material has been used from other sources, it has been properly acknowledged. The similarity index of the research report is 10. If this statement is untrue and I am found guilty of plagiarism, the punitive actions against me should be taken as per Kinnaird Anti Plagiarism Policy.

Maliha Pervaiz

F18BGEO009

B.sc Geography

Signature: Maliha Pervaiz

Signature of Supervisor: Rabia Shawid

Signature of HOD: Ambreena Tawaid

16-6-2022

ACKNOWLEDGEMENT

First and foremost, I would like to praise Allah Almighty for giving me the ability and strength to undertake this research work.

I am thankful to my family for believing in me, especially my elder sister. I would like to extend my sincere thanks to my supervisor, Ms. Rabia Shahid, and Head of the department Dr. Ambreena Javaid, without whose constant support and guidance this research work would be impossible. They helped me a lot which made my work much easier and smooth.

Furthermore, I would like to appreciate my institute **'Kinnaird College for Women'** and my whole Geography department for providing me with a comfortable environment to work on my research.

Maliha Pervaiz

ABSTRACT

Solid waste management is one of the major problems these days, especially in developing countries. The increase in population growth in Pakistan and the massive migration of people from rural to metropolitan cities has unbalanced the whole system and raised multiple issues, one of which is the high rate of waste generation. The study aims to examine the solid waste management system, its comparison with the previous year, and the perception of authorities regarding the matter. The area selected for the research was a commercial road in the Township. It was qualitative research and the methods used for data collection were questionnaires filled by shopkeepers of Abu Bakar Road township and interviews were held with LWMC authorities to get their perception of the ongoing situation to develop a better understanding. Results obtained showed that people were getting affected due to improper and delayed waste collection and were not satisfied with the current management companies. It was concluded that fewer containers, lack of public cooperation, and a considerable distance between the collection point and dumping sites were the main reason for delayed waste pickup. It was recommended to arrange a space for the common collection and dumping points near the selected study area and to raise public awareness about the side effects of solid waste lying openly around, so that they can allow placing trash bins near their houses.

AN ASSESSMENT OF MUNICIPAL SOLID WASTE MANAGEMENT: A CASE STUDY OF ABU BAKAR ROAD TOWNSHIP, LAHORE.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

MSW	Municipal Solid Waste
C&D	Construction and Demolition
LWMC	Lahore Waste Management Company
SWMS	Solid Waste Management System

CHAPTER 1
INTRODUCTION

1.1 BACKGROUND

Garbage or trash that consists of daily used items and are thrown away such as food scraps, cans, paper, plastic bags, bottles, household, school, hospitals and businesses waste materials is commonly known as Municipal Solid Waste ("Municipal Solid Waste," n.d.)

The collection, transporting, treating and disposing of the solid materials that are of no use is referred as solid waste management. Municipal solid waste if left untreated or improperly managed can cause multiple health issues, increase in pollution and environmental degradation. The tasks of solid waste management authorities are to properly monitor and manage the municipal waste on time. (Nathanson, J. A. 2020)

About 2.01 billion tons of municipal solid waste is generated annually around the globe. 33% of waste is not managed or disposed of properly, affecting the environment. Developed and high-income countries are responsible for approximately 34% (683 million tons) of the total waste. (Hoornweg and Bhada-Tata. 2012)

Annually, Pakistan generates around 48.5 million tons of solid waste and this rate is increasing more than 2% every year. Pakistan along many other developing countries lacks in proper waste management infrastructure which is creating environmental issues. In the country municipal waste is either dumped, burned or buried

on vacant lots, which is a threat to health and welfare of people. It is estimated by Government of Pakistan that major metropolitan cities are generating about 87,000 tons of municipal waste on daily basis. These cities are facing major challenges on how to deal with huge rate of urban waste. There are different reasons which further have worsen the situation such as poor urban planning, inadequate and insufficient waste management equipment, public is not much aware of this problem and their contribution towards solving it is less. ("Pakistan Waste Management,"2019)

The collection of waste throughout most of the major cities is the responsibility of local and municipal governments. Only 60-70 percent of waste collected from cities and remaining is left untreated. Different means of transportation are used for primary collection of solid waste such as donkey pull carts, handcarts, open trucks. For secondary collection and transport arm roll containers or trucks are used. Street sweepers and sanitary workers are hired by municipalities to keep the cities clean, the task these workers are to remove small heaps of waste from areas and bins and store it in depots. ("Pakistan Waste Management,"2019)

1.1.1 THE POPULATION OF LAHORE AND WASTE GENERATION

Approximately 15 million people are resident of Lahore. The municipal solid waste generated in Lahore per year is 2090620.633 tons or 2090620633 kg/year and 0.612 kg/capita/day. ("Lahore City Profile, "n.d.)

1.1.2 COLLECTION AND COVERAGE TYPE

Lahore waste management is capable enough. Their waste collection efficiency is up to 95%. Lahore waste management adopts mechanized system for cleaning and sweeping of roads. They clean Major Square, bridges, underpasses and walkways by washing them. Moreover they approach door to door for the collection of waste. They provide facility of collecting hospital infectious waste and dump that in disposal area. Not only this, they also provide service of C&D waste collection and disposal. Source separation isn't done by them. ("Lahore City Profile,"n.d.)

1.1.3 WASTE COMPOSITION

To characterize waste, five categories were assessed and on 60 samples work was carried out. Low income, Middle income, High income, Commercial and Institution were named as five categories. For each category, number of sample taken are 12. 44 out of 60 samples were from model region while remaining 16 sample belong to random region. 177.780 kg waste was taken to work region for characterizing work and on 7500 kg waste separation work was carried out by homogenous mixing. If we consider average waste density as 241 kg/m3, then only on 30-35 m3 waste segregation work is conducted. Results were same as usually developing countries have. The average value according to weight of waste is following. Biodegradable (63,46) is higher in value and then Nylon (9,77), textile (7,05), diaper (6,75), paper-cardboard (3,84), combustibles (3,69), non- combustible (1,82) respectively. ("Lahore City Profile,"n.d.)

1.1.4 Waste Management Practice

The services these companies provide are following

1. Manual Sweeping
2. Mechanical sweeping and washing
3. Collect MSW
4. Provide door to door waste collection service
5. Provide container-based waste collection
6. Facilitate in transferring of waste to disposal area

1.1.5 WASTE DISPOSAL STRATEGY OF LWMC

LWMC adopt various strategies to manage waste. The most preferred strategy by LWMC for waste management is to reduce waste and recycle it. Other strategies include biological waste treatment, treatment of waste buy using thermal energy landfill gas and managing open dump sites etc. Application of 3R (Reduce, reuse and recycle) help in minimizing waste and managing it. Waste disposal in Landfill is the least adopted strategy by LWMC. The strategy adoption depends upon its feasibility, available labor and machinery, technology and sustainability. LWMC believe that their strategy is feasible, capable and efficient in terms of waste management. (“Lahore City Profile,”n.d.)

STATEMENT OF PROBLEM

Improper municipal solid waste management is affecting people working in the vicinity

1.2 RATIONALE

Lahore is the second largest city of Pakistan. Its increasing population growth and unplanned rapid urbanization has raised multiple issues among which is solid waste mismanagement. About 500,00 tons waste is generated annually out of which only 60% is dumped or disposed and remaining lies on roads, streets, and other public spaces. The garbage heaps lying around are creating different health and environmental problems. The purpose of this research is to highlight the reasons of improper solid waste management system and to analyze the perception of public about the ongoing situation and the problems they are having because of it.

1.3 HYPOTHESIS

$\mathbf{H_0}$ = People are not getting affected due to improper waste management.

$\mathbf{H_1}$ = People are getting affected due to improper waste management.

1.4 OBJECTIVES

- To examine solid waste management system of Township (Abu Bakar Road) Lahore
- To compare the state of management of past and current year in the area
- To assess the perception of government authorities regarding solid waste management

1.5 STUDY AREA

Lahore is the second-largest city of Pakistan and the capital of Punjab province with coordinates of 31.5536 N and 74.3572 E. It is a metropolitan city with a dense population. To the north is a walled city southern side consists more of residential and industrial areas.

The study area selected for the research is Abu Bakar Road, Township, Lahore. Township is located at coordinates of 31.4475° N, 74.3081° E. It is considered as one of the largest residential sections of Lahore along with commercial areas. The selected area of Township is a commercial road with many economic activities going on.

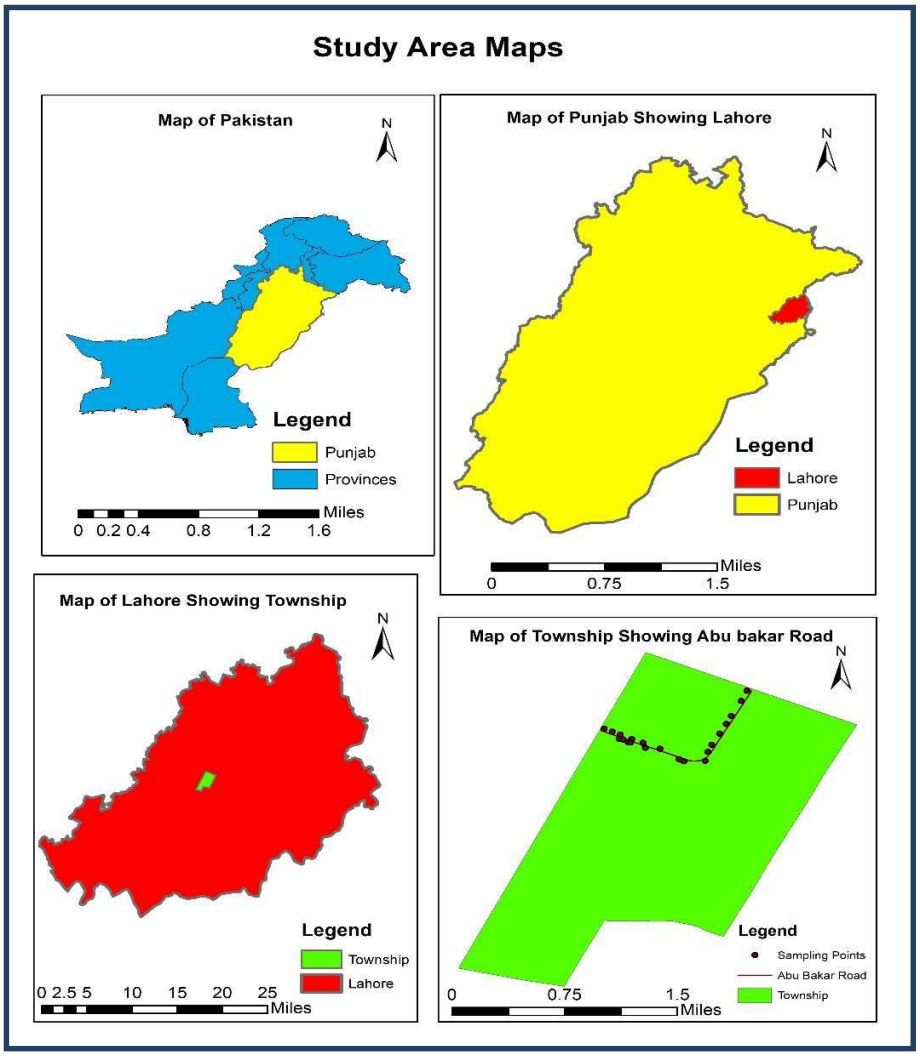


Figure 1.1 Study Area Maps

CHAPTER II
2 LITERATURE REVIEWS

Ahsan *et al* (2014) assessed the Municipal Solid Waste System of six major cities of Bangladesh. For identifying the solid waste management steps six months field study was conducted. The study includes the aspects waste from collection to ultimate disposal. To overcome and fulfill the demands of people for solving this serious socioenvironmental issue city authorities were addressed to perform their role in a better way. Sustainable management was required to solve the problem happening in urban areas. Proper management plan, strategy, public awareness and door to door collection is needed for improvement. For better technical support and facilities private sectors should be approached because current management plans and facilities were not enough to cope up with the worsening situation.

Sharma and Jain (2020) analyzed the global scenario of municipal solid waste generation, composition and management. The purpose of this article was to summarize the current global situation of MSW creation, composition, management, and related issues. The study revealed that waste generation was dependent on urbanization, Industrialization and economic development of countries but the income was the key factor that was observed in managing that waste generation. In high income and upper middle income countries waste is handled in a proper way to great extent, they reuse and recycle the waste. Whereas in lower middle income and low-income countries waste generation rate is high but is neither treated properly nor segregated. The causes of this mismanagement mainly include lack of funding, inappropriate policies, improper infrastructure, inadequate training of workers, public awareness and their attitude towards solid waste management. All these reasons are worsening the situation in these regions, health and environment both are getting affected badly due to this problem. To reduce these issues, it was suggested to arrange proper sites for waste disposal, to reduce costs and maintenance build better routes, segregation of waste should be done, educate people to reduce waste generation and move towards sustainable system.

Masood *et al* (2014) examined the current municipal solid waste management system of Lahore, Pakistan. For this purpose, staff of Lahore waste management company (LWMC), waste pickers, waste buyers were interviewed. Questionnaire survey was conducted to get the perception of general public regarding the issue and its impacts. It was concluded that, about 68% of waste is collected and 27 % is informally recycled as there is no official recycling system in the city. A lot of improvement was required for collection of waste as in many areas of city there was illegal dumping and burning of waste because those areas were unserved. On governance indicators the performance report of Lahore was not good. It was suggested that there should be recycling facilities and all stakeholders should be engaged for improvement.

Mohsin and Chinyama (2016) assessed the impacts of solid waste management practices on environment and public health of Bahawalpur city, Pakistan. Respondents were selected by simple random sampling for structured questionnaire. To analyze the responses simple descriptive statistics were used. Majority of the people responded that solid waste management system was poor and had resulted in skin related diseases. Percentage of household waste was high among other types. Only 40% waste was collected and remaining was openly dumped which was cause of environmental degradation. Heaps of garbage were seen on streets. It was concluded that ongoing solid waste management practices were not satisfactory, and it was suggested that proper utilization of funding and aiding sources were required for improvement in management and to maintain sanitation.

Akmal and Jamil (2021) examined the Health Damages from Improper Disposal of Solid Waste in Metropolitan Islamabad–Rawalpindi. Cross-sectional study was conducted which include structured questionnaire to collect data from residents of both cities. It was evaluated that people's health was affected due inadequate waste management practices. Residents living within 100 m were vulnerable to dengue, malaria and asthma as 75.9% waste was not

segregated. Therefore, it was recommended that local government should arrange proper waste collection and disposal.

Nuzrath and Ruzaik (2017) assessed the public perceptions on effectiveness of solid waste management in Colombo municipality area. Primary data was collected by formal and informal interviews, respondents were selected randomly and divided into three socio economic strata i.e., high-, middle- and low-income earning groups. Informants of public and private sectors were also interviewed. Solid waste management practices were investigated. Majority of the people responded that waste collection system is inefficient, and waste is not collected regularly. It was concluded that private sectors participate about 64.6% and informal sectors around 48.7% on severity index. People wanted the waste to be collected on regular basis. It was suggested that authorities of Colombo municipality area need to engage more with public in order solve problem.

Saidou and Aminou (2015) studied the solid waste management system in the town of Maradi in Niger republic. The aim of their study was to examine the condition of solid waste management for this, interviews with health technicians, cleaning staff, municipal authorities and residents were held. Causes of this major problem included insufficient waste collection, people's lack of effective sensitization, number of garbage dumps and unqualified human resources. Municipal authorities stated that attitude of citizens towards waste issue was not good as they do not dispose waste properly, also financial support was required for vehicle maintenance, hiring more waste pickers, sweepers and managing landfills in a better way. Results showed that municipal authorities of town were failed to keep the town clean as satisfactory rate of people was only 32%. For improvement in the system, it was suggested to request higher authorities to help them with financial means and educate the public so they can understand and participate to solve the issue.

Anchan and Palakshappa (2021) assessed the perception of public and their concerns towards solid waste management of Mangaluru, India. To investigate the situation structured questionnaire was generated and respondents were selected from north (industrial area) and south (educational and residential) zones of city. About 320 tons/day is generated and approximately 245 tons of MSW is collected per day. The factors that were contributing to mismanagement were insufficient funding, citizens needed to act more responsibly, waste collection frequency according to localities was required to be reschedule as some areas needed daily or twice a day waste collection. Irregular waste collection leads the people to do illegal open dumping on roads and burning of waste materials. People living near dumping sides were vulnerable to health issues. Officers in the authorities were not fulfilling their duties properly and areas were not supervised. Majority of the people were willing to give funds if they were promised to get proper services. It was suggested to put bins at appropriate distances and in enough number so they can accommodate the community. The authorities should be more vigilant.

Kouloughli and Kanfoud examined the municipal solid waste management in Constantine, Algeria. the municipality manages waste collection and transportation. About 90% of waste is disposed properly or improperly and treated to some extent. The problem diagnosed was number of containers were less and were not fulfilling the needs of households also the services provided by management were not satisfactory. Some of the waste management practices were leading environmental problems. It was recommended to promote solution like scavenging activities for separation of waste so that treating time can reduce. Proper sizes and number of containers should be placed in such a way that households can throw their waste in them instead of disposing it off on vacant places.

Khoso *et al* (2018) studied solid waste management issues in Hyderabad, Pakistan. Different dumping sites were visited, municipal corporation officers were targeted population questionnaires were filled by them and interviews were also held. The results showed that main causes were that local labor do not operate machines properly, there was lack of facilities provided by management such as height of containers was very high and waste was partially dropped on ground, there

was delayed or no collection of waste and reasons behind were less number of vehicles, fuel shortage and lack of funds. The waste collection begins with the sites that were near dispatch stations as vehicles were less remote areas were left untreated because working hours end which results in heaps of garbage. Moreover, there was no proper schedule for cleaning of roads and streets. All these reasons contributed in worsening the situation. It was suggested that there was dire need to improve management system in the city, local government should arrange funds for betterment. Public awareness can also help to resolve the issues.

De and Debnath (2016) examined the prevalence of health hazards that are associated with solid waste disposal of Kolkata, India. Garbage disposal area in Garia (neighborhood in southern Kolkata) was selected and households near the site were interviewed through two structured questionnaire one related to waste management and other on health issues due to waste disposal practices. Although, the bins were placed in the locality, street sweepers were hired but daily cleaning and waste collection was missing. The main problem identified was open dumping and unsupervised landfills which were affecting the residents nearby. Diarrhea, asthma and skin infections were common diseases found in people. Municipal authorities were not segregating the waste neither treatment facilities were available. People raised their voices to improve the management but there was response by authorities, therefore they were forced to live in such unhygienic environment. It was suggested to take immediate actions to minimize the health impacts by segregating waste and providing proper services to residents.

Shafqat *et al* (2014) assessed the practices and challenges of municipal solid waste management of Bahawalpur city, Pakistan. The situation of management and things that can improve the whole scenario were analyzed. Tehsil Municipal Authority (TMA) is mainly responsible for cleaning the city; therefore, stakeholders were interviewed but most of the data was collected from secondary sources. The unauthorized dumping sites were everywhere in the city. Waste collection services were not proved to everyone, waste is not segregated people throw the trash in the same bins that were placed in the street corners. Storage sites were not sufficient and there was lack of funds to solve the problem. Furthermore, people do not bother

to dispose their waste properly, they just throw it on the roadsides or in the vacant space which make it difficult for sweepers and waste collectors to maintain cleanliness. It was suggested to awake the sense of civic responsibility of public as if people will throw their waste anywhere how will it be possible for worker to collect it from the whole assigned area in his duty hours. Municipality and residents should together put efforts to approach 3Rs (Reduce, Reuse and Recycle) for bringing improvement in the situation of waste manegement.

Longe *et al* (2009) examined the perception of people on household solid waste management in Ojo a local government area in Lagos, Nigeria. Questionnaire and interviews were conducted with focus on people's perception on ways of management handling the system, services, funding and their willingness to pay for improvement. Socio economic profiles were also included .The results indicated that private sectors had more funds and better management policies than government sectors. People with high income rate were more willing to pay for funding than of low income. Although more than 50% respondents were satisfied with current situation of management still improvement was required mainly in areas where people with low incomes were living.

Mahar *et al* (2007) reviewed and analyzed the solid waste management situation in urban areas of Pakistan. The study was based on secondary resources. It was identified that only 51-69% overall waste is collected and rest of waste is either burned or stays there as heaps. There are no proper facilities provided by municipal authorities. Vehicles are in poor conditions and are not able to perform properly. High income areas are clean but situation in middle- and low-income areas is worse. Areas which are supervised by government authorities are in bad condition, while informal sectors are performing much better. The rapid increase in population in urban areas is key factor that is burdening the management in maintaining cleanliness. In the country there is no efficient mechanism to collect and dispose waste in proper manner. There is lack of funding, less number of equipment and negligence in performing duties. The waste is not treated and is disposed as it is in low lying areas such as ponds and rivers. Furthermore, segregation of waste is not done, hazardous and household waste are disposed combinedly which leads to health issues. Keeping these factors in view, it was

recommended that bins should be placed everywhere to accommodate people, littering should be prohibited and encourage the public to make the cities and towns clean. Landfilling should be done is appropriate manner. Municipal authorities have to make sure to create such policies that can reduce the negative impacts of waste.

Kumar et al (2016) examined the solid waste management condition of Jaipur city, India. It was a comprehensive study in which waste collection, transportation, storage, its disposal and final treatment was assessed. Data was collected by visiting sites and interviewing people there. Results showed that there was open dumping of waste, lack of management and there was no proper treatment of waste which was leading to various human health issues and environmental problems. Formal sector workers which were hired for collecting garbage from streets were not doing their job. Every year more staff is hired but there is no check and balance on their working attitude which is resulting in heaps of garbage lying around everywhere in the city. People were having problems with service providers and wanted them to implement proper rules in order to clean the city. It was recommended that authorities should ensure the proper collection, disposal and treatment of solid waste to reduce the effects.

Odonkor et al (2020) examined the house-hold solid waste management in a large Ghanaian district. Data was collected through multistage sampling technique consisting of simple random sampling, cluster and systematic sampling were used for selection of respondents. SPSS software was used for data analyzation and results shows that garbage containers were away from houses, and it takes 11-15 minutes to reach there. The final disposal site of solid waste was about journey of 1-2 hours. It was concluded that there were less bins and even those were at a distance. It was therefore suggested that authorities must provide sufficient bins according to requirement and place them nearer so people should not dispose their household waste indiscriminately.

Saja *et al* (2021) examined the municipal solid waste management practices and challenges in the Southeastern coastal cities of Sri Lanka. Semi structured interviews and field observations were used for data collection. Three urban council areas were selected which shows that 65 tons was generated in Kalmunai, 30 tons per day in the Akkaraipattu municipality, and 25 tons per day in the Ampara. it was concluded that though management systems have all necessary elements for collection and segregation, but their performance was not satisfactory which may have different reasons like less knowledge of technology, ways to reduce waste generation and absence of collecting waste regularly. Waste generation rate was high in selected urban areas and public awareness was required for proper disposal of household waste.it was suggested to make better strategies to solve this problem before it causes severe damage to environment and public health.

Jerie and Tevara (2014) examined the solid waste management practices in informal sector Gweru, Zimbabwe. To examine the effectiveness of practices to transform waste into non-waste in the city 589 enterprises were interviewed, questionnaires were also used. The data collected was related to type of waste generated, waste collection and disposal practices. The reason of inadequacy in cleaning the city faced by management was mainly vehicle breakdown because of poor road conditions. The number of trucks were also less. As vehicles were less, waste was not collected timely and properly. Heaps of garbage were seen in the market areas. The results indicated that illegal dumping was practiced in some areas as waste was left untreated. People were aware of the issue and were willing to participate for improvement. Better strategies and funding were required was collecting and treating waste adequately.

CHAPTER 3

3. MATERIALS AND METHODS

3.1 Research Methodology

For collecting data two types of methods were used primary and secondary. The area of study was Abu Bakr Road Township, Lahore. The primary data was composed of structured questionnaires filled by shopkeepers running shops on that road. Secondary data was collected through the internet using websites, journals, and articles. To prove the objectives hypothetically statistical techniques were applied using Statistical Package for the Social Sciences (SPSS version 21.0). The questionnaire survey duration was from January 4, 2022, to January 9, 2022.

3.2 Nature of Study

The nature of the study is qualitative. Simple statistical techniques such as pie charts, bar graphs, and frequency tables were used to represent primary data results. To test the hypothesis One-Sample Chi Square Test was applied. All the statistical analysis was generated in SPSS software.

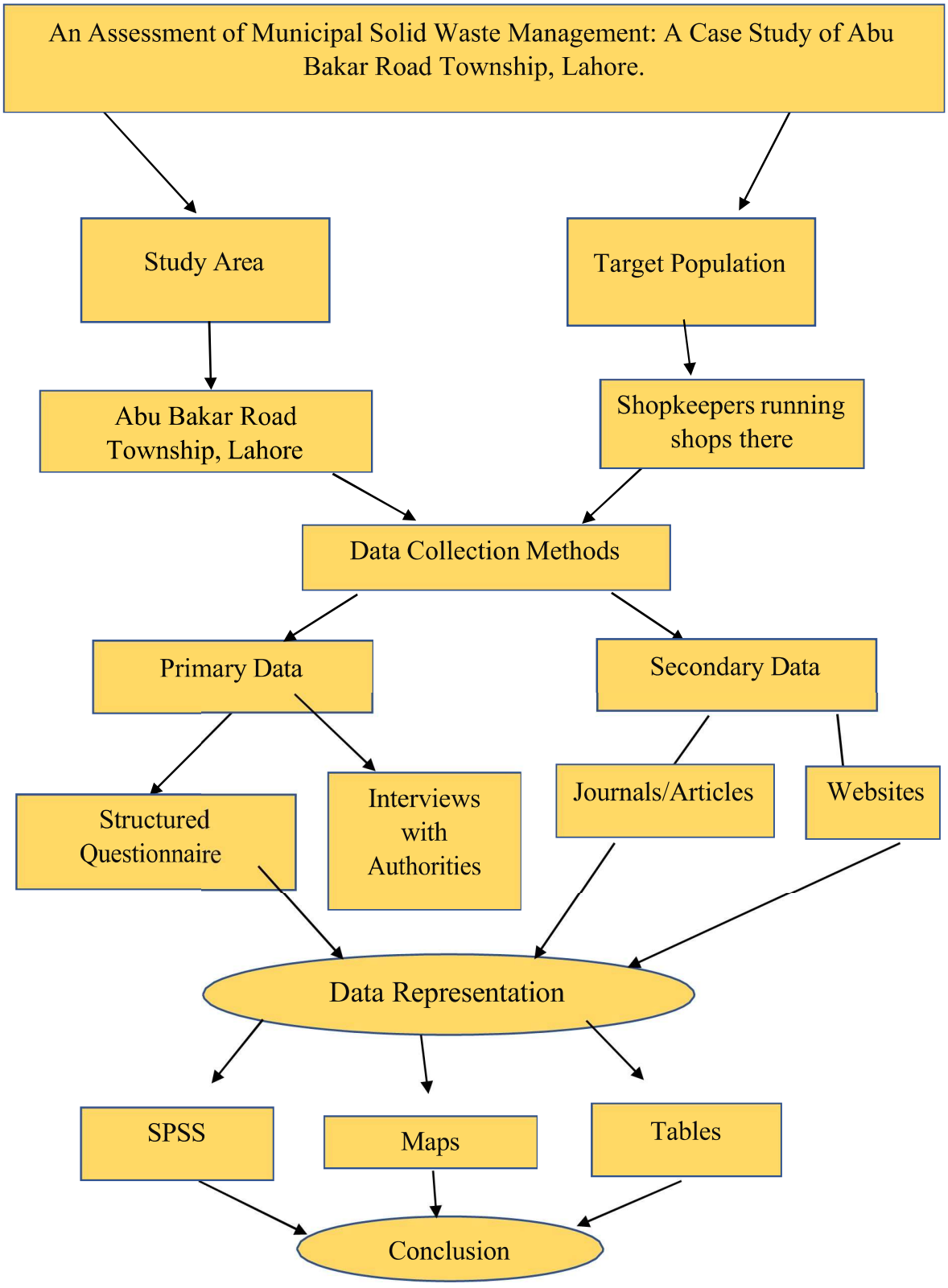
3.3 Data Collection

A structured questionnaire with both open-ended and close-ended questions was designed for the primary data collection approach. The questionnaire was comprised of 15 questions. Total 110 responses were collected from the shopkeepers who run shops on the Abu Bakar Road, Township. Different research articles, websites and journals were used for secondary data collection

3.4 Map Making of Study Area

Google Earth pro and ArcMap 10.7 of ArcGIS software were used for making the maps of the selected study area.

3.5 Flowchart of Methodology



CHAPTER 4

4. RESULTS

The responses of questionnaires were analyzed in SPSS and following table and figures shows the results.

Table 4.1: For how many years you have been running shop here?

Running Shop

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-2 years	22	20.0	20.0	20.0
	3-4 years	24	21.8	21.8	41.8
	5-6 years	18	16.4	16.4	58.2
	7-8 years	20	18.2	18.2	76.4
	More than eight years	26	23.6	23.6	100.0
	Total	**110**	100.0	100.0	

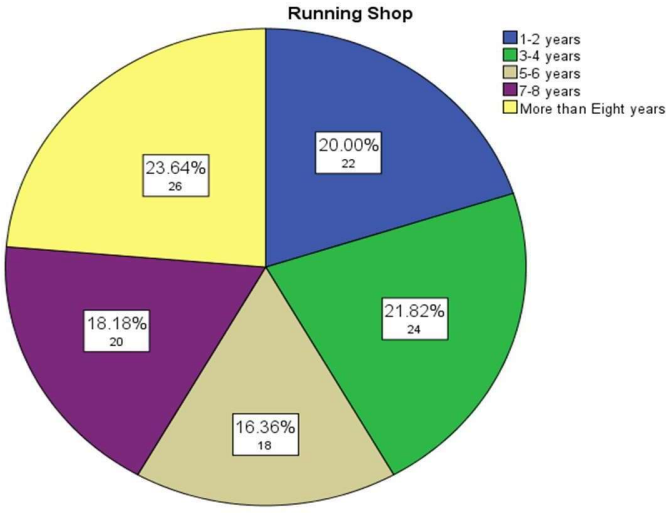


Figure 4.1 Showing number of years of shop in the area

Interpretation: The above pie chart shows that the total number of respondents was 110, out of which 22 respondents were running shop in the selected study area for 1-2 years, 24 respondents for 3-4 years, 18 respondents for 5-6 years, 20 respondents for 7-8 years while 26 respondents for more than 8 years.

Table 4.2: Have you heard about Solid Waste Management?

Solid Waste Management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	73	66.4	66.4	66.4
	No	25	22.7	22.7	89.1
	Maybe	12	10.9	10.9	100.0
	Total	110	100.0	100.0	

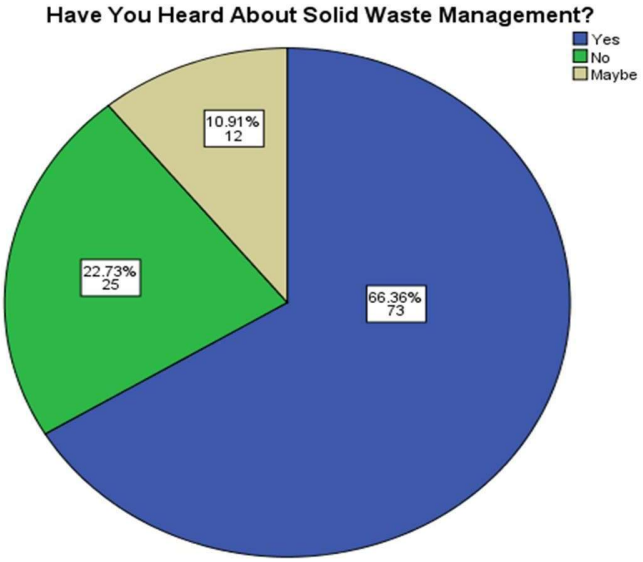


Figure 4.2 Showing about knowledge of respondents about SWM

Interpretation: The above chart shows that 73 respondents had heard about solid waste management systems, 25 respondents were not aware of solid waste management systems and 12 respondents were not sure about it.

Table 4.3: How often the waste containers are emptied?

waste containers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Once a Day	36	32.7	32.7	32.7
	Once in Two Days	17	15.5	15.5	48.2
	Once in Three Days	19	17.3	17.3	65.5
	Once a Week	21	19.1	19.1	84.5
	After a week	17	15.5	15.5	100.0
	Total	110	100.0	100.0	

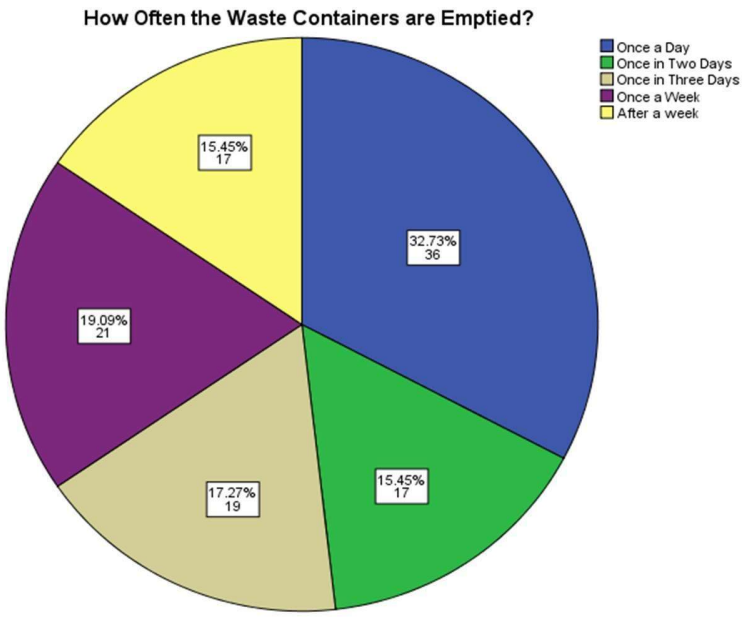


Figure 4.3 showing how often containers are emptied

Interpretation: The above chart shows that 36 respondents selected those containers were emptied once a day, 17 responded for once in two days, 19 responded for once in three days, 21 responded for once a week and 17 responded that containers are emptied after a week.

Table 4.4: Do you complain to the garbage collectors for delayed pickup of garbage?

Complain about delayed waste pickup

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	57	51.8	51.8	51.8
	No	38	34.5	34.5	86.4
	Maybe	15	13.6	13.6	100.0
	Total	110	100.0	100.0	

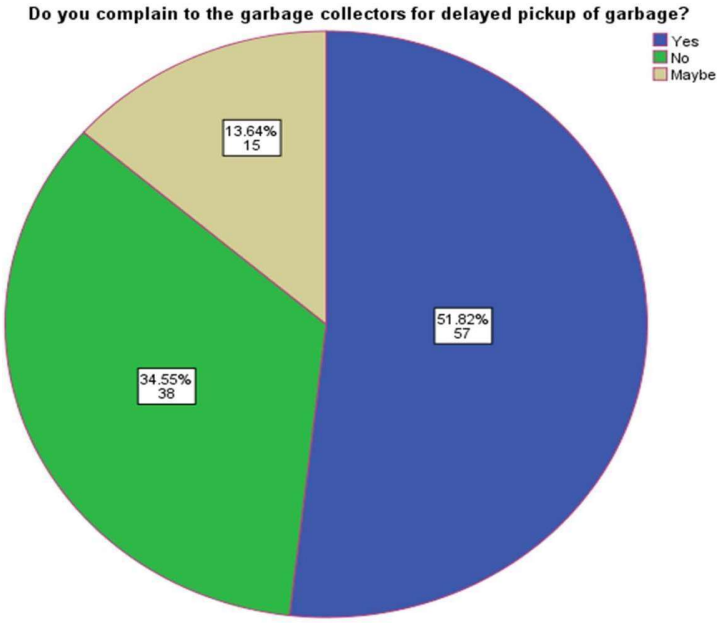


Figure 4.4 Showing responses of complain about delayed waste pickup

Interpretation: The above chart shows that 57 respondents complained to the garbage collectors for delayed pickup of garbage, 38 respondents did not complain, and 15 respondents were not sure about it.

Table 4.5: Do you think there are fewer garbage containers in the area?

fewer garbage containers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	86	78.2	78.2	78.2
	No	13	11.8	11.8	90.0
	Maybe	11	10.0	10.0	100.0
	Total	110	100.0	100.0	

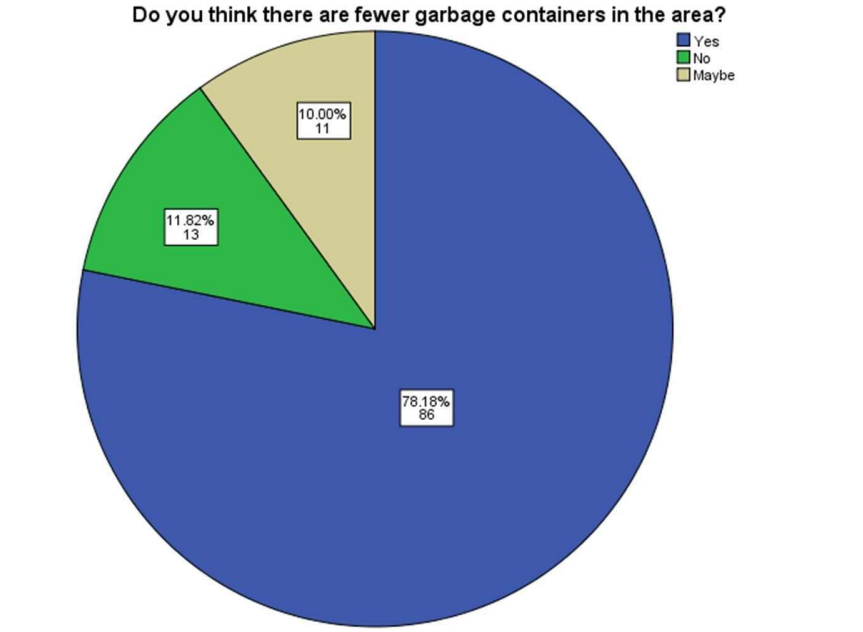


Figure 4.5 Showing responses about fewer containers in the area

Interpretation: The above chart shows that 86 respondents agreed that there are fewer garbage containers in the area, 13 respondents disagreed, and 11 respondents were not sure about it.

Table 4.6: To what extent, you are affected by the smell of waste?

Affected by the smell of waste?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Extremely Affected	50	45.5	45.5	45.5
	Very Affected	22	20.0	20.0	65.5
	Moderately Affected	13	11.8	11.8	77.3
	Slightly Affected	15	13.6	13.6	90.9
	Not at all Affected	10	9.1	9.1	100.0
	Total	110	100.0	100.0	

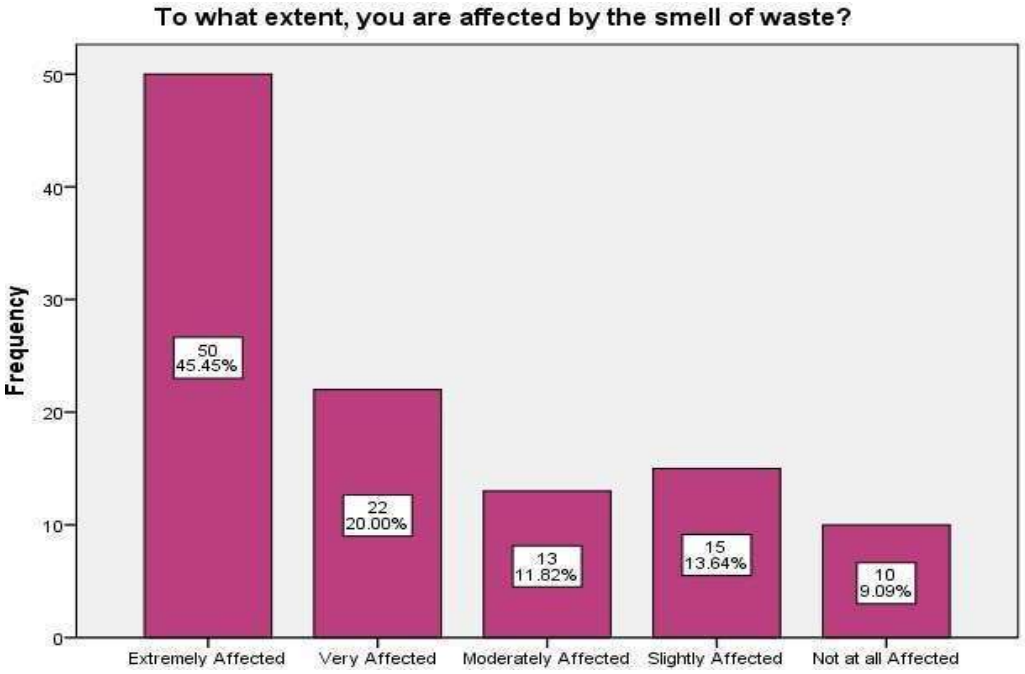


Figure 4.6 Showing extend of respondents affected by smell of waste

Interpretation: The above bar chart shows that 50 respondents were extremely affected, 22 respondents were very affected, 13 respondents were moderately affected, 15 respondents were slightly affected, and 10 respondents were not at all affected.

Table 4.7: In what way your health is affected due to garbage?

health is affected due to garbage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Difficulty in Breathing	44	40.0	40.0	40.0
	Headache	31	28.2	28.2	68.2
	Cough	14	12.7	12.7	80.9
	Not Affected	14	12.7	12.7	93.6
	More Than One Way	7	6.4	6.4	100.0
	Total	110	100.0	100.0	

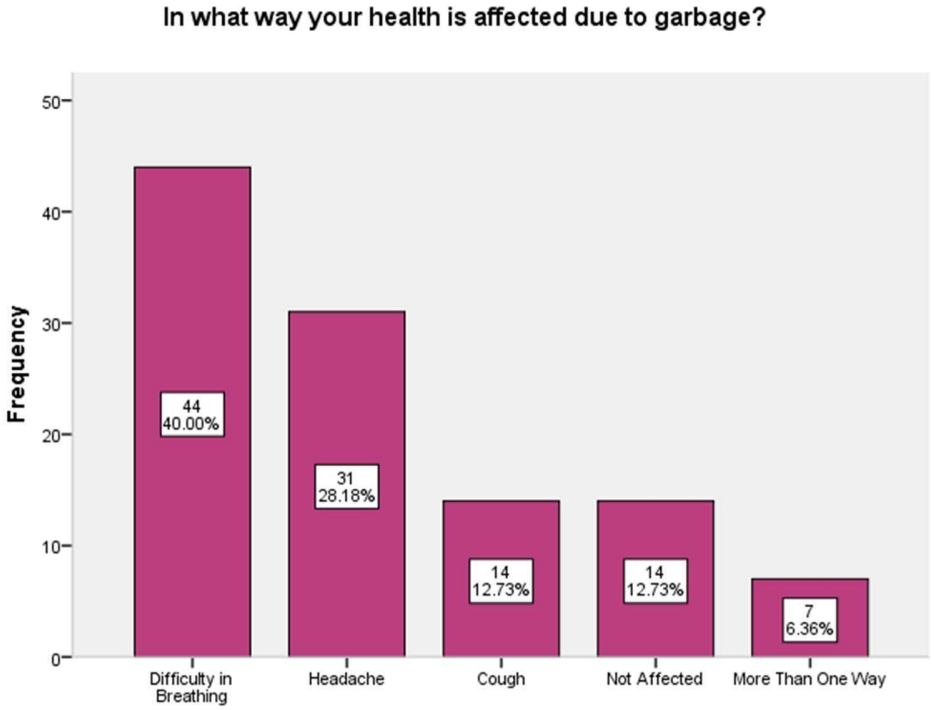


Figure 4.7 Showing that people having different health issues

Interpretation: The above bar chart shows that 44 respondents had difficulty breathing, 31 had headache problems, 14 had a cough, 14 were not affected, and about 7 respondents were affected in more than one way.

Table 4.8: Do customers complain about heaps of garbage lying around?

heaps of garbage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	66	60.0	60.0	60.0
	No	22	20.0	20.0	80.0
	Maybe	22	20.0	20.0	100.0
	Total	110	100.0	100.0	

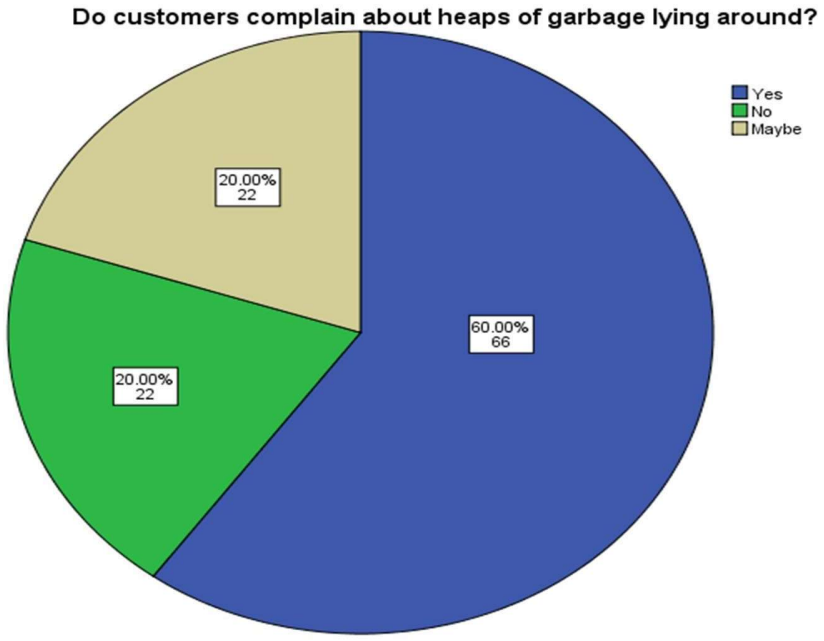


Figure 4.8 Showing about complain of customers regarding garbage lying around

Interpretation: The above chart shows that 66 respondents agreed that customers complain about heaps of garbage, 22 respondents disagreed, and 22 respondents were not sure about it.

Table 4.9: Do people dump their waste alongside the garbage bins instead of putting it in the bins/containers?

Garbage alongside the garbage bins

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	65	59.1	59.1	59.1
	No	21	19.1	19.1	78.2
	Maybe	24	21.8	21.8	100.0
	Total	110	100.0	100.0	

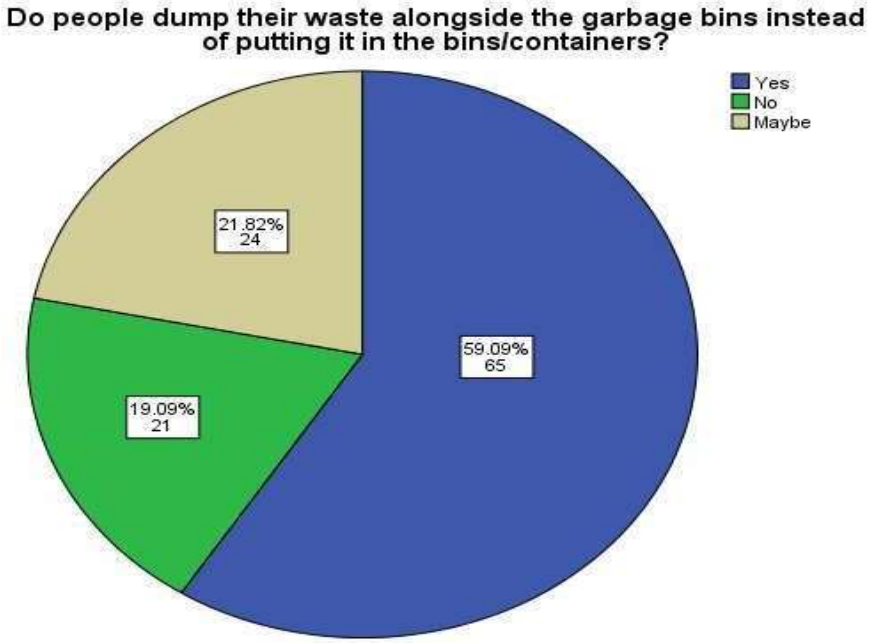


Figure 4.9 Showing responses about people throwing garbage alongside garbage bins

Interpretation: The above chart shows that 65 respondents agreed that people dump their garbage alongside the garbage bins, 21 respondents disagreed, and 24 respondents were not sure about it.

Table 4.10: If yes, then in your opinion why do people behave like this?

Why do people behave like this?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	The height of containers is high	11	10.0	10.0	10.0
	Containers are usually full	41	37.3	37.3	47.3
	People do not bother to put it inside	22	20.0	20.0	67.3
	Containers are not enough	36	32.7	32.7	100.0
	Total	110	100.0	100.0	

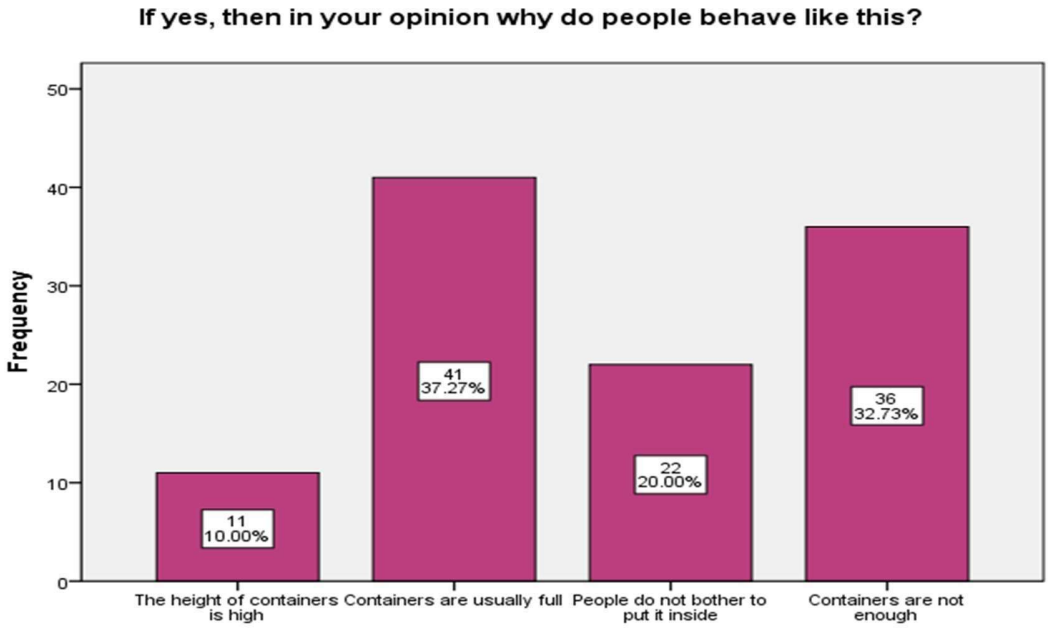


Figure 4.10 Showing why people throw garbage around

Interpretation: The above chart shows that 11 respondents selected that reason people throwing garbage alongside bins is due to the high height of containers, 41 responded that containers are usually full, 22 responded that people do not bother to throw garbage inside the bin, and 36 responded that containers are not enough.

Table 4.11: Do you think that garbage heaps were less in last year than the current year?

Garbage heaps comparison

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	64	58.2	58.2	58.2
	No	24	21.8	21.8	80.0
	Maybe	22	20.0	20.0	100.0
	Total	110	100.0	100.0	

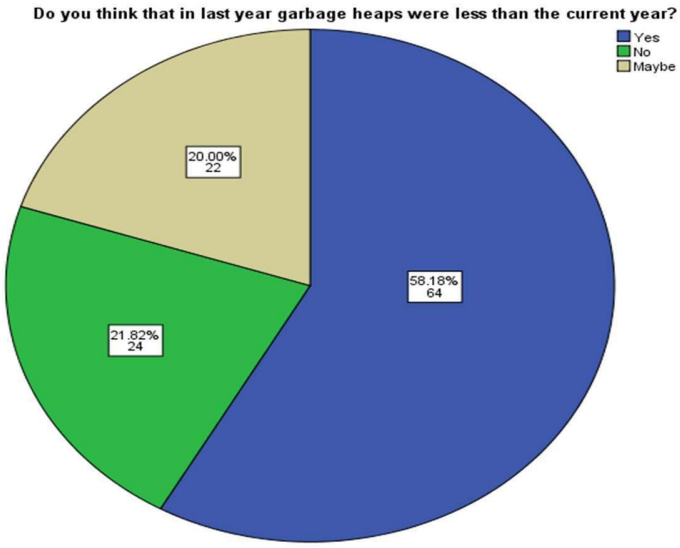


Figure 4.11 Showing comparison of garbage heaps

Interpretation: The above chart shows that 64 respondents agreed that heaps of garbage were less than the current year, 24 respondents disagreed, and 22 respondents were not sure about it.

Table 4.12: How would you rate the solid waste management system of the current year in comparison to the previous year?

Rate the SWMS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Much Better	6	5.5	5.5	5.5
	Somewhat Better	10	9.1	9.1	14.5
	About the Same	33	30.0	30.0	44.5
	Somewhat Worse	22	20.0	20.0	64.5
	Much Worse	39	35.5	35.5	100.0
	Total	110	100.0	100.0	

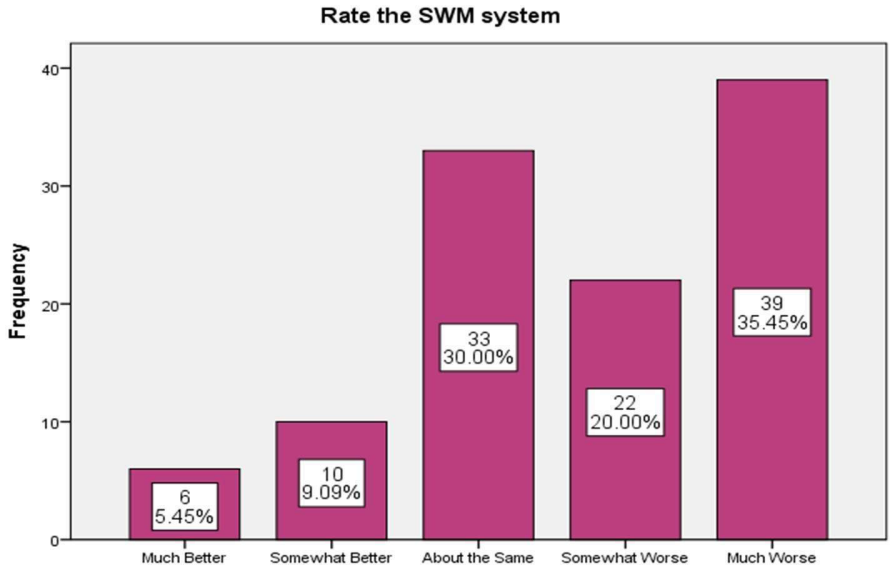


Figure 4.12 Showing rating of SWMS of previous and current year

Interpretation: The above chart shows that 39 respondents said that in comparison to previous year management is much worse, 22 said somewhat worse, 33 said it is almost same, 10 said somewhat better and 7 were in favor of much better

Table 4.13: Do you think that current solid waste management authorities have failed to clean the area

Authorities have failed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	63	57.3	57.3	57.3
	No	25	22.7	22.7	80.0
	Maybe	22	20.0	20.0	100.0
	Total	110	100.0	100.0	

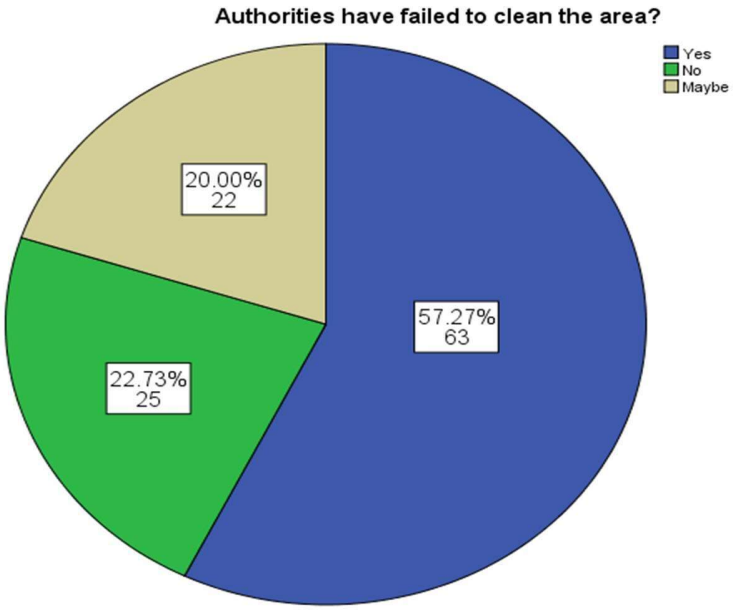


Figure 4.13 Showing opinion about management in cleaning the city

Interpretation The above chart shows that 63 respondents agreed that SWM authorities have failed in cleaning the city, while 25 disagreed and 22 respondents were not about it.

Table 4.14: Are you satisfied with the current solid waste management system?

Satisfaction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	28	25.5	25.5	25.5
	No	77	70.0	70.0	95.5
	Maybe	5	4.5	4.5	100.0
	Total	110	100.0	100.0	

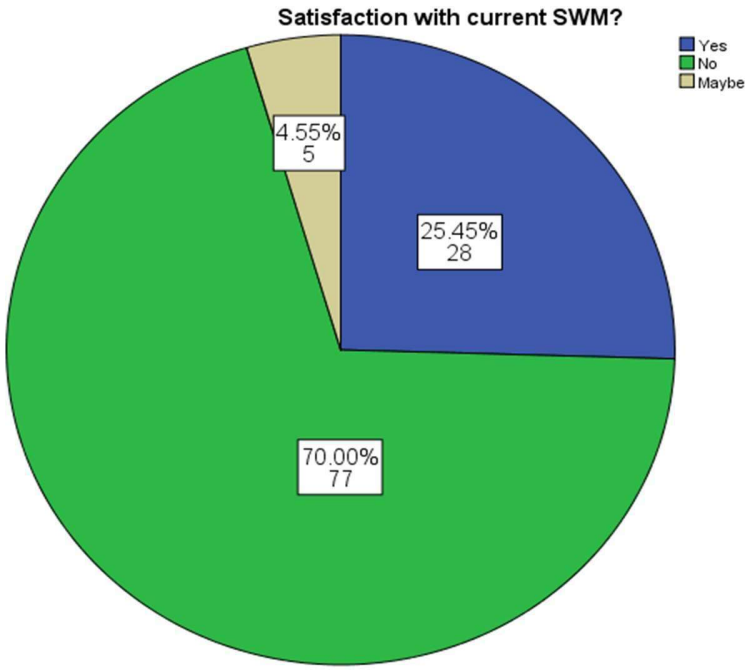
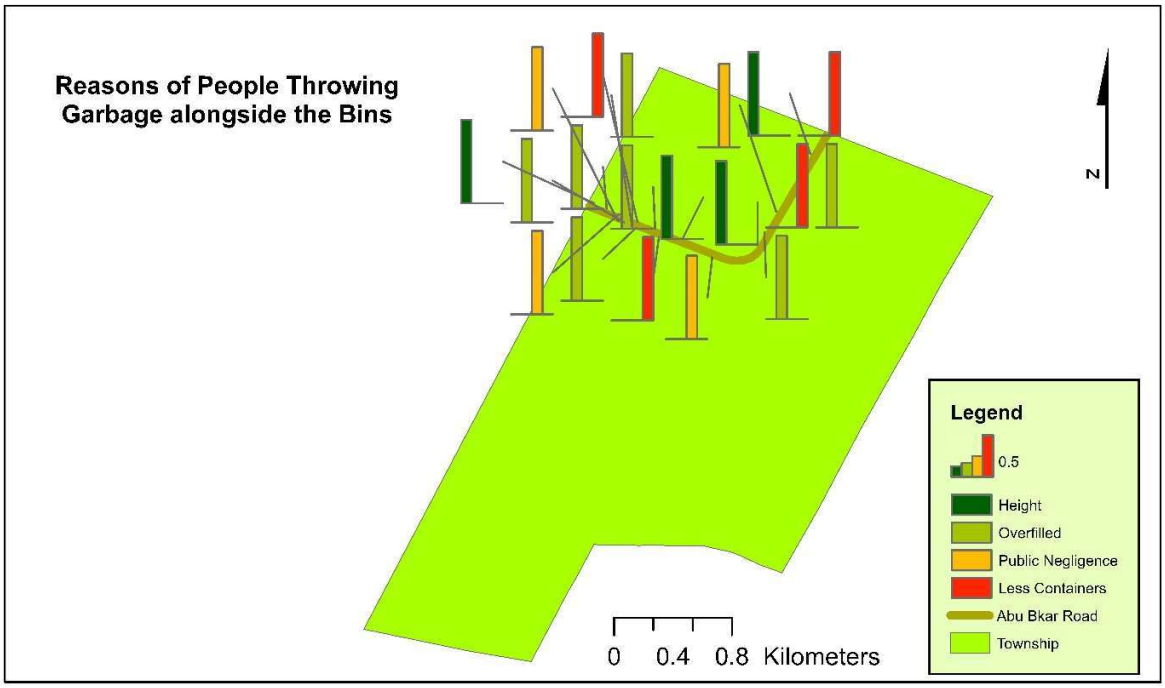


Figure 4.14 Showing the responses about satisfaction with SWMS

Interpretation: The above chart shows that 28 respondents were satisfied with the current solid waste management, while 77 were not and 5 were not sure.

Maps of Responses of Questionnaire Data

RESPONSE OF SHOPKEEPERS



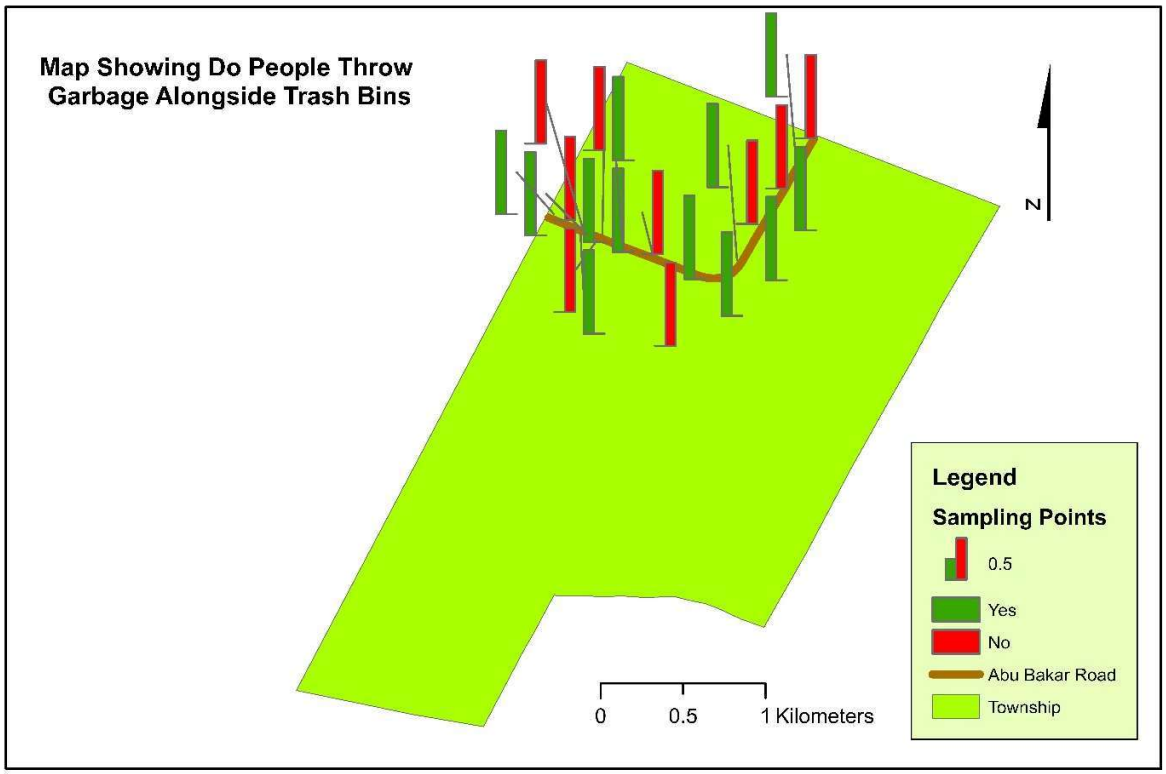


Figure 4.15 Map showing responses of shopkeepers from sampling points

RESPONSE OF SHOPKEEPERS

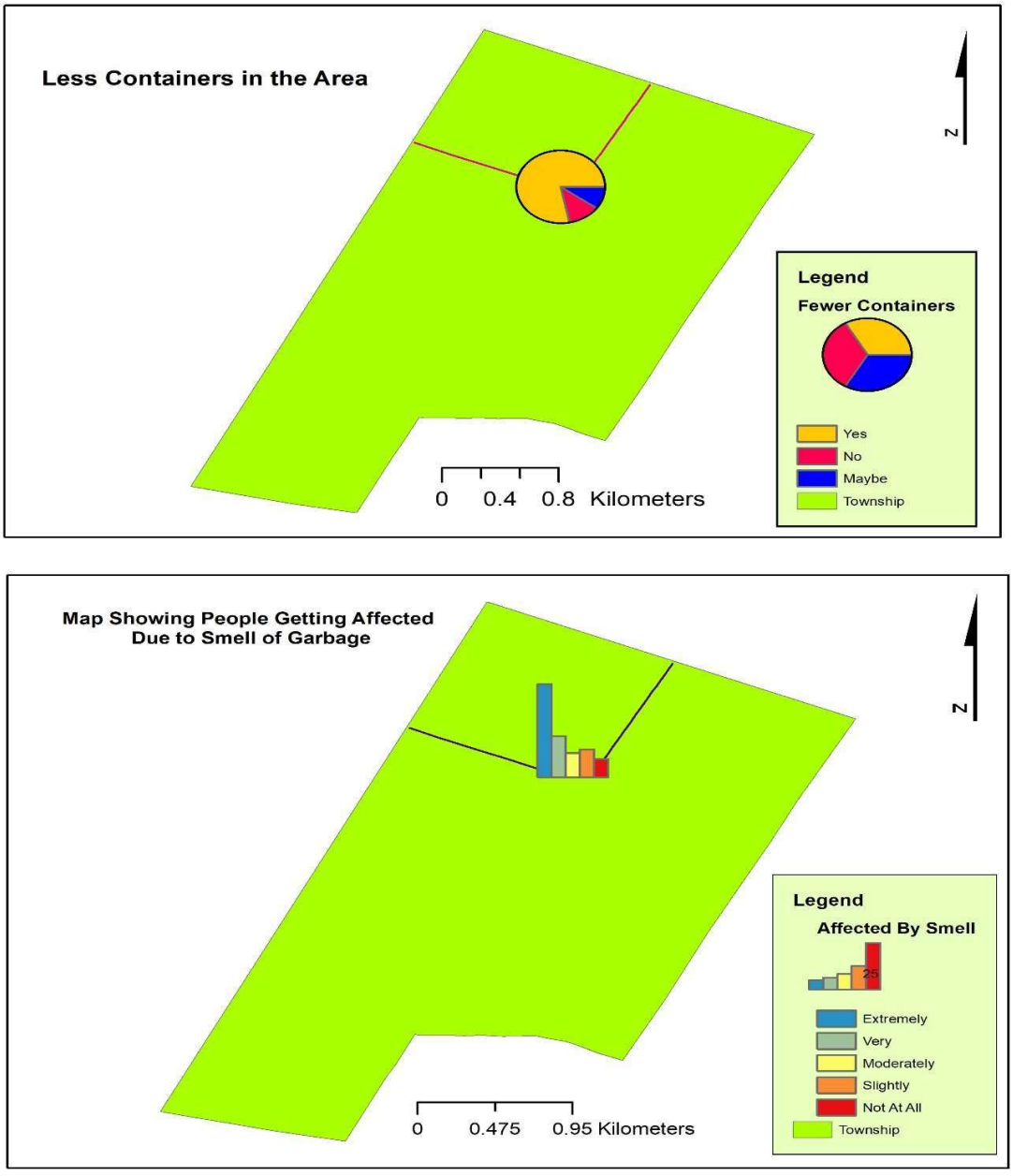


Figure 4.16 Map showing bar and pie charts of questions

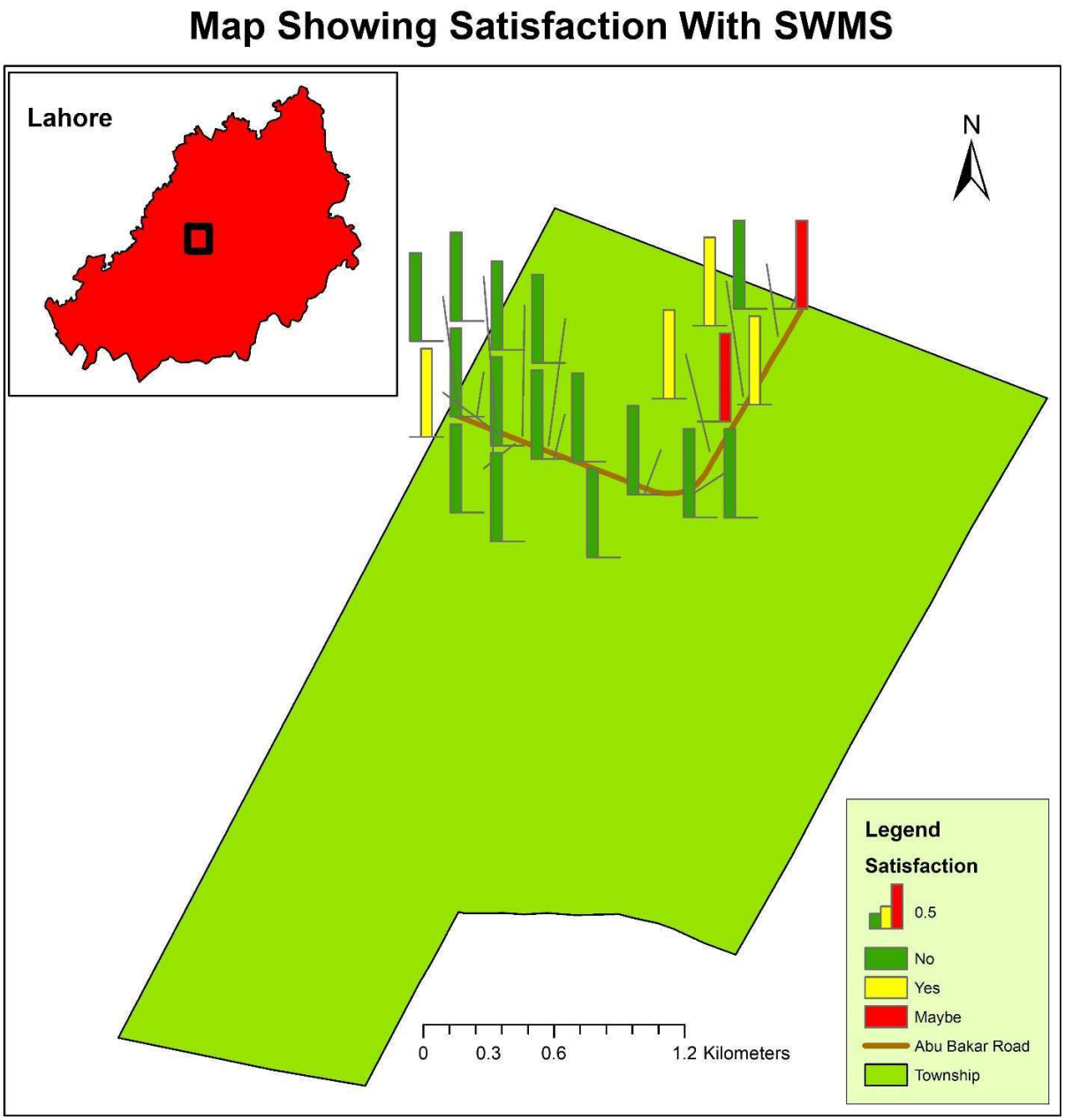


Figure 4.17 Map Showing Satisfaction of respondents with SWMS

CHAPTER 5

5. DISCUSSION

This research observed the assessment of municipal solid waste management and to determine the health problems of people working in the vicinity of the study area. The targeted population was shopkeepers as it was the commercial road. The demographic results showed that most of the respondents were running a shop there for more than 8 years and many of them were aware of the solid waste management authorities.

According to most respondents, the garbage containers were emptied one time a day but do not fulfill the requirements as the number of the containers was less and there was also a delay in collecting garbage. They did complain to the waste collectors about it, but it did not make much change in the situation. This fact can be supported by previous study which showed that although LWMC is full focused and paying attention still 100% results were not achieved, waste collection and transportation needed to be improved. (Masood *et al*.2014)

About 50% of the respondents were extremely affected by the smell of the waste. The respondents were facing general health issues such as about 40% were having difficulty breathing and 28% having headaches during working hours. Most of the customers complain about heaps of garbage lying in front of the shops. People were throwing the garbage alongside the containers and the two main reasons containers were usually full and fewer than the requirement. The previous study conducted in Bahawalpur supported that waste is haphazardly dumped in public spaces and around the containers on roads, and the main reasons observed were the insufficient capacity of containers and lack of public responsibility. (Majeed *et al*.2018)

Respondents were asked to compare the situation of garbage heaps in 2020 and 2021 and most of them responded that in 2020 there were fewer heaps in comparison to 2021, which means the situation is worsening with the time as about 35% of respondents marked that waste management was much worse than the previous year. The results showed that 57% of shopkeepers of the total selected for the study said that current solid waste management has failed to clean Lahore. Operational Deficiencies were observed

in the current waste management in Lahore. Public health like many other third world countries was getting affected by improper waste management in the city (Wilson,2007.).

On the other hand, according to the opinion of authorities' different types of methods are used to collect waste such as door-to-door collection, donkey carts, bins fixed in the streets, sweeping etc. To keep the public areas and roads clean containers and bins are placed in the city, and more bins are still left to arrange to improve the situation. Waste is collected in three shifts but there are still delayed waste pickup issues because the travel time of trucks from the waste-collecting site to the dumping site took 1 to 2 hours. Authorities agreed that there are fewer waste containers in the township according to requirements as the waste generation is high because of the commercial activities. Officer stated that people were not cooperative and do not allow to place containers in front of their shops and homes which results in roadside garbage heaps. He suggested that to keep the township area properly clean, the land is required where a common dumping site and waste collection point can be built. Reduction in travel time of vehicles will help in on time collection of waste. Further public cooperation is key point in keeping the Lahore city clean and for this purpose, LWMC camps are arranged in a different part of the city, people throwing waste on roads are also charged with fine and illegal dumping is observed.

5.1 STATISTICAL ANALYSIS

Ho= People are not getting affected due to improper waste management.

H1= People are getting affected due to improper waste management.

Level of significance = 0.05

Test statistic applied: One-Sample Chi-Square

Test Statistics

	In what way your health is affected due to garbage?
Chi-Square	41.727[a]
df	4
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 22.0.

As the p-value is .000 which is less than 0.05, we will reject the null hypothesis and an alternative hypothesis will be accepted which says that people are getting affected due to improper waste management. According to the frequency table shown in the results about 89 out of 110 respondents were getting affected because of waste while the remaining 21 were either not affected at all or were affected in more than one way.

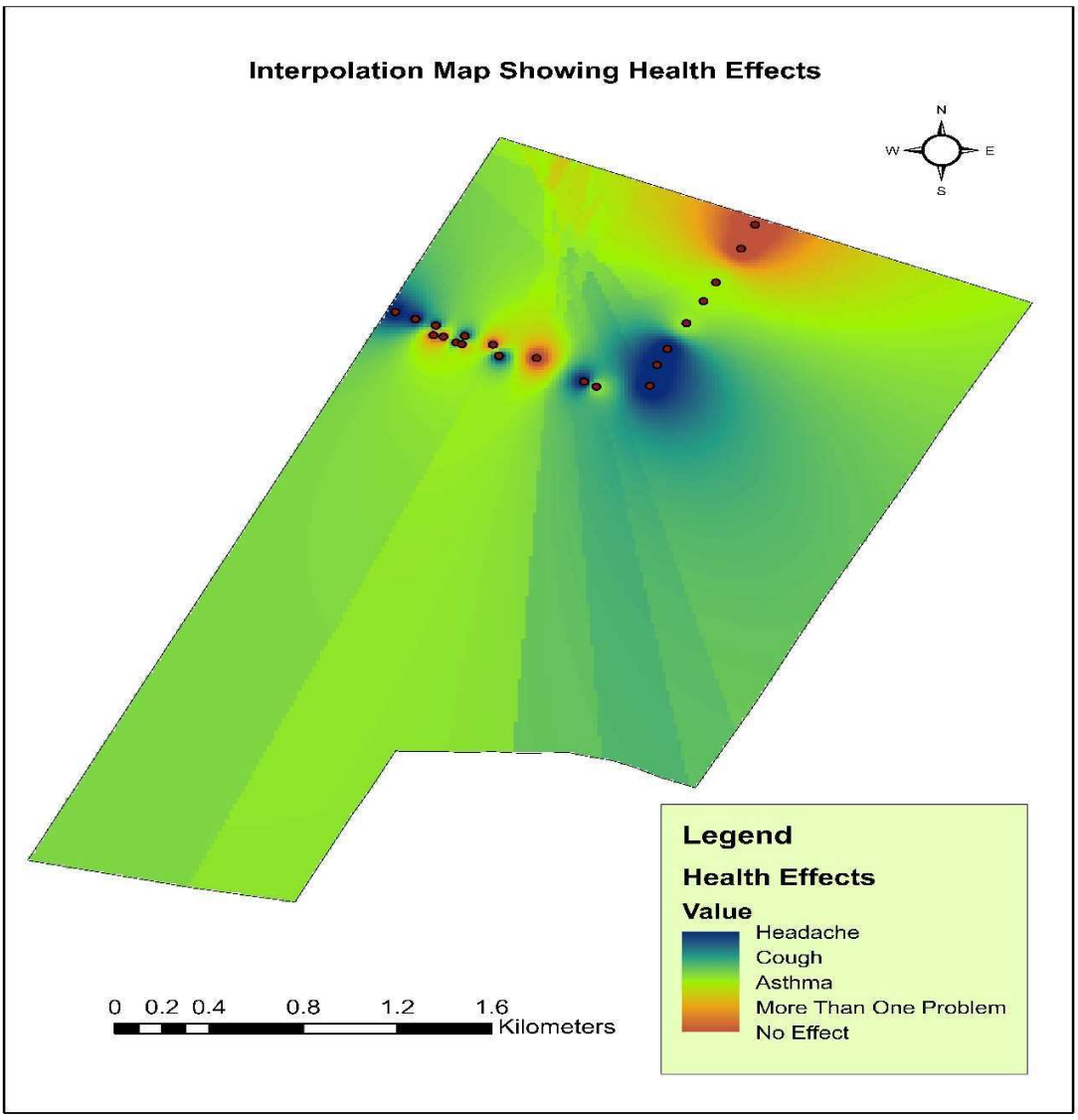


Figure 5.1 Interpolation map showing health effects

The interpolation IDW (Inverse Distance Weighted) method was applied on the sampling points of the selected road in the study area. The map shows that parts with dark and light bluish colors have a high rate of headaches and cough as the trash bins/containers were placed near those shops. While the yellow and greenish shade shows that there was asthma and other problems associated. Moving towards the north side of the road there was no effect as such, as there were either no bins or bins were not near to the shops. So, the interpolation represents those shops having bins near to them were more affected rather than other shops.

6. CONCLUSION

Solid waste management has become a global issue these days. Multiple waste collection and disposal methods are used by waste management companies but are not sufficient. The waste generation rate is very high in Lahore city as the population is increasing day by day and it is becoming difficult to keep the city clean and provide proper services which are resulting in garbage heaps lying in public areas and roads. Due to improper solid waste management, public health is compromised. Heaps of garbage lying around were resulting in headaches and other issues. Most of the respondents were not satisfied with the current waste management practices.

7. RECOMMENDATIONS

More containers should be placed in the area and at appropriate locations to cope with the situation

To reduce the travel time of vehicles pick-up points and dumping points should be near

Public awareness and cooperation should be encouraged for better waste management

More funding can be allocated to management for better services and vehicles

The number of vehicles should be increased to fasten the collection process

To deal with the odor of the waste preventive measures should be used so that people can allow placing the bins near their houses and shops

To improve the quality of customer services LWMC should introduce better means of communication such as websites and complaint centers where queries and issues of people can be resolved.

8. LIMITATIONS

As most of the shopkeepers were less educated, questions were translated into the Urdu language for their understanding which was very time-consuming.

REFERENCES

Ahsan, A., Alamgir, M., El-Sergany, M. M., Shams, S., Rowshon, M. K., & Daud, N. N. (2014). Assessment of Municipal Solid Waste Management System in a Developing Country. *Chinese Journal of Engineering*, 11.

Akmal, T., & Jamil, F. (2021). Assesing Health Damages from Improper Disposal of Solid Waste in Metropolitan Islamabad- Rawalpindi, Pakistan. *Sustainability vol 13*.

Anchan, S. S., & Palakshappa, K. (2021). Public Perception and Concern Towards Solid Waste Management: A Case Study of Mangaluru City, India.

De, S., & Debnath, B. (2016). Prevalence of health hazards associated with solid waste disposal-A case study of kolkata, India. *Procedia Environmental Sciences*, *35*, 201-208.

Hoornweg, D., & Bhada-Tata, P. 2012. What a Waste: A Global Review of Solid Waste Management. *Urban development series; knowledge papers no. 15. World Bank, Washington, DC. © World Bank.*

https://openknowledge.worldbank.org/handle/10986/17388

Municipal Solid Waste. (n.d.). retrieved from https://archive.epa.gov/epawaste/nonhaz/municipal/web/html/

Pakistan Waste Management. (2019). Retrieved from https://www.trade.gov/country-commercial-guides/pakistan-waste-management

Lahore City Profile. (n.d.) retrieved from https://www.waste.ccacoalition.org/sites/default/files/files/lahore_city_profile.pdf

Jerie, S., & Tevera, D. (2014). Solid waste management practices in the informal sector of Gweru, Zimbabwe. *Journal of waste management*, *2014*.

Khoso, A. R., Memon, A. H., Pathan, A. A., & Akhund, M. A. (2018). Solid waste management issues in Hyderabad city. *Mehran University Research Journal of Engineering & Technology*, *37*(3), 653-662.

Kouloughli, S., & Kanfoud, S. (2017). Municipal solid waste management in constantine, Algeria. *Journal of Geoscience and Environment Protection*, *5*(1), 85-93.

Kumar, S., Sharma, S., & Jaluthriya, S. (2016). Solid Waste Management : A Case Study of Jaipur City. *International Journal of Engineering Research and Technology*.

Longe, E. O., Longe, O. O., & Ukpebor, E. F. (2009). People's perception on household solid waste management in Ojo Local Government Area in Nigeria.

Mahar, A., Malik, R. N., Qadir, A., Ahmed, T., Khan, Z., & Khan, M. A. (2007, September). Review and analysis of current solid waste management situation in urban areas of Pakistan. In *Proceedings of the international conference on sustainable solid waste management* (Vol. 8, p. 36). Citeseer.

Majeed, A., Batool, S. A., & Chaudhry, M. N. (2018). Environmental quantification of the existing waste management system in a developing world municipality using EaseTech: the case of Bahawalpur, Pakistan. *Sustainability*, *10*(7), 2424.

Masood , M., Barlow, C. Y., & Wilson, D. C. (2014). An assessment of the current municipal solid waste management system in Lahore, Pakistan. *Waste Management and research*, 834-847.

Mohsin, M., & Chinyama, A. (2016). Impacts of Solid Waste Management Practices on Environment and Public Health: A Case of Bahawalpur City, Pakistan . *Journal of Environmental and Agricultural Sciences*, 2313-3629.

Nathanson, J. A. (2020, November 10). Solid-waste management. Encyclopedia Britannica. https://www.britannica.com/technology/solid-waste-management

Nuzrath, A. N., & Ruzaik, F. (2017). Public Perceptions on Effectiveness of Solid Waste Management in Colombo Municipality Area. *Solid waste and manegement* .

Odonkor , S. T., Frimpong, K., & Kurantin, N. (2020). An assessment of house- hold solid waste management in a large Ghanaian district. *Heliyon 6* , e03040.

Saidou, H., & Aminou, S. (2015). Solid Waste Management in the Town of Maradi in Niger Republic. *Journal of Environmental Protection*, *6*(04), 359.

Saja, A. A., Zimar, A. Z., & Junaideen, S. M. (2021). Municipal Solid Waste Management Practices and Challenges in the Southeastern Coastal Cities of Sri Lanka. *Sustainabilty* , 4556.

Shafqat, A., Noor, S., & Fatima, M. (2014). Practices and challenges of municipal solid waste management in Bahawalpur city, Pakistan. *Journal of Sustainability Science and Management*, *9*(1), 90-98.

Sharma, K. D., & Jain, S. (2020). Municipal solid waste generation, composition, and management: the global scenario. *Social Responsibility Journal*.

Wilson, D. C. (2007). Development drivers for waste management. *Waste Management & Research*, *25*(3), 198-207.

APPENDIX

QUESTIONNAIRE

1. For how many years you have been running a shop here?

A) 1-2 years
B) 3-4 years
C) 5-6 years
D) 6-7 years
E) More than 7 years

2. Have you heard about the solid waste management system?

A) Yes
B) No
C) Maybe

3. How often the waste containers are emptied?

A) Once a day
B) Once in two days
C) Once in three days
D) Once a week
E) After a week

4. Do you complain to the garbage collectors about delayed pickup of garbage?

A) Yes
B) No
C) Maybe

5. Do you think there are fewer garbage containers in the area?

A) Yes
B) No
C) Maybe

6. To what extent, you are affected by the smell of waste?

A) Extremely Affected
B) Very Affected
C) Moderately Affected
D) Slightly Affected
E) Not at all Affected

7. In what way your health is affected due to garbage?

A) Difficulty in Breathing
B) Headache
C) Cough
D) Not Affected
E) More than one problem

8. Do customers complain about heaps of garbage lying around?

A) Yes
B) No
C) Maybe

9. Do people dump their waste alongside the garbage bins instead of putting it in the bins/containers?

A) Yes
B) No
C) Maybe

10. If yes, then in your opinion why do people behave like this?

A) The height of containers is high
B) Containers are usually full
C) People do not bother to put it inside containers
D) Containers are not enough

11. Do you think that last year's garbage heaps were less than the current year?

A) Yes
B) No
C) Maybe

12. How would you rate the management system as compared to last year and the current year?

A) Much Better
B) Somewhat Better
C) Average
D) Somewhat Worse
E) Much Worse

13. Do you think the current solid waste management system has failed to the clean the city?

A) Yes
B) No
C) Maybe

14. Are you satisfied with the current waste collection system?

A) Yes
B) No
C) Maybe

Interview Questions

1. What kind of methods are used to collect waste/garbage?
2. To what extent these methods are effective?
3. How are you trying to keep the roads and public areas clean?
4. In township survey respondents have complained about fewer waste containers, what is your opinion about this?
5. The containers are usually filled, why waste is not collected on time?
6. Why Lahore is not getting clean, there are heaps oof garbage lying around most of the places?
7. What kind of strategies are being planned by LWMC to improve the current situation of Lahore?

Geography

About this page

This is your assignment inbox. To view a paper, select the paper's title. To view a Similarity Report, select the paper's Similarity Report icon in the similarity column. A ghosted icon indicates that the Similarity Report has not yet been generated.

BA June 2022

Inbox | Now Viewing: new papers ▼

Submit File Online Grading Report | Edit assignment settings | Email non-submitters

Delete Download move to...

Author	Title	Similarity	web	publication	student papers	Grade	response	File	Paper ID	Date
Faiza Waheed Khan	BA THESIS DEFENSE JUNE 2022	6%	2%	3%	3%			download paper	1832694472	10-May-2022
Maliha Pervaiz	BA THESIS DEFENSE JUNE 2022	10%	8%	4%	4%			download paper	1832702713	10-May-2022
Masuma Raza	BA THESIS DEFENSE JUNE 2022	14%	8%	11%	3%			download paper	1832703679	10-May-2022
Sufah Khan	BA THESIS DEFENSE JUNE 2022	21%	15%	15%	10%			download paper	1832707268	10-May-2022
Isbah Sohail	BA THESIS DEFENSE JUNE 2022	28%	6%	12%	24%			download paper	1832698360	10-May-2022
Mahnoor Bajwa	BA THESIS DEFENSE JUNE 2022	37%	24%	12%	27%			download paper	1832701225	10-May-2022