Citizen perceptions on solid waste collection services: A case of uMhlathuze Local Municipality

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Abstract

South African municipalities face serious solid waste collection challenges in undertaking solid waste collection. The literature identifies several reasons for municipalities not performing optimally regarding the provision of solid waste collection services. Public service delivery protests are among the consequences of poor solid waste collection services in South Africa. This study aimed to examine citizen perceptions towards solid waste collection services at the uMhlathuze Local Municipality, a municipality with ongoing solid waste collection challenges. A cross-sectional research design was used where quantitative data collected from 385 residents from the municipal were analysed using the factor analysis technique. Results showed that residents are aware of the health hazards associated with poor solid waste collection within the municipality and reported the view that solid waste management policies and strategies should be reviewed. Therefore, the study recommends possible solutions towards improved solid waste management at the uMhlathuze Local Municipality.

Declaration by student

I, Thokozani Emmanuel Gumede, hereby declare that this mini-dissertation represents my own work, except where indicated in the text. I further declare this work has never been submitted for awarding of a degree to another University or qualification.

Signature

Dedication

This mini-dissertation is dedicated to everyone who participated in the study data collection, and everyone who believed in me and my work.

Acknowledgements

Firstly, I would like to thank my supervisor Dr Genius Murwirapachena and my colleagues. Their passion for academics motivated me to complete my mini-dissertation. I offer my sincere appreciation for the guidance and support they gave to me throughout the completion of the course. Special thanks go to the Durban University of Technology for making my dream come true. This idea would have never have seen the light of day if this institution had not opened its doors for me to pursue my dream. I would like to recognise the municipal officials from uMhlathuze Local Municipality, especially the Waste Department, who opened their hands and assisted me to conduct the study. Also, I would like to express my most sincere appreciation to the citizens of uMhlathuze for their participation in this study. If it were not for them, this study would not have taken this shape.

Finally, I would like to thank my family for the support they gave me towards completing my mini dissertation. When my morale was down, the kind of motivation I received from all of you was tremendous. If it were not for you, I would not have made it this far.

Acronyms

ANOVA	Analysis of Variance
CoGTA	Cooperative Governance and Traditional Affairs
DEAT	Department of Environmental Affairs and Tourism
DEFF	Department of Environment, Forestry and Fisheries
DWS	Department of Water and Sanitation
EE	Efficiency and Effectiveness of Waste Management Services
IDP	Integrated Development Plan
KMO	Kaiser-Meyer-Olkin
LGMSA	Local Government Municipal Systems Act
MWSP	Municipal waste sector plan
NDP	National Development Plan
NEMA	National Environmental Management Act
NWMS	National Waste Management Strategy
PCA	Principal Component analysis
PG	Public Health and Governance in Waste Management
ULM	uMhlathuze Local Municipality

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CHAPTER 1

INTRODUCTION

1.1 Background of the study

The Constitution of the Republic of South Africa mandates municipalities to ensure that everyone within their jurisdiction is provided with an environment that is not harmful to their health. Several pieces of South African legislations and national policies compel municipalities to redress past imbalances in the provision of waste collection services. Such legislation includes the National Environmental Management Waste Act (59 of 2008) the National Domestic Waste Collection Standards of 2011, and the National Waste Management Strategy of 2011.

In South Africa, solid waste collection is recognised as a legislated essential service that is mainly determined by the Constitution (Act No. 108 of 1996) and the National Environmental Management Waste Act (59 of 2008). Gogoi et al. (2020) highlighted the common challenges faced by South African municipalities in the provision of solid waste collection services. The challenges are: inadequate provision of skips in high-density dwelling areas also known as peri-urban (township) areas, delayed collection of skips resulting in over-spilling of waste and environmental pollution, separation of waste for recycling, among others.

1.2 Problem statement

Legislation outlines and classifies the objects and responsibility of government to citizenry. A tone is set for government departments and municipalities to establish strategies and action plans of how the set objects can be achieved. Since local municipalities are the third tier of government mandated to retain a sovereign state and yet still directly implement services, the municipality is tasked to conduct practicable and affordable action that is effective for the communities being served. Solid waste collection is an essential service that should be offered to every citizen without prejudice and/or discrimination. Among the key deliverables highlighted by the

2019/2020 uMhlathuze Local Municipality (ULM) (2020) annual report are: the collection of waste, waste minimisation, re-use and recycling of waste, skip management and eradication of illegal dumping, and etcetera.

Often municipalities experience community unrest (protests) and among the challenges that citizens highlight is the inefficiency of municipalities in collecting solid waste. Key challenges highlighted by the 2020/2021 ULM annual report are: the constant breaking down of waste trucks and constrained sourcing of funds for their repairs that result in prolonged unavailability of the same to collect waste from waste bins and over-spilling skips. Further, the same report indicated that the implementation of the national lockdown worsened the effectiveness of solid waste collection.

1.3 Aim and objectives of the study

The aim of this study was to investigate the perceptions of citizens on solid waste collection services in the ULM. This aim was achieved through the fulfilment of three objectives, namely:

i. To examine public service delivery at the uMhlathuze Local Municipality,

ii. To establish the challenges encountered by the uMhlathuze Local Municipality in providing solid waste collection services, and

iii. To investigate citizen perceptions on solid waste collection services at uMhlathuze Local Municipality.

1.4 Significance of the study

The study provides information that can assist the municipality to address negative public perceptions regarding municipal performance. A municipality Integrated Development Plan (IDP) is developed through public participation in accordance to the precepts outlined in Chapter 7 of the Constitution (Act No. 108 of 1996) which mandate municipalities to actively partner with communities in developing the plan. Accordingly, the municipality arranges meetings at venues where communities are able to attend and present their requests and suggestions to the municipality. Once the municipality has concluded its administrative and budgeting tasks, the municipality coordinates a set of meetings with the public (communities), informing them of the apportioning of

funds (budget) to cater for the needs that had been raised. Thus, as stated in the ULM Fifth Generation IDP 2022/2023 to 2026/2027 report (ULM 2022), communities are stakeholders that ULM is obliged to account to. Effective public participation and development of a partnership between communities and the municipality is necessary for communities to gain confidence that their needs will be met in an appropriate way, and for them to have a positive perception of service delivery in their municipality.

1.5 Organisation of the study

The rest of the study comprises four chapters. Chapter 2 presents a review of the theoretical and empirical literature on solid waste collection by local government (municipalities). Chapter 3 discusses the methodology used in the study. Chapter 4 presents the findings of the study. Chapter 5 concludes the study and gives recommendations based on the findings from the study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter provides an overview and detailed discussion of legal requirements of municipalities, their core function, and citizen perceptions on the solid waste collection services that are provided by ULM. The motive of a literature survey is to examine the existing knowledge in the field and identify the gaps, which then informs the aim, objectives, and method of data collection and analysis. Based on the media reporting and findings of authors and researchers, questions were drawn up to ascertain the perceptions of citizens towards ULM solid waste services provision.

2.2 Legislative background

The preamble of the Constitution (Act 108 of 1996) of the Republic of South Africa acknowledges injustices caused by past events proposes a social justice system that will enable government to provide fundamental services to communities. These services are designed to improve the quality of life of citizens and address human needs. Section 24 of the Constitution indicates that government is mandated to provide basic services to the people and ensure that the environment in which citizens live-in is protected from pollution and ecological degradation. Further, the Constitution elucidates that the environment must be kept in a state that will not be harmful to the wellbeing of citizens in any way, and in such a way as to ensure that present and future generations will benefit from having an ecologically sustainable environment and natural resources.

Based on the precepts of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008), the 2020 National Waste Management Strategy (NWMS) provides an overview of government policy and strategic interventions that will enable municipalities and other government implementing agents to be responsive and implement measures set-out by the vision 2030 National Development Plan (NDP)

adopted in 2012, and the 2030 Sustainable Development Goals (SDGs) adopted by the United Nations (UN) in 2015. Chapter 5 of the NDP focuses on environmental sustainability. The three supporting pillars of this focus are: waste minimisation, enablement of effective sustainable waste services, and monitoring the effectiveness of awareness, compliance and enforcement measures.

The National Waste Management Strategy (2020), states that the largest single waste type, after the recycling programme had been established, is biomass and organic waste, followed by a 13% waste contribution from construction and demolition works. The third tier of government (municipalities) must undertake effective strategies and action plans to eradicate waste pollution or at least minimised this (NWMS, 2020). The third chapter of the Constitution titled “Co-operative government”, together with the seventh chapter titled “Local Government”, indicates that municipalities are entrusted with providing services to communities in an affordable and sustainable manner.

Sections 151 and 152 of the Constitution state that municipalities are responsible for direct implementation of services and also have the autonomy to govern “own” initiatives to ensure that the environment is safe and healthy for citizens to live and develop themselves. Section 152 describes the rights of citizens, of which is the right of communities to be involved in local governance matters. Therefore, municipalities must seriously consider citizens’ perceptions of the way it conducts all its operations and functions. Community perception and involvement is of paramount importance in the effective functioning of a municipality. This study attempts to ascertain citizen perceptions of the municipality’s function in collecting solid waste from communities. For this study, the municipality of interest was ULM.

Based on the 1998 White Paper on Local Government, the government established a participatory system through which citizen participation in governance matters should take place. Notice 364 of 2009 of the National Framework (NF), titled “guidelines for provinces and municipalities in the implementation of the ward funding model” states that local governments, such as ULM must ensure that communities are involved in the planning and implementation of development projects. Thus, based on sections 1.9.3 and 1.10 of the National Framework, municipalities must establish an Integrated Development Plan (IDP) that will facilitate the inclusion of citizens in local governance affairs through public dialogue, sharing of knowledge and experiences, and other

appropriate means. Section 2.1.3 of the National Framework highlights the recognition, importance and responsibility of citizens to municipality's primary function of catering for the primary needs of communities.

The National Environmental Management Act (NEMA), 1998 (Act 107 of 1998) is founded on section 24 of the Constitution and states that inhabitants of the Republic must live in an environment that is free of any harmful elements that will be detriment to their health and welfare. Chapter 2 of the Act states that an organ of state (government entity), especially at local government level, must establish an environmental management mechanism that will consider a safe living environment in the planning of any socio-economic development and municipal operation. Further, the selected mechanism must address the physical, psychological, developmental, cultural and social needs of citizens in a manner that is socially, environmentally and economically sustainable (NEMA, 1998). Thus, according to NEMA, the State (government) must be committed in ensuring that it provides a sustainable working mechanism that will measure (detect) and monitor harmful elements and enforce compliance and punitive administrative measures. This, according to NEMA, will ensure that pollution and degradation of the environment is avoided or where not possible, minimised and remedied in the most reasonable practical manner.

In 2012 the National Department of Environmental Affairs and Tourism (DEAT) introduced a municipal waste sector plan (MWSP) to address the historical environmental challenges (backlogs) with waste services provision. Among the waste services that were under scrutiny during the development of the waste plan were waste collection, waste transportation and storage, recycling and safe disposal of waste. Based on the 2002 DEAT report, the MWSP acknowledges that there is a severe backlog of municipalities providing adequate universal access to municipal solid waste collection. The report also states that, while residents or citizens in urban areas enjoy relatively good access to effective refuse removal services, residents in peri-urban and rural areas have limited access to formal waste collection services. Citing Fiehn and Ball (2005), Statistics South Africa (2007) state that as many as 50% of South Africans do not receive a basic municipal waste collection service, thus the by Cabinet to a MWSP developed.

The MWSP mandates municipalities to provide adequate domestic waste collection services (basic refuse removal) that will ensure that the environment is protected from unmanaged waste. In view of the above, the Department of Cooperative Government and Traditional Affairs (COGTA) developed a Local Government Turnaround Strategy and among the strategic objectives indicated is that municipalities must improve their performance and professionalism regarding servicing the needs of the communities they serve (COGTA, 2009). ULM is no exception, as the municipality has had a number of service delivery protests from mainly peri-urban communities in recent years. Thus, among the listed technical performance indicators and targets mentioned in Objective 3 of the Local Government Turnaround Strategy is that municipalities should improve on waste collection (COGTA, 2009). COGTA (2009) states that in order for municipalities to satisfy newly revised turnaround targets in addressing historical backlogs and poor performances in solid waste collection, municipalities such as ULM must increase community involvement and participation in municipal waste service provision before allocating budget that will support operations, equipment acquisition and maintenance, and capacitation to improve waste management services including waste collection.

The preamble of the Municipal Structures Act (MSA), 1998 (Act 117 of 1998) states that municipalities have inherited grossly inequalities in the provision of municipal services, therefore they must now fulfil their constitutional obligations to provide efficient municipal services and provide a safe and healthy environment, among other obligations. Section 81 of chapter 4 of the MSA mandates the involvement and participation of traditional leaders in municipal functions so that development and/or strategies adopted by municipalities can be refined and suitable for citizens in various communities (MSA, 1998).

In view of the above in relation to the formation of local government entities and what is expected from them, the preamble of the Local Government Municipal Systems Act (LGMSA), 2000 (Act 32 of 2000) highlights that successful implementation of the core principles, mechanisms and processes that enable municipalities such as ULM to progress towards the social and economic upliftment of local communities, is dependent on how well the municipal structures (comprising of politicians, general citizens and administrative staff) are coordinated. Further, the LGMSA (2000) states

that among other municipal functions, a municipality must have in place protocols or structures that provide for community participation so as to establish a practical and enabling framework for the planning processes of municipal functions; a performance management system with set key deliverable areas and effective resource mobilisation. This, according to the LGMSA, will align municipalities with other government spheres and attain the overall socio-economic upliftment of communities living in harmony with their local natural environment (LGMSA, 2000).

The LGMSA (2000) states that the viability of municipalities depends on the implementation of mechanisms for resource management and monitoring that are in accordance with the Municipal Finance Management Act (MFMA), 2003 (Act 56 of 2003), and which involve the active participation of communities in the affairs of the municipality. Since government gathers revenue from taxation and through services provided by municipalities to communities, it is of paramount importance that the municipality has in place a framework that aligns with standards of other government spheres, bylaw enforcement, service tariffs, credit control and debt collection (LGMSA, 2000). Regarding the importance of citizen perceptions of a municipality's function, section 16 (1) (a) (iii) of chapter 4 of LGMSA states that a municipality should develop a participatory governance system that encourages local communities to monitor and review the performance of a municipality, including the outcome and impact of such performance. A municipality is required to provide services to communities that are affordable and of a good quality, considering that these communities are a major shareholder to the municipality. One of the mechanisms in place to promote citizen involvement and accountability of municipal service delivery is the Integrated Development Programme (IDP).

2.3 Theoretical literature

A study by Radzililani (2019) states that inefficiencies in tackling waste management is a global challenge faced by developed and developing countries alike. Most research studies focus on the disposal aspect of solid waste, handling of municipal waste (solid waste) at landfill sites, and the facilitation of recycling programmes and associated business opportunities. Few studies focus on the failure to incorporate public awareness and influence regarding municipal operation(s).

Various researchers such as Council for Scientific and Industrial Research (CSIR) (2013) are of the view that the majority of waste generated in the world is as a result of industrialisation and urbanisation. Dlamini et al. (2019) echo the above and state that waste generation for African countries are generally high due to high population growth rates that have increased demand for products, increased rural-urban migration of people, also the search for improved profits and quality of life through industrialisation and urbanisation respectively, and improvement in production processes and standards of living. The authors state that the above have placed unprecedented demands on solid waste collection. Wilson and Velis (2014) and Mohee and Simelane (2015) observe that solid waste collection is often the culprit responsible for inefficiencies in waste management. Muzenda et al. (2012) and Mutanga et al. (2013) (cited in Dlamini et al. 2019) state that, apart from challenges of limited resources, lack of or weak proactive institutional and policy framework on solid waste collection exacerbates the immense pressure on municipal institutions to effectively collect solid waste from communities.

2.4 Empirical literature

Mannie and Bowers (2014) states that, even though strategies are set to enable sustainable collection of waste, municipalities in South Africa still face challenges such as financial constraints, poor advice on the best implementable solutions, failure by decision makers to acknowledge simple cost effective solutions, lack of incentivised campaigns that seek to improve operational objectives and public-private sector partnership. The government has developed world-class strategies, but in the absence of commitment from municipalities to effectively address the identified challenges, the solid waste collection process will remain ineffective. Thus, there is a need for municipalities to establish structures that enable communities to contribute meaningfully to municipal operations as per the Constitution, 1996 (Act 108 of 1996) and the National Framework (NF), 2009 (Notice 364 of 2009).

According to CSIR (2013), municipal solid waste collection is one of the largest cost elements in any municipality in South Africa. Komba (2022) attests to the above and states that solid waste management in general is among the top five most challenging problems in municipalities. The CSIR (2013) states that three aspects are used to classify a municipality's solid waste collection system, namely: availability of collection

services, mode of operation, and the type of waste material being collected. Other studies conducted by the CSIR indicate that in South Africa there are three types of solid waste collection services: communal system, informal block collection, and kerbside/alley collection. The CSIR (2013) highlights challenges associated with each collection services and how communities or citizens contribute to the well-functioning of each service type.

The challenge of using a communal solid waste collection system (widely used system in South Africa for historically disadvantaged communities) is that, since skips (large refuse containers) are placed in public places, lack of ownership by the public results in citizens indiscriminately disposing of waste outside the containers as well (CSIR 2013). Such actions pose environmental pollution and health risks to citizens located close to or passing by the container. Similarly, the challenge of a block collection system is what do waste generators (citizens) do with their waste if they are unable to bring the waste to the collection vehicles on the day they are collecting. This leads to development of informal dump sites in communities. Both these issues demonstrate the importance of municipalities engaging in meaningful partnership or engagement with communities on whatever strategy the municipality wants to pursue.

A study by Buntaine et al. (2021) indicates that, in recent years, local government institutions are increasingly migrating to technological platforms that allow citizens to participate in coproduction of public services. The authors further state that participation of citizens by monitoring and providing feedback to municipal operations has been found to yield improved quality of public services. The authors state that active participation of citizens in the municipality by continuously monitoring and reporting items does not prevent littering, but affects the way managers take decisions on how they will conduct municipal functions that align available resources to citizen-produced data. Capturing citizens' perception of municipal operations helps decision makers identify public services failures, costs incurred due to each public services failure, quality of public services, importance of citizen-produced data, the economies-of-scale, and the benefits of establishing and operating practical citizen-reporting platforms.

A study conducted by the Department of Science and Innovation (DSI) in collaboration with CSIR and the University of Western Cape (DSI, 2022), indicates that in most

cases, category B municipalities such as ULM experience more waste collection problems in lower income status townships than the more affluent suburbs or urban areas. The study further found that very few townships receive regular waste collection services and the majority of households in townships either dump, bury or burn their waste due to lack of adequate waste collection services from the municipality (DSI, 2022).

Owojori et al. (2022) state that if heads of municipalities were to focus on engaging citizens regarding their expectations of each other, a lot of misconceptions and skewed perceptions of how the municipality functions in a discriminatory fashion would be corrected. Sunarti et al. (2023) state that citizens are generators of waste that require the municipality to collect waste products from the location of their households, therefore heads of municipalities together with municipal officials must shift their mind-set and see citizens as stakeholders that should be actively engaged in waste reduction. Widyatmika and Bolia (2023) state that the municipality must have ongoing engagements and strategy participation with its citizens. The 2020/2021 ULM's IDP report indicates that the municipality actively collects ideas and needs of citizens once per annum.

From the above perspectives, in the view of the researcher, there is a possibility that citizens are discontented with a lack of engagement and participation with the municipality on matters of waste collection in their respective areas. This discontent indicates the municipality's failure to create platforms where citizens' perceptions are effectively addressed through them encouraging regular participation and engagement. Therefore, in preparation for this study, the researcher had informal discussions with the Chief Financial Officer (CFO) and the Deputy City Manager (DCM) responsible for community services to find out about fund allocation and community engagement platforms that encourage community involvement on solid waste collection. The researcher found that the perceptions of the municipal officials seemed far apart from the perception of citizens which the researcher knew from anecdotal knowledge. This confirmed to the researcher that formally gathering a sample of the citizen's perceptions of the municipality's function of collecting solid waste would be a useful contribution to development of better services over time.

In as much that the study focuses on citizen's perception, the very perceptions being targeted cannot be obtained if there are no known or developed formalised structures and systems that citizens are aware of that enables them to express their viewpoints. Widyatmika and Boila (2023) state that it is of paramount importance that a municipality must find out how citizens feel about the management of waste, particularly waste collection. The authors further state that it is equally important that citizens be made aware of the incentives in place that encourage their participation (Widyatmika and Boila, 2023). For instance, citizens should be able to trust that their views articulated at these platforms will be taken seriously and implemented where possible. They further state that lack of awareness and implementation of official communication platforms between municipalities and their respective citizens is an underlying reason for non-participation of citizens. Niyobuhungiro and Schenck (2022) state that regular community participation must be the norm with clearly defined guidelines on how both municipality and citizen or community representatives are viewed and the extent to which both parties are expected to be involved in the matters of solid waste collection.

According to Kala and Boila (2020), municipalities need to create or review their policies and structures that deal with communication, customer services and community participation. Joseph (2006) and Biyani and Anantharaman (2017, cited in Kala and Boila, 2020) are of the view that active participation of citizens in planning some aspects of municipal operations or function, and discussing practical strategies that can be employed towards having effective solid waste collection, enhances the sense of partnership, ownership and responsibility in implementation. Thus, according to Mmereki et al. (2016), local municipalities must implement effective community participation on solid waste collection, as this approach has been successful in developed countries in managing their waste.

Studies by Ganesan (2017) and Narain et. al. (2016) attest to the above and further state that the above works effectively in India, thus can be employed by African countries. There is no doubt this consultative approach would improve the effectiveness of municipalities such as ULM in South Africa as well. The South African Local Government Association (SALGA) (2022) has proposed that municipalities should establish portfolio committees with municipality officials and community

representatives to support programmes of waste management, particularly waste collection and recycling of waste.

Guidelines developed by the DEAT to assist municipalities to implement the NWMS highlight the shift or migration of focus from waste disposal to the avoidance of waste generation and minimisation of waste stream (increased waste collection). The guidelines further highlight that in most municipal jurisdictions, areas of high density dwelling (more than 5 000 households in an area or areas with more than 10 dwellings per hectare [10 000m^2]) are the areas most frustrated as they either receive inadequate or failed services, or no waste collection services at all. Thus, according to SALGA, the participation of citizens from those areas would add great value to the municipal function of collecting waste from such areas.

According to Ajzen (2002) and Kendie and Dei (2010, cited in Komba 2021) a perception is a person's view of a specific topic based on formal or informal knowledge about a subject. The authors further state that perceptions are underpinned by the underlying knowledge about the topic, beliefs of the person in relation to the topic, general norms and values (outlook) of the person, attitude of the person on the subject, and etcetera. It is important to note or understand the concept of perception so that any particular expression whether in the form of compliment or frustration or other, can objectively and accurately be categorised and analysed by just looking at the make-up of the perception. Merton (1968, cited in Anchan 2021) states that, in order to correctly capture a person's perception, a researcher should understand that a person's perception embodies how a person see himself/herself in an environment or phenomenon and how their response or attitude or behaviour is influenced by what they conclude about the environment or phenomenon based on their own reality or experience or judgement.

Based on the above literature, the current study investigated whether ULM's function of effectively collecting solid waste does satisfy the anticipation of citizens and their active involvement in solid waste collection. Chapter 3 of this study outlines the methodology that was used to obtain data and produces results on this topic.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines in detail the research approach that enabled the study to attain its set aims and objectives. This chapter also presents the ethics and research structure that ensured that the data collection process yielded accurate and credible information.

3.2 Research philosophy

Pragmatism acknowledges that each individual constructs their own reality, it also recognises that this reality is a reconstruction of something that is generally stable (Creswell 2009). Essentially, pragmatism emphasises the usefulness of both positivist and interpretivist assumptions. It emphasises the significance of empirical findings while emphasising that these observations depend on the researcher's interpretation of them. In this study the researcher investigated the organisation from the viewpoints of several social groupings. As a result, it was possible to comprehend the social environment as it was perceived by the participants.

3.3 Research approach

A mixed method design integrates both qualitative and quantitative methodologies (Hesse-Biber 2010). The literature lists a number of mixed-method designs' benefits. Firstly, a mixed technique enhances the robustness of the study by offering diverse views derived from the combination of quantitative and qualitative methodologies (Leech et al. 2009; Torres et al. 2010). Secondly, a mixed approach establishes connections between survey data, data collecting, analysis, and interpretation. Thirdly, a mixed-method design provides a thorough grasp of the study objectives by reducing the constraints of both qualitative and quantitative methodologies (Bergman 2008).

This study utilizes a quantitative method to ascertain the connection between public perception to municipality's challenges in collecting solid waste and the issues encountered by residents due to the municipality's ineffectiveness. The opinions of solid waste service recipients are captured and considered in the comprehensive dataset. Quantitative data is gathered from homes that were the beneficiaries and consumers of solid waste services.

3.4 The research design

A research study is a logical process that is undertaken in a systematic manner with the aim of seeking information on a particular topic (Rajasekar et al. 2006). The intention of a researcher together with selecting an appropriate research design influences and guides the direction that a study takes (Creswell 2014). A research design is a master plan that outlines data collection and data analysis processes (Zikmund and Babin 2007; Bryman and Bell 2007; Sanders et al., 2016; Creswell and Creswell, 2018).

A research design should be a well-thought out plan of how to structure the conditions of collecting and analysing data which helps to strategise how to answer research questions in a manner that is relevant to the purpose of the study (Kalashe 2016). Thus, a research design is a blueprint that outlines how a study should be conducted and how the data should be analysed for the researcher to achieve the desired outcome.

Leedy and Ormrod (2014) and Goundar (2012, cited by Zikmund and Babin 2007), are of the view that there are three perspectives that must be addressed to select an appropriate research type; the application of the research study, the objectives of undertaking the research, and the inquiry mode to be employed. Understanding if a research is either pure (aimed at developing and testing theories and hypotheses) or applied (aimed at solving existing specific and practical questions) makes it easy to classify and align the research study to the research design.

The primary types of research described by Sanders et al. (2016) and Zikmund and Babin (2007) are:

- Experimental (correlational) research that attempts to investigate the relationship between two or more characteristics of a group or situation;

- Exploratory research which seeks to gain new insights in a given area that is little known and attempts to clarify the researcher's understanding of a problem through literature and interviewing of individuals and focus groups.

- Descriptive research portrays an accurate profile of persons, events or situations so that a clear picture of the phenomena is revealed. Thus, descriptive research seeks to describe the attitudes of the topic or phenomenon or situation or problem systematically.

- Explanatory research seeks to establish the casual relationships of the why's and how's between two or more variables to get a clearer explanation of the relationship between variables.

- Casual-comparative research seeks to examine the differences between two or more groups or variables on one issue or topic.

Even though that there are several studies on municipal waste management, none of these studies examine waste collection based on how citizens perceive municipal functions on waste collection. Consequently, the exploratory research approach was used to explore the perception of citizens. This allowed respondents to provide information based on how they viewed solid waste collection, creating an opportunity for new insights on the matter of solid waste collection (Vilakati 2009).

A survey research approach allowed the study to gather information of how and why citizens feel the way they do towards solid waste collection, and how ULM impacts their everyday experience of solid waste collection phenomenon. Perceptions from individuals living in different community clusters or groups were selected and questionnaires were used to gather data.

3.5 Study site and population

According to Leedy and Ormrod (2021) and Leavy (2017), in a research study a population is simply a group of people that have been identified by a researcher for the purpose of enabling an inquiry (study). The target population in a study are residents from

households located at Esikhawini and the surrounding peri-urban and rural areas. In terms of a study that is quantitative in nature, the target population is the total number of units or persons that are of interest to the study (Zikmund and Babin 2010; Creswell and Creswell 2018). For this research work, the targeted population was citizens of ULM living in formalised dwellings in the urban, peri-urban and rural areas.

The ULM jurisdiction comprises two formal towns (Empangeni and Richards Bay); four townships (unformalised) towns (Ngwelezane, Vulindlela, Nseleni and Esikhaleni); and, areas under traditional authority (rural areas) (Mzingazi, Mandlazini, Port Dunford, Macekane, Dlangezwa outskirts, Ngwelezane outskirts such as Mhlanga traditional area, and Ntambanana). According to Statistics South Africa, in 2016 the ULM had a total population of 410 456 people and 110 503 households across 34 wards.

The target population was two suburb areas in each of the formalised towns, an area located within each of the unformalised towns that are otherwise known as peri-urban areas, and lastly four rural areas under traditional authority. The location of the municipality on the South African map as well as the different wards of the municipality are shown in Figure 3.1.

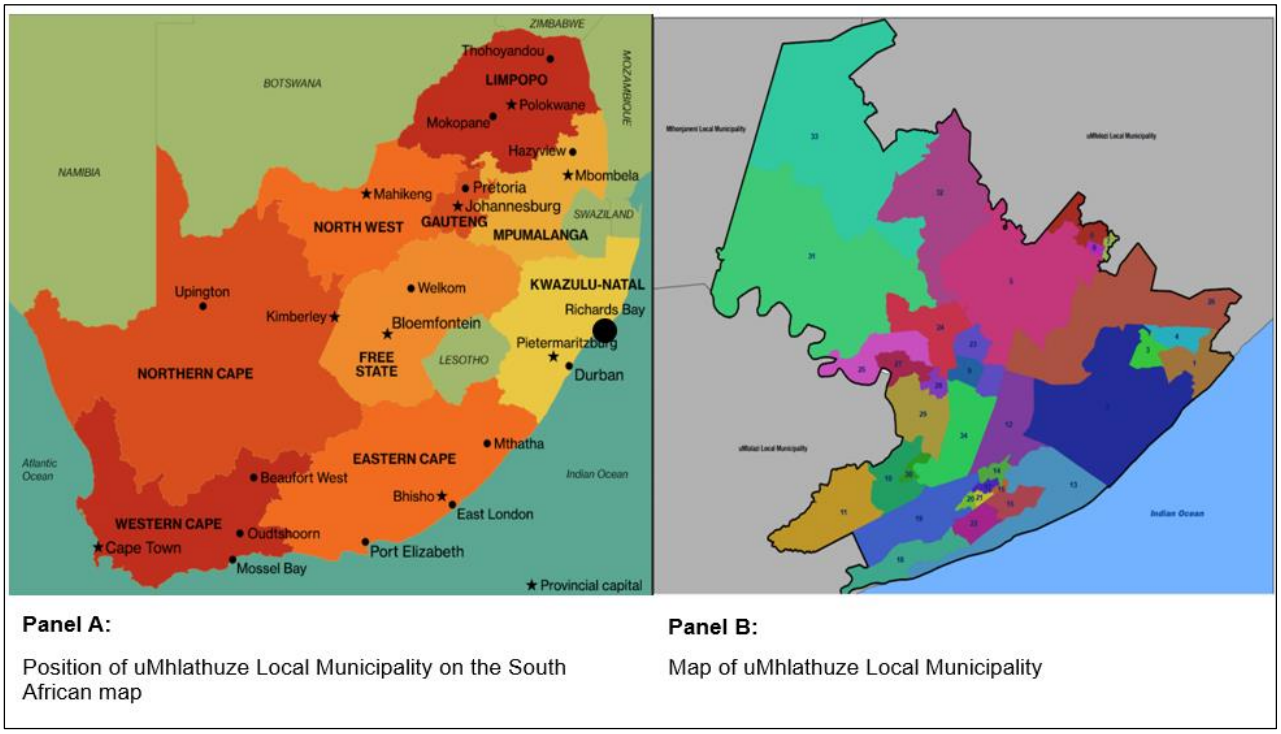

Figure 3.1: The location of the ULM municipality

3.6 Sample and sample size

Sample size refers to the number of elements that have been drawn from the population for the purpose of conducting a study (Burns and Bush 2010; Rakgoale 2011). The Krejcie and Morgan (1970) table was used to determine the minimum sample size. With a total population of 410 456 people, a confidence level of 95%, and a 5% margin of error, the Krejcie and Morgan (1970) table suggests that a minimum of 384 respondents should be surveyed for reliable results to be drawn. As a result, this study collected primary data from at least 384 respondents.

Sampling is the process of selecting a segment that is representative of the targeted population (Saunders et al. 2016; Onwuegbuzie and Collins 2007; Creswell 2014). The most appropriate sampling method for a quantitative study is probability sampling (Creswell 2014; Zikmund and Babin 2010). Lantham (2007) and Creswell (2014) define probability sampling as a method that gives every subject or unit an equal chance of being selected based on the selection process that the researcher has set for the study.

Probability sampling must be used for quantitative research in order to satisfy the research objective Battaglia 2011). There are a number of probability techniques that can be selected for use for a quantitative research study. According to Saunders et al. (2016), The sampling type dictates the credibility of the data being collected. Thus, it is important that the correct sampling method is selected based on the nature and objectives of the research study (Saunders et al. 2016).

The sampling approaches that must be considered for a quantitative study are as follows (Creswell and Creswell 2018):

- Random sampling process that seeks to ensure that each element in a population has an equal chance of being selected, yet each element might possess unique or different characteristic traits that exist in the population. Random sampling can be conducted under the pretext of convenience.

- Systematic sampling is a process that uses a statistical function to select a sample from the population. With systematic sampling, the element is based on a statistical position of the element in the dataset.

- Stratified sampling is a method that is used to ensure that various subgroups or stratum in a population are represented on pertinent sample characteristics.

3.7 Sampling technique

Since the sampling must represent all formalised areas of the targeted population group indicated above, the probability sampling process that is selected for the study is the survey sampling technique. Based on the views expressed by Sanders et al. (2016), Goundar (2012) and Lathem (2007), survey sampling technique is selected based on the description that survey sampling is a process of selecting a sample to conduct a survey. What the author's further state is that survey sampling involves using questionnaires to determine and measure the characteristics and/or attitudes of the people towards the municipality's role and effect on waste collection in their communities?

To have equal representation of the various community groups within the ULM jurisdiction, two areas of each category were selected, i.e., the formal towns, the townships and the areas under traditional authorities. The formal town areas selected were Arboretum in Richards Bay and Empangeni central business district (CBD), The township areas selected were Nseleni (peri-urban area of Richards Bay) and Ngwelezane (peri-urban area of Empangeni). The rural areas that were selected were Mzingazi and Macekane. All areas were selected based on their proximity to the towns for ease of comparison between views of citizens living in areas that are close to each other.

3.8 Data collection instrument

Research instruments are devices that researchers use to collect data (Sanders et al. 2016). Research instruments are developed so as to assist researchers in eliminating flaws such as their biases on the subject matter and assumptions that would compromise the study (Rossman and Marshall 2011; Merriam 2009).

The research instrument in this study was a questionnaire. Questionnaires are effective in measuring subject behaviour, opinions and attitudes, and are one of the fastest methods for gathering large amounts of data in an efficient and inexpensive way when well administered (Creswell and Creswell 2018; and Silverman 2005).

Questionnaires offer a scalable and flexible approach for the researcher to collect data over a wide coverage area and sample simultaneously. Two types of question exist: structured (closed questions) and unstructured (open ended questions) (Annum, 2016). Since this study is quantitative in nature, closed-ended (static and dynamic based) questions with numerically rated items were used in the questionnaire.

3.9 Data collection procedure

Welman and Kruger (2001, cited by Paile, 2012) state that questionnaires can be issued using physical means such as face-to-face or through digital platforms such as the internet and emails. According to Kishore, Jaswal, Kulkarni and De (2021), a researcher must follow a set of guidelines stipulated by a majority of researchers and authors when issuing questionnaires. This means that before issuing questionnaires, the researcher must assess which platform to use and the political and socioeconomic standing of the targeted respondents. The researcher must employ an approach that will optimise the responses (Cooper and Schindler 2011).

In relation to issuing and collecting questionnaires, the face-to-face approach provides the benefit of yielding positive interactions between the researcher and participants with regards to providing clarity, explaining and answering the questionnaires, but this approach is limited. The approach that was most appropriate for this study was to use the respective ward (area) councillors that are constitutionally the official representatives of the communities as distribution agents.

This method is known as self-administered questionnaires, because they are physically distributed to respondents by the researcher and the respondents are afforded an opportunity to answer questions on their own. The researcher collected the questionnaires from the citizens after the questions had been answered. Taking into consideration that questionnaires can easily be lost and that there is generally a high percentage of non-responsiveness in surveys, the following steps were employed. The study was publicised with an invitation to a meeting where the study was explained and questions answered. The dates, venue and time slots for administration of the questionnaire were announced during the meeting, before the questionnaires were issued to respective councillors.

All questions were standardised so that all respondents received questions with identical wording (Sanders et al. 2016). The use of respective councillors to distribute the questionnaires eliminated the possibilities of the researcher distributing questionnaires based on convenience and other socio-economic factors that might compromise the required coverage and representation of the population. Questionnaires were issued to the participants before the allocated time slots so that they could familiarise themselves with the questions. Clarity was also provided to participants during this time and explanations provided as necessary. Ethical considerations were employed as discussed later in this chapter. Collected questionnaires were scanned and stored on a USB. Such data will be preserved or stored in accordance to the procedures outlined by Durban University of Technology.

3.10 Data analysis

Data analysis entails interpreting collected data by applying scientific methods to identify trends, correlations, or patterns (Humble 2020). It helps with recommendations, debates, confirming prior research, and leading to findings and conclusions. Data analysis usually involves two key steps, namely: (a) reducing the collected data to manageable proportions and (b) identifying patterns and themes in the data. The first step in the analysis of data is a critical examination of the collected data (Babooa 2008). Zikmund and Babin (2010) recommend that questionnaires must be analysed using programs such as Microsoft Excel, SPSS, ATLAS, Hyper SEARCH, and etcetera. For this research study, the responses from questionnaires were populated on Microsoft Excel and analysed using SPSS. According to MacQueen (2006), among the effective method for analysing data obtained from questionnaires is using a series of “structural” codes, however this method is not used for this study.

This study used statistical techniques to establish the factors influencing the provision of waste services at the ULM. More specifically, the factor analysis technique was adopted to establish the key determinants of waste service provision at the selected municipality.

Factor analysis is a useful tool for narrowing down an enormous number of variables connected to a large number of factors, prior to using them in other analyses such as multiple regression or multivariate analysis of variance. While various types of factor

analysis exist, the Principle Component Analysis (PCA) is commonly referred to in the literature (Salih Hasan and Abdulazeez 2021; Kherif and Latypova 2020). Therefore, this study adopts the PCA as a tool to identify the key determinants of waste service provision at ULM.

PCA is commonly thought of as a statistical technique for data reduction. The approach is used to reduce the number of variables in an analysis by describing a series of uncorrelated linear combinations of the variables that contain most of the variance. In addition to data reduction, the variances from a PCA are often inspected to learn more about the underlying structure of data. The approach is used in the literature in studies from assorted domains and the most recent studies include the works of Aghimien et al. (2024), Hadji and Dib (2022), Moteki (2022), Patnaik et al. (2022), and Zahedifar (2023). PCA is generally interpreted as a fixed-effects factor analysis with homoscedastic residuals and whose mathematical formulation is expressed as: yij=$\mathbf{a}i'\mathbf{b}j$+eij i=1,…,. j=1, …where yij are the elements of $\mathbf{Y}$, $\mathbf{a}i$ (scores) and $\mathbf{b}j$ (loadings) are f-vectors of parameters, and eij are independent homoscedastic residuals. In the case of factor analysis, the scores $\mathbf{a}i$ are random rather than fixed, and the residuals are allowed to be heteroskedastic in j. It then follows that ($\mathbf{Y}$) is a matrix rank of f, with f typically substantially less than n or p (Jackson 2003). In this manner, PCA is thought of as a regression model with a restricted number but unknown independent variables.

3.11 Validity and reliability

Validity refers to the application of correct procedures that best align to the objectives of the study in order to find answers to the research questions (Goundar 2012), and has an impact on the integrity of the conclusions that are generated from a piece of research (Bryman 2006). Reliability is the quality of measurement procedure which should enable other researchers to achieve similar results if they were to conduct a similar study (Goundar 2012; Bryman 2006).

Questionnaires must be developed in a manner that eliminates researcher's biasness and views on the topic. In this regard, the competency of the researcher plays a huge role in research, and if the questions are unchecked, the trustworthiness of the study

will be negatively influenced (Noble and Smith 2015). According to The questions must be tested for ambiguity, simplicity, and for validity (Creswell 2014).

3.12 Ethical considerations

In order to maintain efforts that ensure high research integrity, a researcher must avoid any misconduct that will negatively affect the validity of the study (Scott and Morrison 2006; Zikmund and Babin 2010). Prior to the process of data collection respondents must be informed regarding the nature of the study and the purpose of it, and reassured that ethical standards would be upheld including voluntary consent and the right to withdraw at any stage, as well as anonymity and confidentiality. Respondents must sign informed consent forms (Creswell 2014; Gill et al. 2008; Sanders et al., 2016). The consent form must assure potential participants that their participation will not cause any form of harm to them during the duration of the study and beyond. Further, it must be clear to potential participants that the research is for academic purposes only, and that the results will be honestly presented (Zikmund and Babin 2007; Sanders et al. 2016).

Thus, the above ethical considerations were upheld in this study. Details of the researcher, the supervisor, and contact details for the administrator of the ethics committee at the Durban University of Technology were provided to each respondent who can use those details in case of any complaint against the researcher.

3.13 Conclusion

This chapter discussed in detail the research design used to collect and analyse data, the research philosophy that guided the research in gaining an in-depth understanding of the phenomena in order to achieve the research objectives. The research strategies employed were discussed in detail, and the target population and sampling technique utilised were outlined. The next chapter focusses on organising and analysing the collected data and interpret the findings from the responses received.

CHAPTER 4

RESULTS

4.1 Introduction

This chapter presents the analysis of data collected to examine citizen perceptions of solid waste collection services in ULM with the aim of identifying the factors influencing citizen perceptions and their correlation with municipal waste management operations. The study sought to achieve three objectives. The first objective was to examine public service delivery at ULM. The second objective was to establish the challenges encountered by ULM in providing solid waste collection services. The third objective was to investigate citizen's perception on solid waste collection services at the ULM. Following the problem statement and research methodology outlined in Chapters 1 and 3 respectively, the researcher employed a quantitative approach, utilising questionnaires to gather data across various municipal wards. Ethical guidelines were strictly followed during data collection to ensure confidentiality and voluntary participation. This chapter provides an overview of data analysis results, including descriptive and inferential statistics. The findings offer valuable insights into citizen dissatisfaction, shed light on municipal challenges, and lead to recommendations for improvement. The results will be discussed in the context of existing literature, contributing to a comprehensive understanding of waste management issues.

4.2 Descriptive statistics

This section provides a narrative summary of the population or sample characteristics and demographics of the participants in the project using descriptive analysis. Descriptive statistics is a statistical method that is useful to organise, summarise, and describe a set of survey data (Grand-Clement et al. 2018). Descriptive statistics were applied to establish the number of participants, gender, age, race, place of residence, education level, household classification, household monthly income. Quantitative data were collected from the 385 questionnaires that had been distributed to 385

households sampled across the ULM jurisdiction during December 2023 and January 2024, which is a 100% return rate.

Of the 385 responses, 157 were residents of Esikhawini, indicating a significant concentration of survey participants from this area. Other areas such as Mabuyeni, Madlankaka, Mkhobosa, Ndaya, Ndindima, Port Dunford, and Vulindlela each represented a smaller proportion of respondents, ranging from 0.3% to 1.0%. Dube Village had the lowest representation, with only one respondent, accounting for 0.3% of the total sample size. This distribution highlights the predominance of respondents from Esikhawini and underscores the importance of considering the perception that citizens from this area understands about solid waste collection services in uMhlathuze Local Municipality. Descriptive statistics for the data are presented in Table 4.1. The results are presented in frequency tables and percentages to promote readability.

Table 0.1: Demographic characteristics of respondents

		Statistic (N = 385)	Percentage
Gender	Male	205	53
	Female	170	44
	Other	10	3
Age	2000-2024	30	8
	1994-2003	137	36
	1984-1993	109	28
	1974-1983	66	17
	Before 1974	43	11
Race	African	370	96
	White	4	1
	Indian/Asian	3	1
	Coloured	8	2
Education	Never attended school	22	6
	Primary school	41	11
	High school	198	51
	Diploma	76	20
	Degree	32	8
	Postgraduate	16	4
Rating of service delivery	Good	276	72
	Bad	109	28
Residence	Resident	336	87
	Visitors	49	13
Household size	Mean	6	-
	Standard deviation	3	-
	Minimum	1	-
	Maximum	21	-
Household monthly income (R)	Mean	4 994	-
	Standard deviation	5 073	-
	Minimum	0	-
	Maximum	50 000	-
Years of service	Mean	12	-
	Standard deviation	9	-
	Minimum	0	-
	Maximum	42	-

Most of the respondents were male (53%), which is contrary to the statistics contained in the 2016 Community Survey, where Statistics South Africa (2016) reported that females were a greater proportion than men in the ULM. Most of the respondents were African (96%) which aligns with the municipality's population data, which reflects

Africans as the majority of the population (City of uMhlathuze Local Municipality 2023). Most of the respondents were born between 1984 and 2003 (64%); this distribution suggests that younger adults and middle-aged individuals were well-represented in the sample. In terms of the level of education, 51% of the respondents possessed at least a high school certificate, implying that most of the respondents were sufficiently educated to understand the questions.

The majority of respondents rated the waste collection service as “Good” (72%), indicating overall satisfaction with the service. However, a significant minority rated it as “Bad” (28%), suggesting that there is room for improvement in waste management practices. Most of the respondents were residents (87%) of ULM. This distinction provides context regarding the perspectives of individuals who have a long-term stake in the community compared to those who may have temporary or transient ties.

The mean household size was 5.83 occupants, with a standard deviation of 2.618, indicating a moderate level of variability in household sizes among respondents. The minimum household size was 1 person, while the maximum was 21 people, reflecting a wide range of household compositions in the sample. The household size measured is close to the average household size of the municipality of four, which was reported in the 2016 Community Survey by Statistics South Africa (2016). The mean monthly household income was R4 994.22, with a standard deviation of R5 073.442. The minimum reported income was 0, while the maximum was R50 000, indicating a wide disparity in income levels among respondents. This diversity in income levels underscores the importance of considering socioeconomic factors in waste management planning and policy implementation.

The mean years of service for waste collection was 11.83, with a standard deviation of 8.865, suggesting considerable variability in the duration of service experienced by respondents. The minimum reported years of service was 0, indicating instances where respondents may have experienced recent changes in waste management practices, while the maximum was 42 years, reflecting long-standing familiarity with the service. The demographic characteristics of the sample provide valuable insights into the diversity of perspectives among residents regarding waste management services in ULM. Understanding these demographic variables is crucial for interpreting

the findings and formulating targeted interventions to address the identified challenges and improve service delivery.

4.3 Perceptions on solid waste collection from the municipality

Perceptions of solid waste collection services provided by the municipality play a crucial role in shaping community attitudes, satisfaction levels, and overall quality of life. Understanding these perceptions is essential for municipal authorities to identify areas for improvement, allocate resources effectively, and enhance service delivery to meet the needs and expectations of residents. Respondents were asked to share their perceptions of basic solid waste collection in ULM. Ten questions were asked using a 4-point Likert scale with the options “strongly agree, agree, disagree and strongly disagree”. These questions were in line with the third objective of the study, which sought to investigate citizens’ perceptions of solid waste collection services at the ULM. This section presents results on respondents’ opinions on the state of solid waste collection services delivery at the ULM. The section is divided into three subsections. Firstly, reliability test of the questions; secondly, the frequency distribution of responses, thirdly, analysis of the data using PCA.

4.3.1 Reliability test of the questions on citizen’s perceptions

A reliability test was performed on the 10 Likert scale public service delivery questions. The reliability of the summative questions was assessed using Cronbach’s alpha test, as proposed by George and Mallery (2019). This test yields a scale that encompasses an unweighted total of the items. The typical interpretation of Cronbach’s alpha (α) is as follows: a value greater than 0.8 suggests high (excellent) dependability, while values falling between 0.5 and 0.8 indicate moderate (acceptable) reliability. Conversely, results yielding α values below 0.5 indicate low reliability (Ekolu and Quainoo, 2019). Table 4.2 presents the results of the Cronbach’s alpha test for the 10 Likert scale questions related to citizen’s perceptions on solid waste collection services at the ULM.

Table 0.2: Cronbach's alpha results for the citizens' perceptions questions

	Scale Mean	Scale Variance	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha
Collection	16.98	18.870	0.350	0.218	0.754
Capacity	16.60	17.324	0.443	0.291	0.741
Outsourced	16.44	17.570	0.296	0.180	0.764
Trucks	16.55	16.374	0.607	0.396	0.720
Health issues	16.36	17.017	0.467	0.273	0.738
Illnesses	16.85	19.380	0.118	0.066	0.781
Benefits	16.37	16.097	0.562	0.410	0.723
Communication	16.33	16.628	0.520	0.427	0.731
Councillor	16.26	17.200	0.403	0.285	0.747
Improvement	16.54	15.983	0.534	0.335	0.727
Test scale					**0.763**

Table 4.2 shows an overall Cronbach's alpha value of 0.763, surpassing the threshold of 0.5, indicating moderate (acceptable) reliability of the scale. Additionally, individual Cronbach's alpha test results for each question are presented in the table. The lowest Cronbach's alpha obtained was 0.723, while the highest was 0.781. These results demonstrate that all questions yielded Cronbach's alpha values signifying moderately acceptable reliability of the scale. Consequently, the questions included in the questionnaire on waste collection services at the ULM can be considered reliable.

4.3.2 Frequency distribution of responses on solid waste collection services

This subsection presents the frequency distribution of responses to the 10 questions measuring the perception of solid waste collection service. A stacked bar graph was used to represent the frequency of responses where the frequency of each Likert scale option (i.e., strongly disagree, disagree, agree and strongly agree) for each question is presented in each bar. Figure 4.1 presents the frequency distribution of the responses to each question (i.e., the percentage of each option for each question).

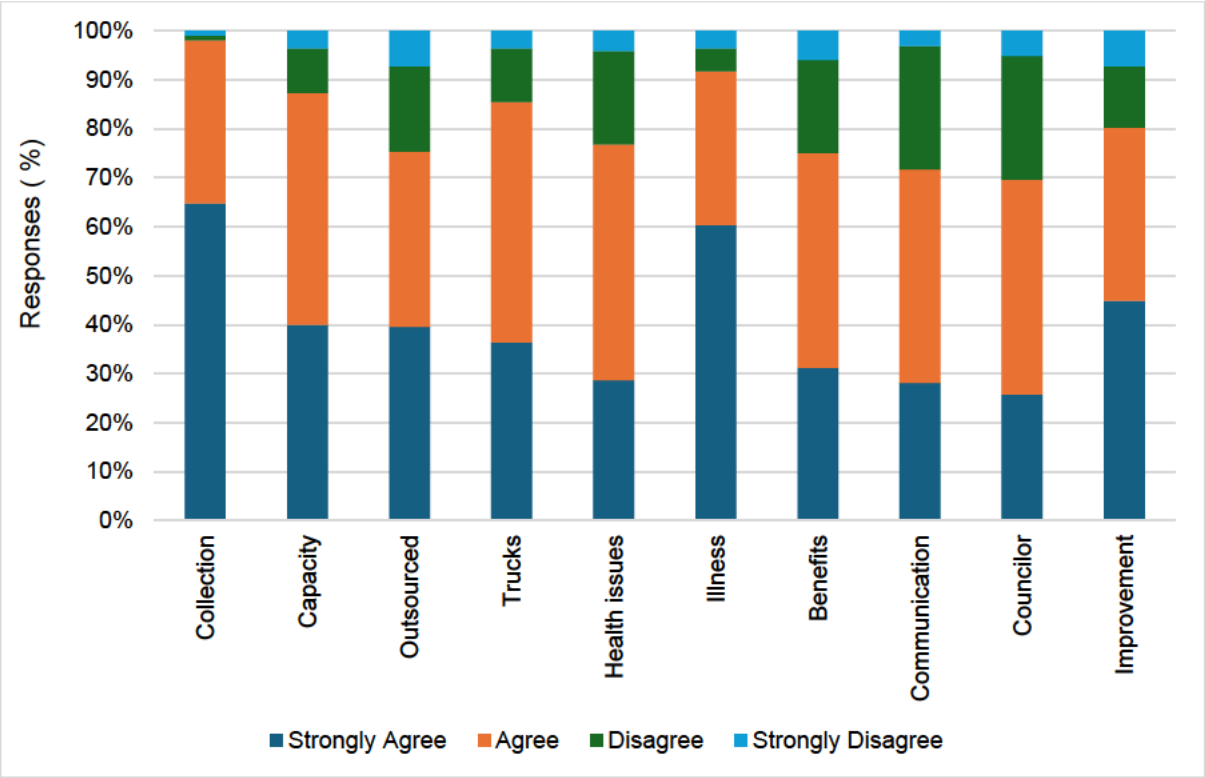

Figure 0.1: Responses on the perception of solid waste collection services

Figure 4.1 shows the perception of solid waste collection services in the municipality. The results reveal that the majority of respondents (98%) either strongly agree or agree that the municipality's waste collection is compulsory, indicating high confidence in the mandatory nature of waste collection. This perception aligns with the expectation that municipalities have a responsibility to manage waste collection effectively to maintain public health and environmental cleanliness and that citizens expect their local government to provide essential services reliably (Li and Shang 2020). A significant proportion of respondents (87%) agree or strongly agree that the municipality has the capacity to provide waste collection services, suggesting a generally positive perception of the municipality's capability. This finding underscores the importance of adequate infrastructure and resources in ensuring efficient waste management (Serge Kubanza and Simatele 2022). The positive perception regarding the municipality's capacity to provide services is crucial for building trust in local governance and enhancing civic engagement (Abdi 2023).

While there is some agreement (75%) that outsourcing could enhance waste collection services, a notable proportion (24%) either disagree or strongly disagree. This indicates a mixed perception among respondents regarding the effectiveness of outsourcing in improving service quality. Literature suggests that outsourcing waste management services can lead to cost savings and efficiency improvements but may also pose challenges in terms of accountability and service quality (Oosthuizen 2016; Dickinson and Yates 2023). A majority of respondents (85%) either agree or strongly agree that waste collection trucks are in good condition, reflecting confidence in the municipality's infrastructure maintenance efforts. This perception is crucial as well-maintained trucks are essential for effective waste collection and transportation (Sukholthaman and Shirahada 2015 Moraes et al. 2020).

The perception that non-collection of waste leads to health issues is prevalent among respondents, with 79% either agreeing or strongly agreeing. This finding underscores the understanding among residents of the health risks associated with improper waste management, highlighting the importance of timely waste collection in safeguarding public health (Perkumienė et al. 2023). The strong agreement (92%) on this statement reinforces the perceived link between inadequate waste management and adverse health outcomes, emphasising the need for effective waste collection to mitigate health risks (Abubakar et al. 2022). The overall satisfaction with the cost-effectiveness of waste management services indicates that residents perceive the services to provide adequate value for the amount paid (75%), which is crucial for maintaining public support and compliance with waste management initiatives (Abdi 2023).

While there is some agreement (72%) that communication between residents and municipality was good, a notable proportion (28%) either disagree or strongly disagree. The mixed perceptions regarding communication effectiveness highlight the importance of transparent and responsive communication channels in fostering trust and collaboration between citizens and local government (Molina Rodríguez-Navas et al., 2021). There was varying opinion on councillor effectiveness in assisting with the situation with 70% agreeing and 30% disagreeing. The varying opinions on councillor effectiveness underscore the significance of local representatives in addressing community concerns and the need for enhanced responsiveness to waste management challenges (Muzvondiwa, 2021). The optimism expressed by most of the

respondents (80%) regarding the potential for improvement in waste management services suggests a willingness to engage in community development initiatives and support efforts to address waste management challenges.

In summary, the data provides a nuanced understanding of citizen perceptions of solid waste management services, highlighting areas of satisfaction, concern, and potential for improvement. These findings can inform policy interventions and service delivery strategies aimed at addressing community needs and enhancing waste management effectiveness in ULM.

4.3.3 Factor analysis of responses on solid waste collection services

Factor analysis is a statistical method used to identify underlying factors or latent variables that explain the correlations among a set of observed variables. It aims to uncover the underlying structure or patterns in the data by reducing the dimensionality and identifying the common sources of variation among the variables. Factor analysis is widely used in various fields, including psychology, sociology, marketing, and finance. It helps researchers uncover the underlying structure of complex data sets, identify meaningful patterns, and reduce the dimensionality of the data, making it easier to interpret and analyse. In this study, factor analysis with varimax rotation was applied to the set of 10 items measuring the perception of solid waste collection with the aim of reducing them to a small number of latent variables. During the process, some items may be dropped either because they do not load strongly enough onto any factor or because they cross-load onto multiple factors.

4.3.3.1 Factor correlation

This subsection discusses the correlation matrices for the 10 questions addressing citizen perceptions of solid waste management services variables. Correlation analysis is a statistical method used to evaluate the strength and direction of the relationship between two or more variables. It helps researchers understand how changes in one variable are associated with changes in another variable. Pearson correlation analysis was conducted to examine the strength and direction of relationships between different variables measuring of solid waste management services. The correlation coefficient ranges from 0 to 1, where 0 indicates no relationship while 1 entails a strong relationship between the variables (Edelmann et

al. 2021). The relationship between variables is deemed reasonably strong if the correlation coefficient is 0.5 or higher; otherwise, it is considered weak. A negative correlation coefficient suggests an inverse relationship between the variables, while a positive correlation suggests a positive relationship between the variables. The Pearson coefficient results are shown in Table 4.3.

Table 0.3: Correlation matrices for perceptions of solid waste management services variables

	Collection	Capacity	Outsourced	Trucks	Health issues	Illnesses	Benefits	Communication	Councillor	Improvement
Collection	1.000									
Capacity	0.392	1.000								
Outsourced	0.279	0.170	1.000							
Trucks	0.294	0.332	0.366	1.000						
Health issues	0.128	0.250	0.117	0.415	1.000					
Illnesses	0.120	0.132	0.045	0.169	0.052	1.000				
Benefits	0.162	0.233	0.166	0.414	0.383	0.139	1.000			
Communication	0.113	0.173	0.180	0.324	0.350	0.027	0.559	1.000		
Councillor	0.090	0.235	0.070	0.274	0.314	-0.036	0.349	0.479	1.000	
Improvement	0.254	0.410	0.215	0.426	0.348	0.029	0.390	0.353	0.277	1.000

The results show that several variables exhibited correlation coefficients of 0.5 or higher, suggesting the presence of relationships among them (Hadd and Rodgers 2020; Wagavkar 2023). Consequently, considering the significant correlations among certain variables in the set of questions related to public service delivery, it was appropriate to conduct a PAC. the next subsection will present and discuss the outcomes derived from the PAC.

4.3.3.2 Measure of sampling adequacy for the variables

This subsection discussed measures of sampling adequacy for the 10 questions addressing citizen perceptions of solid waste management services variables. Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's test of sphericity were applied to measure the suitability of the data for factor analysis. The factor extraction is deemed to be successful if the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy exceeds 0.5 and Bartlett's test of sphericity is significant (Shrestha 2021). The KMO and Bartlett's test results are presented in Table 4.4.

Table 0.4: KMO and Bartlett's tests for perceptions of solid waste collection

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy		0.807
Bartlett's test of sphericity	Approx. Chi-Square	831.156
	Df	45
	Sig.	<0.001

Table 4.4 shows that the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy exceeds 0.5 because the measured value was 0.807 and Bartlett's test measure was statistically significant ($p = 0.001$). The findings indicate that the data was adequate for successful and reliable extraction. The KMO value of 0.807 indicates that the dataset is appropriate for factor analysis, as the variables are sufficiently related, allowing for the identification of underlying factors. Equally, the statistically significant result of Bartlett's test ($p < 0.001$) indicate that the variables are significantly correlated, and the correlation matrix is not an identity matrix. Therefore, the dataset contained enough inter-variable correlations to justify the use of factor analysis.

Overall, the results of both tests confirm that the dataset on perceptions of solid waste collection exhibits sufficient inter-variable correlations, making it suitable for factor

analysis. Factor analysis could then be employed to identify underlying factors or dimensions that explain the patterns observed in the dataset, providing valuable insights into the perceptions of solid waste collection among the respondents.

4.3.3.3 Principal component analysis

PCA is a method for reducing variables while retaining the majority of the original variance (Ghojogh et al. 2023; Labrín and Urdinez 2020). Eigenvalues are generated by PCA, and a common rule is to select components with eigenvalues exceeding 1. PCA provides insights into the proportion of variance explained by each component and the cumulative variance across successive components. During the PCA, the varimax rotation was applied to the 10 items in the study. Table 4.5 shows the output of a rotated PCA conducted on the data pertaining to perceptions of solid waste collection services.

Table 0.5: Total variance extracted in the items measuring perception of solid waste collection

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.379	33.788	33.788	3.379	33.788	33.788	2.743	27.429	27.429
2	1.345	13.451	47.239	1.345	13.451	47.239	1.981	19.809	47.239
3	0.994	9.943	57.182						
4	0.905	9.049	66.231						
5	0.759	7.588	73.819						
6	0.647	6.465	80.284						
7	0.612	6.120	86.404						
8	0.500	5.001	91.405						
9	0.475	4.753	96.158						
10	0.384	3.842	100.000						

The results in Figure 4.5 show that two factors (components) were extracted from the rotated PCA analysis which explain 47.239% of the variance in perception of solid waste collection. Table 4.6 shows the rotated component matrix of the two extracted factors. In this analysis, a varimax rotation with Kaiser normalisation was applied to improve the interpretability of the factors. A rotated component matrix reveals the relationships between the observed variables (items) and the extracted components. Each component represents an underlying factor or dimension that explains the variation in the observed variable. Two items were dropped due to cross loading (item 4) and poor loading below 0.5 (item 6).

Table 0.6: Rotated component matrix loadings

Items	Component 1	Component 2
Collection		0.745
Capacity		0.630
Outsourced		0.570
Trucks	0.500	0.551
Health issues	0.635	
Illnesses		
Benefits	0.736	
Communication	0.802	
Councillor	0.722	
Improvement	0.543	

Table 4.6 shows the result of the rotated component matrix based on the factor extraction. The findings indicate that 12 variables measuring perception of solid waste management loaded into two separate components. Component 1 is linked to items related to Public Health and Governance in Waste Management (PG). This construct encompasses perceptions related to public health concerns and governance aspects in waste management. The items included in this construct are 5, 7, 8, 9, and 10, which represent factors related to health issues associated with waste, benefits of waste management, communication with the municipality, the role of the Councillor, and potential improvement in waste management services.

Component 2 is linked to items related to Efficiency and Effectiveness of Waste Management Services (EE): This construct represents perceptions related to the efficiency and effectiveness of waste management services. The items included in this construct are 1, 2, and 3, which pertain to factors such as the compulsory nature of waste collection, the capacity of the municipality to provide waste services, and the potential improvement of services through outsourcing. The extracted two components were further reassessed for reliability using Cronbach's alpha (Table 4.7).

Table 0.7: Reliability of extracted factors in perception of solid waste collection

Component	Construct	Items included	Variance extracted	Cronbach's alpha
1	Public Health and Governance in Waste Management (PG)	5,7,8,9,10	33.788	0.752
2	Efficiency and Effectiveness of Waste Management Services (EE)	1, 2, 3	13.451	0.497

Table 4.7 shows that the variance extracted for component 1 is 33.788, indicating that these items collectively explain a significant proportion of the variance in respondents' perceptions. The Cronbach's alpha coefficient for component 1 is 0.752, suggesting good internal consistency or reliability among the items. This indicates that the items included in this construct measure related aspects of public health and governance in waste management consistently.

The variance extracted for component 2 is 13.451, indicating that these items collectively explain a moderate proportion of the variance in respondents' perceptions. The Cronbach's alpha coefficient for component 2 is 0.497, suggesting acceptable but somewhat lower internal consistency among the items compared to the PG construct.

In summary, factor analysis revealed two distinct dimensions of perceptions regarding waste management services: one related to public health and governance aspects, and the other related to the efficiency and effectiveness of service delivery. These constructs provide valuable insights into the underlying factors shaping individuals' perceptions of waste management and can inform targeted interventions or policy decisions to improve waste management practices.

Table 4.8 shows the composite assessment of the respondents' perception of solid waste management based on the extracted factors (PG and EE). Composite variables are formed by calculating the average of the agreement scores for all items included in a variable. One-sample t-test to test was applied for agreement/disagreement on these two composite variables.

Table 0.8: Composite analysis of extracted variables on perception of solid waste management

Construct	N	Mean	Std. Dev	T	df	p-value
Public Health and Governance in Waste Management (PG)	385	1.99	0.60	65.151	384	<0.001
Efficiency and Effectiveness of Waste Management Services (EC)	385	1.69	0.54	61.374	384	<0.001

The results indicate that for the Public Health and Governance (PG) construct, the mean score is 1.99 with a standard deviation of 0.60, suggesting a highly positive perception among respondents regarding aspects of public health and governance in waste management. The t-value of 65.151 and p-value of less than.001 indicate a statistically significant difference from the neutral point, further supporting the positive perception. Similarly, for the Efficiency and Effectiveness (EE) construct, the mean score is 1.69 with a standard deviation of 0.54, reflecting a positive perception of waste management services. The t-value of 61.374 and p-value of less than 0.001 also signify a significant difference from neutrality, highlighting the favourable view of respondents towards service efficiency and effectiveness.

Table 0.9: Pearson correlation of extracted factors on solid waste management

Correlations				
		Years of service	EE	PG
Years of service	Pearson Correlation	1	0.116*	0.160**
	Sig. (2-tailed)		0.022	0.002
	N	385	385	385
EE	Pearson Correlation	0.116*	1	0.371**
	Sig. (2-tailed)	0.022		<0.001
	N	385	385	385
PG	Pearson Correlation	0.160**	0.371**	1
	Sig. (2-tailed)	0.002	<0.001	
	N	385	385	385
*. Correlation is significant at the 0.05 level (2-tailed).				
**. Correlation is significant at the 0.01 level (2-tailed).				

The findings from the Pearson correlation analysis provide valuable insights into the relationship between various factors and perceptions of waste management services. Firstly, the weak positive correlation between years of service and perceptions of efficiency and effectiveness in waste management ($r = 0.116$, $p = 0.022$) suggests that longer tenure within the municipality may lead to slightly more positive views regarding the operational aspects of waste management. This finding is consistent with previous research highlighting the potential influence of familiarity and experience on perceptions of service quality.

Secondly, the slightly stronger positive correlation between years of service and perceptions of public health and governance aspects in waste management ($r = 0.160$, $p = 0.002$) indicates that as individuals spend more time in the municipality, they may develop a better understanding and appreciation of the municipality's efforts in addressing public health concerns and governance issues related to waste management. This finding resonates with studies emphasising the role of institutional trust and community engagement in shaping perceptions of public services (Matasick 2017; He and Ma 2021).

Lastly, the moderate positive correlation between perceptions of efficiency and effectiveness of waste management services and perceptions of public health and governance aspects ($r = 0.371$, $p < 0.001$) underscores the interconnectedness of

these constructs. It suggests that perceptions of operational efficiency and effectiveness are closely linked to perceptions of governance and public health outcomes in waste management. This finding aligns with the literature emphasising the multifaceted nature of waste management perceptions, where operational aspects intersect with broader governance and public health considerations (Rodić and Wilson 2017).

4.4 Relationship between demographic characteristics and perceptions of solid waste management

This section explores the relationship between demographic characteristics and perceptions of solid waste management. This section aims to investigate whether demographic factors such as age, gender, education level, income, or residential location influence individuals' perceptions of solid waste management practices based on the two dimensions (PG and EE). ANOVA was applied in this study to statistically evaluate whether there are significant differences in perceptions of solid waste management among different demographic groups. It allows researchers to examine the influence of demographic characteristics on perceptions, providing valuable insights for understanding and addressing disparities in waste management attitudes and behaviours. ANOVA tests were conducted to determine if there are differences in perceptions of public health and governance in waste management (PG) and the efficiency and effectiveness of waste management services (EE) between male and female respondents or between residents of different age groups, and or race (Table 4.10).

Table 0.10: Perceptions across different demographic groups

		Public Health and Governance in Waste Management (PG)		Efficiency and Effectiveness of Waste Management Services (EE)	
		M	*SD*	*M*	*SD*
Gender	Male	1.95	0.60	1.69	0.56
	Female	2.05	0.60	1.70	0.53
	Other	1.80	0.48	1.67	0.31
	F ratio	1.862	0.021		
	Sig.	0.157		0.979	
Race	African	1.99	0.61	1.69	0.54
	White	1.90	0.26	1.58	0.57
	Indian/Asian	2.67	0.12	1.67	0.58
	Coloured	2.00	0.35	1.83	0.36
	F ratio	1.311	0.240		
	Sig.	0.270		0.869	
Age group	2000-2024	1.61	0.49	1.48	0.38
	1994-2003	1.89	0.55	1.71	0.59
	1984-1993	2.03	0.50	1.67	0.53
	1974-1983	2.13	0.65	1.75	0.54
	Before 1974	2.25	0.80	1.77	0.50
	F ratio	6.996	1.653		
	Sig.	0.001		0.160	

*Note: M stands for Mean ** and SD stands for Standard deviation **

The findings from the analysis of variance (ANOVA) reveal important insights into the factors influencing perceptions of waste management services. Firstly, the lack of significant differences in perceptions of public health and governance (PG: $F(2, 382) = 1.862$, $p = 0.157$) and efficiency and effectiveness (EE: $F(2, 382) = 0.021$, $p = 0.979$) of waste management services among different genders and racial groups suggests that gender and race may not be significant determinants of how individuals perceive waste management services. This finding aligns with previous studies that have similarly found no significant gender or racial disparities in perceptions of public services (Cochran and Warren 2012).

However, the significant variation in perceptions across different age groups indicates that age demographics play a substantial role in shaping perceptions of waste management services. Younger age groups tend to report lower mean scores for both PG ($M = 1.61$) and EE ($M = 1.48$), suggesting potential generational differences in attitudes towards waste management. This finding is consistent with existing literature

highlighting the influence of age on perceptions of public services (Aitalieva and Morelock 2019). The significant difference in perceptions of PG F (2, 382) = 0.021, p = 0.979) but not EE (F(4, 380) = 1.653, p = 0.160) among age groups further underscores the need to tailor waste management strategies to address the specific concerns and preferences of different age demographics. Overall, these findings highlight the importance of considering demographic factors such as age when designing waste management policies and initiatives to ensure they effectively meet the diverse needs and expectations of residents.

4.5 Challenges experienced by citizens of uMhlathuze local municipality

Citizens in the ULM face a range of challenges in solid waste management. These challenges encompass issues such as inadequate waste collection services, limited access to proper disposal facilities, insufficient awareness and education regarding waste separation and recycling practices, illegal dumping, and environmental pollution. Additionally, factors like population growth, urbanisation, and socio-economic disparities exacerbate the complexities of waste management within the community. Understanding the perceptions of the citizens of ULM on these challenges is essential for municipal authorities to prioritise improving infrastructure, enhancing public education and participation, implementing effective enforcement measures, and fostering collaboration between local authorities, stakeholders, and residents. Respondents were asked to share their perceptions regarding the challenges they perceive in solid waste collection in ULM. In relation to the dichotomous questions of yes or no, 10 questions were asked. These questions were in line with the second objective which was to establish the challenges encountered by ULM in providing solid waste collection services. This section presents results on respondents' opinions on the challenges of solid waste management at the ULM. The section is divided into three subsections. Firstly, reliability test of the questions; secondly, frequency distribution of the responses; thirdly, analysis of the data using PCA.

4.5.1 Reliability test of the questions on challenges of solid waste management

A reliability test was performed on the 10 dichotomous questions on citizens' challenges to solid waste management. The reliability of the summative questions was assessed using Cronbach's alpha test, as proposed by George and Mallery (2019). Table 4.11 presents the results of the Cronbach's alpha test for the 10 questions related to citizens' perception of the challenges of solid waste collection management at the ULM.

Table 0.11: Cronbach's alpha results for the citizens' perceptions of challenges questions

	Scale Mean	Scale Variance	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha
Solid waste	6.74	5.843	0.285	0.301	0.624
Trolley bins	6.89	5.710	0.255	0.242	0.628
Communication	7.04	5.025	0.546	0.363	0.570
Refuse bags	6.89	5.518	0.351	0.213	0.611
Bin damages	7.13	5.327	0.400	0.273	0.600
Friendliness	6.85	5.953	0.159	0.077	0.643
Meetings	7.01	5.641	0.258	0.219	0.627
Public help	7.03	5.791	0.190	0.194	0.640
Unrest	6.93	6.094	0.073	0.033	0.659
Status quo	7.05	5.248	0.436	0.271	0.593
Frequency	6.94	5.671	0.258	0.121	0.627
School	6.85	5.798	0.230	0.131	0.632
Test scale					0.640

Table 4.10 shows an overall Cronbach's alpha value of 0.640, surpassing the threshold of 0.5, indicating moderate (acceptable) reliability of the scale. Additionally, individual Cronbach's alpha test results for each question are presented in the table. The lowest Cronbach's alpha obtained was 0.570, while the highest was 0.643. These results demonstrate that all questions yielded Cronbach's alpha values signifying moderately acceptable reliability of the scale. Consequently, the questions included in the questionnaire on challenges of solid waste management at the ULM can be considered reliable.

4.5.2 Frequency distribution of responses on solid waste collection services

This subsection presents the frequency distribution of responses to the 10 questions measuring the challenges of solid waste management. A stacked bar graph was used to represent the frequency of responses where the frequency of each dichotomous scale option (i.e., yes or no) for each question is presented in each bar. Figure 4.2 presents the frequency distribution of the responses to each question (i.e., the percentage of each option for each question).

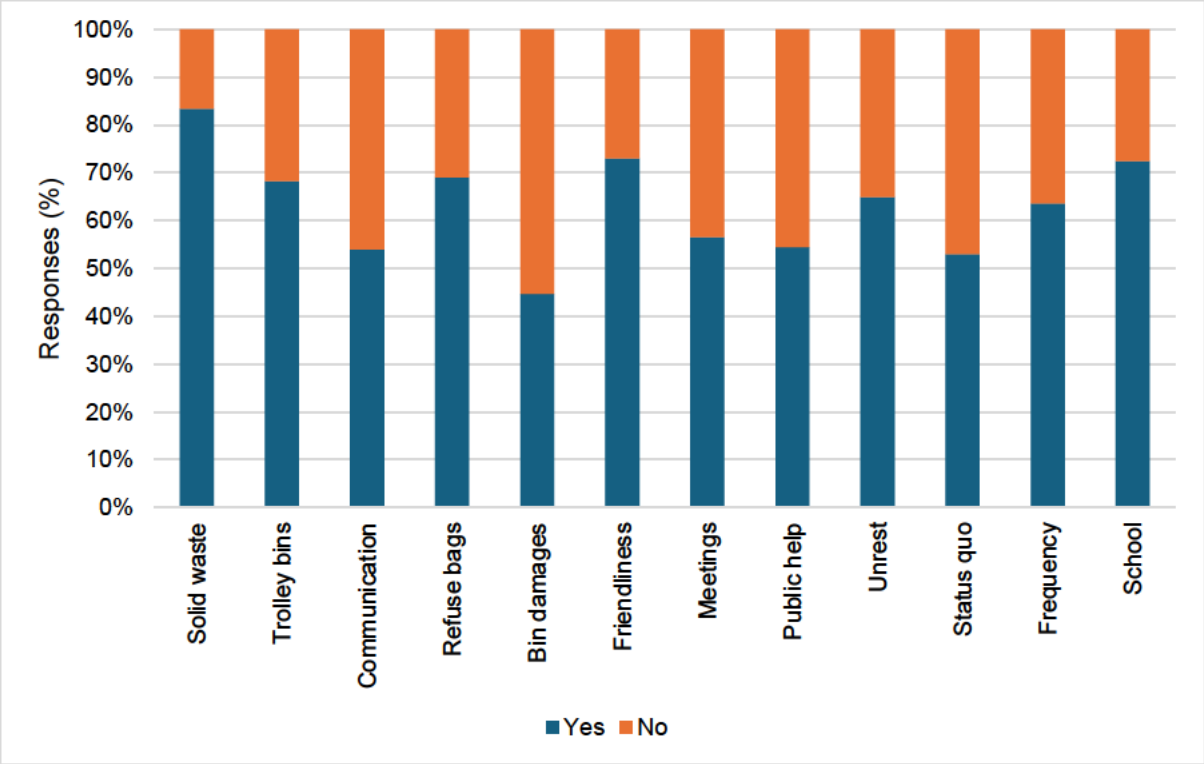

Figure 0.2: Challenges experienced by citizens

The findings underscore the multifaceted challenges faced by residents of ULM in regard to solid waste management. Firstly, a significant proportion of respondents reported dissatisfaction (16%) with the execution of solid waste collection as per the agreement suggests potential shortcomings in the municipality's waste collection practices, which may contribute to public discontent. This aligns with previous studies highlighting the importance of efficient waste collection in maintaining public satisfaction with municipal services (Esmaeilizadeh et al. 2021). Secondly, the disagreement (32%) regarding the sufficiency of the 240-litre trolley bin indicates varying perceptions among residents regarding the adequacy of waste disposal

infrastructure, reflecting potential disparities in service accessibility and household needs. Similar disparities have been observed in other contexts, emphasising the need for tailored waste management solutions (Miezah et al. 2015). Moreover, the lack of communication (46%) from the municipality in the event of missed waste collection highlights deficiencies in service delivery transparency and accountability, potentially eroding public trust in local governance (Tsang et al. 2009).

Furthermore, the reliance on plastic bags for waste collection, coupled with the municipality's limited provision of free replacements for damaged waste bins, underscores the environmental and financial implications of current waste management practices. Encouragingly, the positive perception (73%) of municipal staff friendliness may indicate a potential avenue for improving community engagement and trust-building in waste management initiatives. However, the low reported attendance of solid waste officials at ward meetings (43%) and the perceived lack of community involvement in resolving waste management issues (46%) suggest opportunities for enhancing stakeholder collaboration and participatory decision-making processes (Zohoori and Ghani 2017).

Moreover, the widespread concern among respondents (65%) regarding the potential escalation of waste management issues into community unrest highlights the urgent need for proactive measures to address underlying socio-economic and environmental challenges associated with inadequate waste management infrastructure and services (Mamokhere 2020). Additionally, the considerable proportion of respondents (53%) expressing dissatisfaction with the status quo underscores the importance of responsive and accountable municipal leadership in addressing community concerns and fostering public confidence in governance (Hartanto and Siregar 2021).

Overall, these findings reveal the complex interplay of socio-economic, environmental, and governance factors shaping residents' perceptions of waste management services in ULM, highlighting the imperative for holistic and context-specific interventions to address the identified challenges and improve service delivery effectiveness and community well-being.

4.5.3 Factor analysis of responses on challenges of solid waste management

Factor analysis is a statistical method used to identify underlying factors or latent variables that explain the correlations among a set of observed variables. It aims to uncover the underlying structure or patterns in the data by reducing the dimensionality and identifying the common sources of variation among the variables. In this study, factor analysis with varimax rotation was applied to the set of 10 items measuring the challenges of solid waste management with the aim of reducing them to a small number of latent variables. During the process, some items were dropped either because they did not load strongly enough onto any factor or because they cross-loaded onto multiple factors.

4.5.3.1 Factor correlation

This subsection discusses factor correlation matrices for the 10 questions addressing challenges experienced by the citizens with respect to solid waste management services variables. At this stage of the study, it is important to reiterate that the Pearson correlation analysis is conducted to examine the strength and direction of relationships between different variables measuring of solid waste management services. The Pearson coefficient results are indicated in Table 4.12.

Table 0.12: Correlation matrices for perceptions of solid waste management services variables

	Solid waste	Trolley bins	Communication	Refuse bags	Bin damages	Friendliness	Meetings	Public help	Unrest	Status quo	Frequency	School
Solid waste	1.000											
Trolley bins	0.431	1.000										
Communication	0.386	0.268	1.000									
Refuse bags	0.049	0.124	0.184	1.000								
Bin damages	0.008	0.140	0.336	0.364	1.000							
Friendliness	0.153	0.063	0.143	0.137	0.111	1.000						
Meetings	0.088	0.035	0.276	0.061	0.165	0.152	1.000					
Public help	-0.001	-0.072	0.226	0.089	0.065	-0.003	0.348	1.000				
Unrest	0.037	-0.009	0.130	0.015	0.080	-0.067	0.005	0.073	1.000			
Status quo	0.125	0.242	0.290	0.350	0.365	0.048	0.163	0.049	0.049	1.000		
Frequency	0.112	0.100	0.169	0.195	0.158	0.039	0.025	0.004	0.022	0.272	1.000	0.211
School	0.053	0.030	0.225	0.141	0.133	0.057	-0.047	0.161	0.035	0.153	0.211	1.000

The results show that several variables exhibited correlation coefficients of 0.5 or higher, suggesting the presence of relationships among them (Hadd and Rodgers 2020; Wagavkar 2023). Consequently, considering the significant correlations among certain variables in the set of questions related to challenges of solid waste management, it is appropriate to conduct a PAC. Hence, the subsequent subsection will delve into a discussion of the outcomes derived from the PAC.

4.5.3.2 Measure of sampling adequacy for the variables

This subsection discussed measures of sampling adequacy for the 10 questions addressing the challenges perceived by citizen of solid waste management services variables. Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's test of sphericity was applied to measure the suitability of the data for factor analysis. The KMO and Bartlett's test results are presented in Table 4.13.

Table 0.13: KMO and Bartlett's tests for challenges of solid waste management

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.673
Bartlett's Test of Sphericity	Approx. Chi-Square	596.939
	Df	66
	Sig.	<0.001

Table 4.13 shows that the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy exceeds 0.5 because the measured value was 0.637 and the Bartlett's test measure was statistically significant ($p = 0.001$). The findings indicate that the data was adequate for successful and reliable extraction. The KMO value of 0.637 indicates that the dataset is appropriate for factor analysis, as the variables are sufficiently related, allowing for the identification of underlying factors. Equally, the statistically significant result of Bartlett's test ($p < 0.001$) indicates that the variables are significantly correlated, and the correlation matrix is not an identity matrix. Therefore, the dataset contains enough inter-variable correlations to justify the use of factor analysis.

Overall, the results of both tests confirm that the dataset on the challenges experienced by citizens on solid waste management exhibits sufficient inter-variable correlations, making it suitable for factor analysis. Factor analysis can then be employed to identify underlying factors or dimensions that explain the patterns

observed in the dataset, providing valuable insights into the perceptions of solid waste collection among the respondents.

4.5.3.3 Principal component analysis

Table 4.14 reflects the output of a rotated PCA conducted on the data pertaining to challenges perceived by citizens regarding solid waste management.

Table 0.14: Total variance extracted in the items measuring challenges of solid waste management

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.630	21.915	21.915	2.630	21.915	21.915	1.876	15.631	15.631
2	1.397	11.642	33.557	1.397	11.642	33.557	1.717	14.305	29.936
3	1.324	11.035	44.591	1.324	11.035	44.591	1.535	12.789	42.726
4	1.112	9.267	53.859	1.112	9.267	53.859	1.260	10.502	53.227
5	1.023	8.528	62.386	1.023	8.528	62.386	1.099	9.159	62.386
6	0.911	7.589	69.975						
7	0.810	6.750	76.726						
8	0.697	5.812	82.538						
9	0.614	5.116	87.653						
10	0.554	4.617	92.270						
11	0.499	4.162	96.432						
12	0.428	3.568	100.000						

Extraction Method: Principal Component Analysis.

Table 4.14 shows that four factors (components) were extracted from the rotated PCA analysis explaining 62.386% of the total variance in question, measuring the challenges citizens perceived with regards to solid waste management. Table 4.15 shows the rotated component matrix of the four extracted factors. In this analysis, a varimax rotation with Kaiser normalisation was applied to improve the interpretability of the factors. The rotated component matrix reveals the relationships between the observed variables (items) and the extracted components. Each component represents an underlying factor or dimension that explains the variation in the observed variable. Two items were dropped due to cross loading (item 4) and poor loading below 0.5 (item 6).

Table 0.15: Rotated component matrix loadings

Items	Components				
	1	2	3	4	5
Solid waste		0.852			
Trolley bins		0.762			
Communication		0.538			
Refuse bags	0.720				
Bin damages	0.766				
Friendliness					0.669
Meetings			0.754		
Public help			0.793		
Unrest					-0.767
Status quo	0.704				
Frequency				0.571	
School				0.862	

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalisation.

a. Rotation converged in 5 iterations.

Table 4.15 shows the result of the rotated component matrix based on the factor extraction. The finding indicates that 12 variables measuring the challenges of solid waste management loaded into four separate components. Component 1 is linked to items related to Community Satisfaction with Waste Management Practices. The items include collection of waste in plastic bags (loading = 0.720). This item indicates the perception of waste collection methods, particularly regarding the use of plastic bags. A higher loading suggests a moderately positive correlation with the underlying factor or component. Municipality replacing damaged waste bin for free (loading = 0.766). This item reflects the perception regarding the responsiveness and efficiency of municipal services in addressing issues related to damage waste bins. The high loading suggests a strong positive correlation with the underlying factor or component. Mayor of the municipality being satisfied with the status quo (loading = 0.704). This item pertains to individuals' satisfaction or dissatisfaction with the current state of waste management practices within the municipality, as perceived from a hypothetical leadership perspective. The moderate loading indicates a positive correlation with the underlying factor or component.

Component 2 is linked to items related to Perceptions of Solid Waste Collection Efficiency and Service Satisfaction. This reflects the common theme of perceptions regarding the execution of waste collection services, adequacy of provided waste bins, and communication practices in case of service disruptions. The item “solid waste collection is executed as per agreement” reflects the perception of whether solid waste collection services are carried out according to agreed-upon terms or schedules. The high loading (loading = 0.852) suggests a strong positive correlation with the underlying factor or component. The item regarding 240-litre trolley bins being enough for each household pertains to the perception or opinion regarding the adequacy of the provided waste bins for each household. The moderate to high loading (loading = 0.762) indicates a positive correlation with the underlying factor or component. The item “If they are not coming to collect, do they communicate” relates to the perception of communication practices in case of missed waste collection services. The lower loading (loading = 0.538) suggests a weaker correlation with the underlying factor or component compared to the other items.

Component 3 is related to items linked to Community Engagement and Collaboration in Solid Waste Management. This component reflects the common theme of perceptions regarding interactions between municipal officials and the community, particularly regarding communication, collaboration, and mutual efforts in addressing solid waste management issues. The item regarding whether the councillor invites the officials from solid waste to ward meetings reflects the perception of whether municipal officials, particularly those from the solid waste department, are invited to ward meetings by the local councillor. The high loading (loading = 0.754) suggests a strong positive correlation with the underlying factor or component. The item regarding whether municipal officials ask for any help from the community in order to resolve this issue pertains to the perception of whether municipal officials seek assistance from the community in addressing solid waste management issues. The high loading (loading = 0.793) indicates a strong positive correlation with the underlying factor or component.

Component 4 is linked to items related to Extent of Solid Waste Management Issues across Institutions. This component reflects the common theme of perceptions regarding the spread or impact of solid waste management issues beyond the

municipality to other institutions like schools and clinics. This item reflects the perception of whether the issues related to solid waste management are exclusive to the respondent's municipality. The moderate loading suggests a moderate positive correlation with the underlying factor or component. The item on whether solid waste challenge is happening only in your municipality reflects the perception of whether the issues related to solid waste management are exclusive to the respondent's municipality. The moderate loading (loading = 0.571) suggests a moderate positive correlation with the underlying factor or component. The item on whether schools and clinics also affected pertains to the perception of whether other institutions, such as schools and clinics, are also impacted by the issues related to solid waste management. The high loading (loading = 0.862) indicates a strong positive correlation with the underlying factor or component.

Component 5 is linked to items related to Community Perceptions of Municipal Relations and Social Stability. This component reflects the common theme of perceptions regarding interactions with municipal staff, as well as concerns about potential social unrest related to ongoing issues in the community. The item on whether the municipal staff are friendly reflects the perception of respondents regarding the friendliness of municipal staff members. The moderate loading (loading = 0.669) suggests a moderate positive correlation with the underlying factor or component, indicating that perceptions of staff friendliness are related to other aspects. The item on whether community unrest may arise from the situation pertains to the perception or anticipation of respondents regarding the potential for community unrest if the current situation persists. The negative loading (loading = -0.767) indicates an inverse relationship with the underlying factor or component, suggesting that this aspect is negatively associated with other factors in the analysis.

4.6 Conclusion

In this chapter, a comprehensive examination of residents' perceptions of solid waste management services in ULM was conducted, encompassing various facets such as infrastructure, privatisation, equipment maintenance, public health implications, and community engagement. The research unearthed predominantly positive sentiments regarding the municipality's capacity and equipment maintenance, albeit with some notable concerns raised. Residents demonstrated an acute awareness of the health

hazards associated with inadequate waste management practices and expressed hope for potential enhancements through outsourcing.

Factor analysis delineated two pivotal constructs, “Public Health and Governance in Waste Management” and “Efficiency and Effectiveness of Waste Management Services” yielding valuable insights into the intricacies of the issue. Correlation analysis revealed varying degrees of association between these constructs and years of service, ranging from weak to moderate. ANOVA tests unveiled no significant disparities based on gender or race but did uncover variations across different age brackets. Lastly, the chapter encapsulated the challenges perceived by residents, including the ramifications on educational institutions and healthcare facilities, as well as apprehensions regarding community unrest.

CHAPTER 5

CONCLUSION

5.1 Introduction

This chapter consists of four parts. The initial section provides a summary of the study's findings and conclusions. Following that, recommendations based on the study are presented. Next, potential areas for future research are discussed, followed by a conclusion. Overall, the goal of this chapter was to encapsulate the study's outcomes.

5.2 Summary

The previous chapter presented and discussed the results of the study. This chapter concludes the study, giving recommendations and identifying areas of future work. The main aim of the study was to examine the role of citizen perceptions on solid waste collection services: a case of ULM of households in the city of Durban. To achieve this aim, the study was set to fulfil four main objectives. Firstly, the study sought to examine public service delivery in the ULM; secondly, the study sought to establish the challenges encountered by the ULM in providing solid waste collection services; thirdly the study sought to investigate citizen perceptions on solid waste collection services, and; fourthly, the study sought to recommend some possible solutions for the ULM to consider.

To achieve the aim and outlined objectives, the study adopted a quantitative approach where numerical data was collected, analysed, and discussed. The quantitative data was collected through a survey conducted on 385 households residing across different residential areas of ULM. Descriptive statistics, factor analysis, correlation, and ANOVA tests, were systematically employed to the quantitative data. Several key findings were reported, and these are categorised according to the objectives of the study.

In terms of the objective which sought to investigate citizen perceptions on solid waste collection services at ULM, the key findings from the analysis of citizens' perceptions of solid waste collection services in ULM reveal insights crucial for understanding community attitudes and identifying areas for improvement. Most respondents expressed confidence in the mandatory nature of waste collection (98%) and the municipality's capacity to provide services (87%). However, there were mixed views on outsourcing (75% agreement) and communication effectiveness (72% agreement), highlighting areas for potential improvement.

The perception that non-collection of waste leads to health issues was prevalent (79%), emphasising the importance of timely waste collection for public health. Factor analysis revealed two main constructs: Public Health and Governance in Waste Management and Efficiency and Effectiveness of Waste Management Services. These dimensions provide valuable insights into the factors shaping perceptions of waste management services and can inform targeted interventions. Furthermore, demographic analysis indicated significant differences in perceptions across age groups, suggesting the need for tailored strategies to address diverse community needs and expectations.

The findings align with the existing literature on waste management perceptions, which emphasises the importance of understanding community attitudes for effective service delivery (Bao et al. 2019; Li and Shang 2020). Studies have shown that perceptions of service quality, infrastructure, and communication channels influence overall satisfaction and trust in local governance (Serge Kubanza and Simatele 2022; Molina Rodríguez-Navas et al. 2021).

Further, the findings suggest that longer tenure within the municipality may lead to slightly more positive views regarding the operational aspects of waste management, and that individuals spending more time in the municipality may develop a better understanding and appreciation of the municipality's efforts in addressing public health concerns and governance issues related to waste management.

In terms of the objective which sought to establish the challenges encountered by the ULM in providing solid waste collection services, the key findings suggest that a significant proportion of respondents expressed dissatisfaction with various aspects of

solid waste management, including waste collection execution, adequacy of waste bins, communication from the municipality, and community involvement in resolving waste management issues. These findings align with previous studies emphasising the importance of efficient waste collection, tailored waste management solutions, and transparent communication in maintaining public satisfaction and trust (Esmaeilizadeh et al. 2021; Hartanto and Siregar 2021).

5.3 Recommendations

Based on the findings and conclusions of this study regarding the key challenges and citizens perceptions of solid waste management, five key recommendations can be made.

1. The first recommendation is to enhance communication and transparency. The finding from the study suggests that there is concern about the lack of communication from the municipality in the event of missed waste collection. The study, therefore, recommends that ULM should improve communication channels to keep residents informed about waste collection schedules, service disruptions, and any changes in waste management practices. Studies by Tsang et al. (2009) and Zohoori and Ghani (2017) emphasise the importance of transparent communication in maintaining public trust and satisfaction with municipal services. Effective communication fosters citizen engagement and enhances service delivery accountability.

2. The second recommendation is to invest in community engagement initiatives. From the study findings, low reported attendance of solid waste officials at ward meetings, and the perceived lack of community involvement in resolving waste management issues were uncovered as a significant concern among the respondents. The study recommends that the municipality implement community engagement programmes to involve residents in waste management decision-making processes, such as participatory budgeting or citizen advisory committees. Research by Hartanto and Siregar (2021) highlights the positive impact of community engagement on governance outcomes and service quality. Engaging residents in decision-making fosters a sense of ownership and promotes sustainable waste management practices.

3. The third recommendation is to strengthen waste collection infrastructure. From the study findings, some of the respondents raised concerns about the sufficiency of the 240-litre trolley bin for waste disposable. In light of this, the study recommends that the municipality allocate resources to improve waste collection infrastructure, including the provision of adequate waste bins, expansion of collection coverage, and optimisation of collection routes. This is in line with the views of Miezah et al. (2015) who emphasise the significance of efficient waste collection infrastructure in enhancing service accessibility and reducing environmental pollution. Investing in infrastructure upgrades can improve service efficiency and address community concerns.

4. Part of the study finding is the perceived dissatisfaction among some of the respondents with the execution of solid waste collection as per the agreement. It is therefore recommended that the municipality develop targeted educational campaigns to raise awareness about waste separation, recycling practices, and the environmental and health impacts of improper waste disposal. Esmaeilizadeh et al. (2021) advocate for educational interventions to promote sustainable waste management behaviours and foster community participation. Increasing public awareness can lead to behaviour change and reduce waste generation.

5. Lastly, respondents expressed concerns regarding the potential escalation of waste management issues into community unrest. Hence, the study highly recommends that the municipality collaborate with local stakeholders such as businesses, community organisations, and educational institutions, to develop holistic waste management solutions and leverage resources effectively. This view is supported by Mamokhere (2020) who emphasises the importance of multi-stakeholder collaboration in addressing complex waste management challenges. Engaging diverse stakeholders fosters innovation, resource sharing, and collective action towards sustainable waste management practices.

5.4 Limitations of the study

Although the research was established on solid literature and methodological foundations, it must be acknowledged that there were certain limitations or weaknesses. The study's findings may be subject to sampling bias, as the sample population may not fully represent the diversity of perspectives within the ULM. Certain demographic groups or geographic areas may be underrepresented, impacting the generalizability of the results. The study relies on self-reported data from survey responses, which may be subject to inaccuracies or memory biases. Respondents' recollection of past experiences and perceptions thereof may be influenced by various factors, impacting the reliability of the data.

5.5 Directions for future research

Bearing in mind the limitations identified in the study, it is proposed that longitudinal studies be conducted to track changes in citizens' perceptions and experiences of waste management services over time. Long-term data collection would provide insights into the effectiveness of interventions and policy changes, allowing for the assessment of trends and patterns in waste management practices. Secondly, future studies should seek to complement quantitative surveys with qualitative research methods, such as focus groups or interviews, to gain deeper insights into the underlying factors shaping citizen perceptions and behaviours related to waste management.

Qualitative data can offer nuanced understandings of community attitudes and preferences, informing more targeted interventions. In addition, future studies can to investigate behavioural aspects related to waste generation, separation, and disposal to understand the drivers behind individual waste management practices. Behavioural studies could explore factors influencing recycling behaviour, perceptions of waste sorting convenience, and attitudes towards sustainable waste management practices.

5.6 Conclusion

In conclusion, this study provides valuable insights into citizens' perceptions regarding solid waste management services in the ULM. The findings highlight a range of challenges faced by residents, including issues related to waste collection execution,

adequacy of waste bins, communication from the municipality, and community involvement in waste management. These challenges underscore the importance of addressing service delivery gaps, enhancing community engagement, and fostering collaboration between stakeholders to improve waste management practices and promote community well-being. Factor analysis revealed key dimensions shaping citizen perceptions, including satisfaction with waste management practices, perceptions of service efficiency and effectiveness, community engagement in waste management, and the extent of waste management issues across institutions. These dimensions provide valuable insights for developing targeted interventions and policy measures to address the identified challenges and improve service delivery effectiveness.

The study's implications for theory, practice, and policy underscore the importance of understanding community attitudes and preferences for effective waste management. It emphasises the need for tailored strategies that take into account socio-demographic characteristics, promote transparent communication, and leverage technology and innovation to enhance service delivery and community satisfaction. However, it is essential to acknowledge the limitations of the study, such as the reliance on self-reported data and the potential for response bias. Future research should address these limitations and explore areas for further investigation, such as longitudinal studies, qualitative research, comparative analyses, impact assessments, behavioural studies, and research on climate change adaptation and innovation in waste management.

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List of Appendices

Appendix 1: Letter of information

LETTER OF INFORMATION

Title of the Research Study: Citizen Perceptions on solid waste collection services: A case of uMhlathuze Local Municipality.

Researcher: Thokozani Gumede, Postgraduate Diploma in Business Administration **(PDBA)**

Supervisor: Dr Genius Murwirapachena, PhD in Economic

Brief Introduction and Purpose of the Study:

Greetings, thank you for showing interest in this study. I am a student registered for the Master of Management Sciences in Business Administration at the Durban University of Technology. I would like to invite you to participate in this study. The aim of this study is to establish ways through which household satisfaction with Solid waste collection provided by the uMhlathuze Local Municipality can be improved. This is important given existing evidence on the challenges commonly reported by citizens across the city of uMhlathuze. Therefore, I would like to invite you to participate in the study by responding to the questionnaire attached.

Your participation in the study is voluntary and under no circumstances should you feel uncomfortable. I would like to emphasise that you can withdraw from the study at any time should you feel uncomfortable to continue participating. As part of the procedure, I will give you a questionnaire that you would go through and complete as honestly and freely as possible. If you need us to go through the questions together, I will gladly go through the questions with you.

Participating in this study should not result in you experiencing any discomfort or significant risk. I will not perform any painful procedure on you or on anyone from your household. Therefore, there will be no discomfort or risk to you as a participant. Furthermore, there will be no negative consequences if you choose not to participate or withdraw participation in the survey. There will also be no expected injuries from participating in this study.

As mentioned earlier, you can choose to withdraw or stop participating in the study at any time without having to provide reason. There will be no negative consequence if you decide to withdraw your participation.

Kindly also note that we will withdraw you from the study if you do not follow the instructions given or decided not to honour your commitment.
Kindly also note that you will not be compensated for your participation in the survey. Your participation is voluntary and will inform policy making and the academic literature. Further, it is important to also indicate that you will not incur any expenses by participating in this study. The information collected in this study will be managed and stored in a manner that ensures that your confidentiality and anonymity is always maintained. Kindly avoid recording your personal and any other identifying information. The results of this study will be published after the data has been thoroughly analysed. If any findings emerge during the research, we will make all respondents aware of such.

Please note that the data collected in this study will be stored in a manner that ensures that your confidentiality and anonymity is maintained. All completed questionnaires will be stored in my supervisor's office in a locked cupboard for a period of up to 5 years. Only myself and my supervisor will have access to the completed questionnaires.

Persons to contact in the Event of Any Problems or Queries:

In the event of any problem or query, please contact me on 083 659 3653 or tkgumede21@gmail.com`

You can also contact my supervisor Dr Genius Murwirapachena on 031 373 5193 or geniusm@dut.ac.za. Alternatively, you can call the DUT-Institutional Research Ethics Administrator on 031 373 2375 or report complaints to the Acting Director: Research and Postgraduate Support on researchdirector@dut.ac.za

Appendix 2: Consent letter

CONSENT

Full Title of the Study: Citizen perceptions on solid waste collection services: A case of uMhlathuze Local Municipality

Names of Researcher/s: Thokozani Gumede

Statement of Agreement to Participate in the Research Study:

□ I hereby confirm that I have been informed by the researcher, Thokozani Gumede, about thenature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,

□ I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.

□ I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.

□ In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.

□ I may, at any stage, without prejudice, withdraw my consent and participation in the study.

□ I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.

□ I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

---------- ---------- ---------- ----------

Full Name of Participant Date Time Signature / Right Thumbprint

I, Thokozani Gumede hereby confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

---------- ---------- ----------

Full Name of Researcher Date Signature / Right

Appendix 3: Ethical clearance letter

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

21 December 2023

Mr T E Gumede
52 Tunbridge Drive

Dear Mr Gumede

Citizen perceptions on solid waste collection services: A case of uMhlathuze Local Municipality
Ethics Clearance Number: IREC 234/23

The DUT-Institutional Research Ethics Committee acknowledges receipt of your notification regarding the piloting of your data collection tool.

Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the DUT-IREC acknowledges receipt of your gatekeeper permission letter.

Please note that FULL APPROVAL is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the DUT-IREC according to the DUT-IREC SOP's.

Please note that any deviations from the approved proposal require the approval of the DUT-IREC as outlined in the DUT-IREC SOP's.

It is compulsory for a student or researcher to apply for recertification on an annual basis. The failure to do so will result in withdrawal of ethics clearance. It is the responsibility of the researcher and the supervisor to apply for recertification.

Please note that you are required to submit a Notification of Completion of Study form together with an abstract to the DUT-IREC office on completion of your study.

Yours Sincerely

Prof J K Adam
Chairperson: DUT-IREC

Appendix 4: Request for gatekeeper's permission

Enquiries: reg@umhlathuze.gov.za
Telephone: 035 907 5000
Fax: 035 907 5444/5/6/7
Toll Free No: 0800 222 827

Your ref:
Contact: Vikash Singh

Physical Address:
5 Mark Strasse Civic Centre
Private Bag X1004
Richards Bay, 3900

Our file ref: 1640202
In response to DMS No.:
Date: 29 November 2023

ATTENTION: Mr TE Gumede
Durban University of Technology

Sir

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH

Your e-mail dated 13 November 2023, that was sent to the Municipality requesting permission from Council to conduct your research has reference.

This serves as an acknowledgement that the Municipality notes the conduct of your study. In order to ensure that your study can be used to improve the City of uMhlathuze overall, you may be requested to do a presentation for the Executive Management Team on your findings upon conclusion of your research.

Whilst the Municipality grants you permission to conduct this study, you would still have to get consent directly from your respondents that shall be participating in your study.

I wish you all the best with your research and await a bound copy of your dissertation upon completion of your studies.

MR MB SIBIYA
DEPUTY CITY MANAGER: CORPORATE SERVICES
DMS 1640202

Appendix 5: Draft questionnaire

Citizen perceptions on solid waste collection services: A case of uMhlathuze Local Municipality

My name is Thokozani Gumede, a Master's student in the Department of Management and Economics at the Durban University of Technology. I am conducting research on household satisfaction with government-provided houses in the city of Durban. This survey collects data that will inform public policy on the solid waste collection. The survey is divided into two sections. Section A collects biographical information of the respondents, while section B contains general questions on household satisfaction with Solid waste collection by the uMhlathuze Local Municipality. Kindly note that all information collected will be used for academic purposes only and all personal information will be treated confidentially. Please take some time to answer the following questions as truthful as possible.

Date: ____/_____/2023 Place: _____

A: PERSONAL INFORMATION

1. Gender

Male	
Female	
Other	

2. What is your year of birth? (*Optional*)

3. Which population group do you belong to? (*Optional*)

African	
White	
Indian/ Asian	
Coloured	

4. How many people live in your household?

5. What is your highest level of education?

Never attended school	
Primary school	
High school	
Diploma	
Degree	
Postgraduate	

6. What is your household's average monthly income?

7. Which best describes your current service on solid waste collect?

Good	
Bad	

8. How long have you been receiving this service? (*State the period in months or years*).

9. Are you a permanent resident of uMhlathuze or a visitor?

Resident	
Visitor	

SECTION B: GENERAL QUESTIONS

10. The following questions relate to your satisfaction with your perception on solid waste collection from the municipality that you receive. (*Please choose the most appropriate response to each question*)

		Strongly agree	Agree	Disagree	Strongly Disagree
1	Is it compulsory that the municipality collects your waste?				
2	Do they have the capacity to do this service?				
3	If this service is outsourced, do you think it can improve?				
4	The trucks are in good condition.				
5	Does the Department of Health view the non-collection of waste as health issue?				
6	Do you think that non-collection of solid waste can lead to various illnesses?				
7	Is there value or benefit for the amount that you pay for waste collection?				
8	Communication between residents and the municipality is good.				
9	Is the ward Councillor doing enough to assist in this situation?				
10	Do you think this situation can change in the near future?				

11. The following questions relate to the challenges experienced by citizens of uMhlathuze Local Municipality. (*Please choose the most appropriate response to each question*)

		Yes	No
1	The solid waste collection is executed as per agreement.		
2	The 240liters trolley bin is enough for each household.		
3	If they are not coming to collect, do they communicate?		
4	Do they collect waste in plastic bags?		
5	When the municipality damages your waste bin, do they replace it for free?		
6	Are the municipal staff friendly?		
7	If there is ward meetings, the Councillor invites the officials from solid waste.		
8	Do municipal officials ask for any help form the community in order to resolve this issue?		
9	If the situation continues, do you think there might be community unrest?		
10	If you were the Mayor of the municipality, will you be satisfied with the status quo?		
11	Is this happening only in your municipality?		
12	Are the schools and clinics also affected by this?		

Thank you

Appendix 6: Editing certificate

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EDITING CERTIFICATE

Re: **Thokozani Emmanuel Gumede**
DUT MBA: **Citizen perceptions on solid waste collection services: A case of uMhlathuze Local Municipality**

I confirm that I edited this dissertation and the references for clarity, language and layout. I returned the document to the author with track changes so correct implementation of the changes and clarifications requested in the text and references is the responsibility of the author. The intellectual content of the document is the responsibility of the author. I am a freelance editor specialising in proofreading and editing academic documents. My original tertiary degree which I obtained at the University of Cape Town was a B.A. with English as a major and I went on to complete an H.D.E. (P.G.) Sec. with English as my teaching subject. I was a part-time lecturer in the Department of Homoeopathy at the Durban University of Technology for 13 years and supervised many master's degree dissertations during that period.

Dr Richard Steele
28 May 2024
per email